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Agricultural nitrate pollution – regulatory approaches in the EU and Denmark

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Abstract¹

Despite the passing of almost 25 years since the adoption of the EU Nitrates Directive, agricultural nitrate pollution remains a major concern in most EU Member States. This is also the case in Denmark, although a fairly strict regulatory regime has resulted in almost a 50 per cent reduction in nitrogen leaching since the mid-80s. Nevertheless, further effort is needed, particularly in ecologically sensitive areas. This article discusses different regulatory approaches – and in particular the need for a differentiated nitrate regulation tailored to meet site-specific ecological demands – from a legal perspective drawing on EU and Danish experiences. It argues that there is a need for a mix of regulatory approaches and instruments taking into account concerns regarding the unequal treatment of farmers and potential interference with private property rights. One option might be a differentiation of the mandatory specification standards of the Nitrates Directive combined with additional instruments to address the need for severe restrictions on fertiliser use or cultivation practices in the most ecologically vulnerable areas.

1. Introduction

Almost 25 years have passed since the adoption of the EU Nitrates Directive in 1991.² While some improvements to the aquatic environment have been noted during the years,³ nitrate pollution from agriculture remains one of the biggest challenges to achieve a good status of both surface water and groundwater.⁴ The implementation of the Nitrates Directive in the Member States may, thus, still be lagging behind.⁵ Yet, it must be kept in mind that regulating agricultural nitrate

² Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources, OJ (1991) L 375/1.

³ According to the most recent implementation report from the European Commission, for the reporting period 2008–2011 compared to the period 2004–2007, there has been a slight improvement from 15 % to 14.4 % regarding the number of groundwater monitoring stations exceeding 50 mg nitrate/l. A similar improvement can be seen for freshwater monitoring stations, although it is difficult to compare the trophic status due to a lack of data (see European Commission, Report from the Commission to the Council and the European Parliament on the implementation of Council Directive 91/797/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources based on Member State reports for the period 2008–2011, COM (2013)0683 final).

⁴ European Environment Agency (EEA), 2015, The European environment – state and outlook 2015: synthesis report, Copenhagen. The report estimates that more than 40 % of rivers and coastal waters are affected by diffuse pollution from agriculture, although nutrient levels in European rivers declined by 57 % for phosphate and 20 % for nitrate between 1992 and 2011.

⁵ As of June 2013, ten infringement cases were open against Member States as well as seven requests under the EU Pilot scheme, see European Commission (2013), *supra* n. 3 p. 10.

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¹ This article is partly based on conference papers presented at the Nordic Environmental Social Science Conference – NESS 2015, Trondheim 9–11 June 2015 and the Environmental Law on Three Continents Research Conference on Comparative Environmental Law in China, USA and EU, Uppsala 25–28 August 2015.

pollution is very complex, the reasons for which are manifold. In particular, the diffuse character of most agricultural nitrate pollution combined with a highly complex multitude of factors, e.g. crop and cultivation practices, soil characteristics as well as climatic conditions, makes it difficult to measure – or even predict – pollution levels resulting from the application of fertilisers. Furthermore, local soil conditions, e.g. the capacity to retain nitrogen, and ecological conditions in individual catchments or water bodies may determine the extent to which a certain nitrogen load is harmful or not. The latter implies that a general reduction in nitrate pollution is insufficient to address site-specific problems of eutrophication or high nitrate concentrations in river basins or water bodies. Hence, there is a need not only for a general reduction in agricultural nitrate pollution, but also for a differentiated nitrate regulation tailored to meet site-specific environmental objectives, e.g. established in accordance with the EU Water Framework Directive.⁶ While farmers often resist any kind of restrictions on farming practices, in particular the need for a tailored or differentiated regulation may raise pertinent questions regarding the scientific basis for differential treatment of farmers as well as the potential interference with private property rights due to individual hardship for some farmers. Consequently, a crucial question is how to ensure an appropriate regulation of agricultural nitrate pollution both from an environmental and legal point of view. This article discusses different regulatory approaches – and in particular the need for a differentiated nitrate regulation tailored to

meet site-specific ecological demands – drawing on EU and Danish experiences.

At the EU level, the 1991 Nitrates Directive specifically addresses agricultural nitrate pollution through a set of mandatory measures to be applied in the so-called nitrate vulnerable zones (NVZs) designated by the Member States. This reflects a differentiated approach. However, in several Member States, it has been appropriate to adopt a whole territory approach under the Nitrates Directive as only few or no areas could be excluded as nitrate vulnerable.⁷ Since 2000, the Water Framework Directive (WFD)⁸ obliges Member States to adopt a river basin management approach, including the setting of environmental objectives and environmental quality standards for relevant surface and groundwater bodies as well as the necessary measures to achieve these objectives. As nitrate pollution is a major concern for both surface and groundwater quality, the WFD sets an overall framework for nitrate regulation in combination with the Nitrates Directive requiring a tailored nitrate regulation. To what extent the Member States will succeed in linking the environmental objectives of the WFD with the measures under the Nitrates Directive, however, remains to be seen.

In Denmark, agricultural nitrate pollution has been a major concern in Danish environmental policy and legislation since the mid 1980s. This has resulted in a fairly complex and detailed regulation addressing non-point as well as point sources. The regulation resulted in almost a 50 % reduction in agricultural nitrate pollution to the aquatic environment from 1985 to 2003.⁹ Howev-

⁶ See also A.M. Keesen et. al. The Need for Flexibility and Differentiation in the Protection of Vulnerable Areas in EU Environmental Law: The Implementation of the Nitrates Directive in the Netherlands, *JEEPL* 8.2 (2011) 141–164 and S. Boyle. The Case of Regulation of Agricultural Water Pollution, *Env L Rev* 16 (2014) 4–20.

⁷ For the Netherlands, see e.g. Keesen et .al. *supra* n. 6. A similar situation applies in Denmark.

⁸ European Parliament and Council Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy (2000) OJ L327/1.

⁹ B. Riemann et. al. Recovery of Danish Coastal Ecosystems after Reductions in Nutrient Loading: A Holistic

er, the improvement in water quality in coastal waters, in particular, has been lagging behind.¹⁰ Furthermore, the Danish nitrate regulation is increasingly being criticised for putting an unnecessary burden on farmers. Thus, nitrate regulation in Denmark – and most likely also in other countries – stands at a crossroads where there is a need to carefully consider the most appropriate regulatory approach and, in particular, the need to tailor or differentiate nitrate regulation to meet site-specific ecological demands.

This article analyses the characteristics of nitrate regulation within the EU and Denmark with a particular view to the legal and regulatory challenges associated with the need for a tailored or differentiated regulation. Before going into detail with nitrates regulation at the EU and national level, a short account of key concepts and distinctions in relation to regulatory approaches and instruments is presented.

2. Regulatory approaches and instruments – a nitrate perspective

The notion of regulatory approaches is somewhat ambiguous and often used in different ways. One may choose a broad notion covering a variety of different approaches most commonly divided into: 1) command and control regulation; 2) economic instruments; 3) self-regulation; 4) voluntarism, and; 5) information strategies.¹¹ Alternatively, one may choose a narrow notion primarily referring to command and control regulation, i.e. regulation in a more traditional or narrow sense.¹² The latter, however, disguises

the fact that not only command and control regulation, but also the use of economic instruments, self-regulation, etc. often requires some degree of regulation to set a framework for the use of such instruments.¹³ This article adheres to the broad notion of regulatory approaches. Yet, when it comes to the analysis of regulatory approaches with regards to nitrate pollution in the EU and Denmark, they primarily operate within the more narrow or traditional category of regulatory instruments – although economic incentives, voluntary or informative measures are also used to some extent. Furthermore, it must be kept in mind that a regulatory approach may include a mix of instruments or even express a mix of different regulatory approaches.

Another distinction regarding regulatory instruments is the distinction between general regulation or standards, e.g. general standards on the use of fertilisers, and individual regulation, e.g. individual permit requirements or individual orders at the farm or field level. In relation to diffuse pollution from agriculture, *Gunningham & Sinclair* have distinguished the following three types of general standards – performance, specification and process. Performance standards set a limit on the level of pollution, e.g. emission limit standards, or an objective to be achieved, e.g. environmental quality standards. Specification standards dictate a particular type of design or physical change, e.g. standards on input use or technology choices and may also include landscape changes, e.g. riparian zones.

Ecosystem Approach, *Estuaries and Coasts* (2015) DOI 10.1007/s12237-015-9980-0.

¹⁰ Ibid.

¹¹ See e.g. Gunningham & Sinclair. *Regulatory Pluralism: Designing Policy Mixes for Environmental Protection*, *Law & Policy*, Vol. 21, No. 1, 1999, pp. 49–76.

¹² See, e.g. the identification of different options for addressing diffuse pollution in agriculture in Gunningham & Sinclair. *Policy Instrument Choice and Diffuse*

Source Pollution, *Journal of Environmental Law* (2005) Vol. 17 No. 1, 51–81.

¹³ Gunningham has defined regulation as a broader category (than state-based law) including “more flexible, imaginative and innovative forms of social control”, yet involving the state as a central player as opposed to governance, which does not privilege the state, Gunningham. *Environmental Law, Regulation and Governance: Shifting Architectures*, *Journal of Environmental Law* (2009) 21:2, 179–212.

Process standards, on the other hand, dictate management decision-making processes, e.g. nutrient management plans.¹⁴ In addition, *Gunningham & Sinclair* point to changes in land-use patterns as important mechanisms to address the broader scale of, e.g. catchment or sub-catchment level, e.g. through planning mechanisms and possibly the use of subsidies. According to *Gunningham & Sinclair*, changes in land-use patterns at the catchment scale make it possible to target different instruments at the locations or farms likely to generate the greatest improvements in water quality. The latter signifies the crucial point in regulating diffuse nitrate pollution; it is not sufficient to focus on farm level practices alone. As it will be argued in this article, there is a need to tailor farm level practices to meet the ecological demands of individual river basins or water bodies.¹⁵ This is likely to entail a combination of different regulatory instruments and approaches.

The need for a tailored or differentiated regulation is, to some extent, reflected in the Nitrates Directive as well as the Water Framework Directive. From the outset, both Directives combine the use of planning instruments with the use of different types of standards. While the Nitrates Directive primarily focuses on specification standards, the WFD employs overall performance standards at the river basin (or sub-basin) level. Furthermore, both Directives reflect an adaptive approach where, in particular, monitoring requirements and planning cycles allow the continuous adaptation of appropriate measures in order to meet the environmental objectives.¹⁶

¹⁴ For an analysis of, in particular, specification and process standards in EU nitrate regulation as well as options for economic instruments, see Boyle, *supra* n. 6.

¹⁵ See also Keesen et al., *supra* n. 6 and Boyle, *supra* n. 6 at 17.

¹⁶ Green et al. identify the following seven critical elements for adaptive governance: 1) multiple overlapping levels of control with one level of control or strong coor-

How nitrate regulation can be tailored or differentiated is likely to be quite country-specific drawing on regulatory traditions, natural conditions as well as the level of scientific knowledge available to justify and preferably also control a differential treatment. Thus, the potential scale or character of differentiation may vary from one country to another. In a Dutch study, *Keesen et al.* have identified four options for the differentiation of nitrate regulation based on: 1) the NVZ approach under the Nitrates Directive; 2) environmental conditions (soil types); 3) farm performance, and; 4) the river basin level under the WFD. Differentiation based on soil types is regarded as the most feasible solution in the Netherlands, whereas differentiation based on farm performance would require monitoring efforts that are not considered technically feasible.¹⁷

A similar – possibly slightly more detailed form of differentiation – has been suggested in Denmark based on the existing system of nitrogen norms for crops combined with a differentiation based on the capacity of the soil to retain nitrogen as well as the ecological sensitivity of river basins or water bodies.¹⁸ The initial broad political support for such a new differentiated

dination at the relevant social-ecological scale; 2) horizontal and vertical flow of information and coordination of decision-making; 3) meaningful public participation; 4) local capacity building; 5) authority to respond to changes across a range of scenarios; 6) monitoring and system feedback, and; 7) enforcement, see Green et al. *EU Water Governance: Striking the Right Balance between Regulatory Flexibility and Enforcement? Ecology and Society* 18(2):10 (2013).

¹⁷ Keesen et al. (2011) *supra* n. 6, p. 158–159.

¹⁸ Natur- og Landbrugskommissionen, *Natur og Landbrug – en ny start* (2013), available at http://www.naturoglandbrug.dk/slutrapport_2013.aspx?ID=52071. Natur- og Landbrugskommissionen (Nature and Agriculture Committee) was an expert committee established by the former Government in 2012 with the aim of recommending policy initiatives which reconcile agricultural and environmental interests. The report with 44 recommendations was published in April 2013.

nitrate regulation, however, seems to have faded and the new liberal government, which came into power in June 2015, has signalled a relaxation of the general fertiliser regulation, without more precise indications of how to meet site-specific water quality objectives. It appears that despite a relatively broad consensus on the need for a differentiated regulation tailored to meet ecological demands at the individual river basin, sub-basin or water body level, such a regulation is likely to face a number of regulatory (and political) challenges associated with a potential differential treatment of farmers and potential interference with private property rights due to individual hardship for some farmers. In this article, however, it is argued that such issues can be resolved by carefully designing an appropriate mix of regulatory approaches and instruments at least from a legal point of view.

3. EU nitrate legislation

In 1991, the EU adopted specific legislation to address nitrate pollution from agriculture. The Nitrates Directive, together with the 1991 Urban Waste Water Directive,¹⁹ was adopted as a follow up to the existing legislation on water quality (surface water and groundwater) addressing two specific – partly diffuse – sources of water pollution. The relevant EU legislation on ecological water quality was subsequently superseded by the 2000 EU Water Framework Directive establishing close links to the Nitrates Directive. More recently, the 2008 Marine Strategy Framework Directive²⁰ lays down the overall objective of good environmental status to be achieved by 2020 for marine waters. Furthermore, water qual-

ity is also an important element in the 1992 EU Habitats Directive²¹ as many habitat types and species are dependent upon the aquatic environment. In Denmark, a significant part of the Natura 2000-sites are aquatic and eutrophication is a major concern. In addition, other EU directives address livestock installations and to some extent also the management of livestock manure at the farm level. This includes the 1985 Environmental Impact Assessment Directive (codified in 2011)²² and the 1996 Integrated Pollution Prevention and Control (IPPC) Directive²³ – now replaced by the 2010 Industrial Emissions Directive (IED).²⁴ The implications of, and linkages between, these Directives are not crystal clear, which adds to the complexity when seeking an appropriate nitrate regulation at the Member State level.

In the following, the focus is on the Nitrates Directive and the Water Framework Directive, but it should be kept in mind that, in particular, the requirements of the Habitats Directive have strong implications with regards to nitrate pollution of aquatic Natura 2000-sites. Furthermore, the project- or activity oriented requirements of the EIA and IE Directives also impose certain obligations to include water quality issues in individual assessment or permit procedures regarding livestock installations, e.g. the so-called combined approach of the IE Directive and the WFD.

¹⁹ Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment (1991) OJ L 135/40.

²⁰ European Parliament and Council Directive 2008/56/EC of 17 June establishing a framework for community action in the field of marine environmental policy (2008) OJ L 164/19.

²¹ Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, (1992) OJ L 206/7.

²² European Parliament and Council Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (codification), (2012) OJ L 26/1 as amended by European Parliament and Council Directive 2014/52/EU, (2014) OJ L 124/1.

²³ European Parliament and Council Directive 2008/1/EC on integrated pollution prevention and control (codified version), (2008) OJ L 24/7.

²⁴ European Parliament and Council Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (2010) OJ L334/17.

3.1 Nitrates Directive

The 1991 Nitrates Directive specifically addresses nitrate pollution from agricultural sources. The objective is to reduce and prevent such pollution by focusing mainly on diffuse sources related to the excessive use of fertilisers, including livestock manure. Yet, the Nitrates Directive does not set a clear requirement to achieve a specific environmental outcome.²⁵ In this respect, the WFD now provides more specific environmental objectives and quality standards, including those related to nitrates.

According to the Nitrates Directive, Member States shall identify all waters that are or could be affected by nitrate pollution. The criterion for identifying these waters is the actual or potential excess nitrate concentration of 50 mg/l in surface freshwater or groundwater in accordance with the drinking water thresholds laid down in the former Drinking Water Directive 75/440/EEC. Another criterion is whether surface waters are, or in the near future may become, eutrophic, cf. Annex I.²⁶ The identification of waters that are, or may be, affected by nitrate pollution serves the purpose of designating nitrate vulnerable zones (NVZs) defined as, “all known areas of land ... which drain into the waters identified ... and which contribute to pollution,” cf. Article 3(2). A Member State may, however, choose to adopt a whole territory approach. Several countries have chosen a whole territory approach including Denmark.²⁷ The consequence of choosing a

whole territory approach is that the so-called action programmes must be mandatory throughout the national territory of the Member State. In countries that have chosen to designate NVZs, the action programmes are only mandatory in the NVZs, whereas general codes of good agricultural practice, to be implemented by farmers on a voluntary basis, apply outside NVZs, cf. Article 4. Codes of good agricultural practice shall contain at least the items listed in Annex II of the Directive including inappropriate periods or other conditions for land application of fertilisers.

According to Article 5, the action programmes applying in NVZs – or alternatively the whole territory – must include a number of mandatory measures listed in Annex III of the Directive together with the measures in the codes of good agricultural practice which have not been superseded by Annex III measures. The mandatory measures in Annex III include prohibition periods regarding fertiliser application, storage capacity for livestock manure equivalent to the longest prohibition period, limitation of the land application of fertilisers based on a balance between foreseeable crop requirements and nitrogen supply from soil and fertilisers (balanced fertilisation) and a maximum load of 170 kg N/ha/year of livestock manure. The Court of Justice of the European Union (CJEU) has maintained that a clear and precise transposition and implementation of the mandatory measures is required. In C-322/00 *Commission v Netherlands*, the Court rejected the Dutch use of loss standards as not satisfying the balanced fertilisation requirement,

Member States (Austria, Denmark, Finland, Germany, Ireland, Lithuania, Luxembourg, Malta, the Netherlands and Slovenia) and two regions (Flanders and Northern Ireland) have chosen a whole territory approach. The share of NVZs in the remaining Member States varies, but there has been an increase in some countries – possibly as a response to pressure from the European Commission.

²⁵ See also Boyle, *supra* n. 6 and William Howarth, *Diffuse Water Pollution and Diffuse Environmental Laws. Tackling Diffuse Water Pollution in England*, Report by the Comptroller and Auditor General HC 186, Session 2010-2011, 6 July 2010, *Journal of Environmental Law* 23:1 (2011), 129–141, at 132.

²⁶ For a critical analysis of the criteria of the Nitrates Directive (and the WFD), see William Howarth, *The Progression Towards Ecological Quality Standards*, *Journal of Environmental Law* 18:1 (2006), 3–35.

²⁷ According to the 2013 implementation report from the European Commission, COM(2013)0683 *supra* n. 2 ten

which presumed standards regarding the use of fertilisers.²⁸ According to the Court, “use standards are applied beforehand and appear to be necessary for the purpose of reducing and preventing pollution, while the loss standards under the MINAS system are applied at a subsequent stage of the nitrogen cycle, and any exceeding of those loss standards will necessarily contribute to pollution” (para. 74). More recently, in *C-237/12 Commission v France*, the Commission, amongst other issues, questioned the volatilisation coefficients used for different types of manure to calculate the nitrogen level in land application of manure.²⁹ The Court stated that “only by establishing volatilisation coefficients on the basis of the data which estimates the loss of nitrogen by volatilisation at the lowest percentage is it possible to ensure that the limit laid down by Directive 91/676 for the land application of manure is properly observed by all French livestock units” (para. 141). Furthermore, France had failed to ensure the full and correct implementation of other mandatory measures including a failure to provide rules that enabled farmers and monitoring authorities to calculate exactly how much nitrogen can be applied in order to ensure balanced fertilisation (paras. 97–110).

It follows from Article 5(5) that if it becomes apparent that the mandatory measures are insufficient to achieve the objectives, the action programmes must include additional measures. The Directive does not specify the character of such additional measures, but the Court has stated that additional measures must be taken when the Member State first observes a need for them.³⁰ The action programmes must be reviewed at least every four years. The Court has

ruled that the action programmes are, “plans and programmes” within the meaning of Directive 2001/42 on the assessment of the effects of certain plans and programmes on the environment.³¹ This means that a (strategic) environmental assessment must be carried out prior to the adoption of an action programme. This is also the case if an action programme is adopted by legislative means. The Nitrates Directive also establishes certain monitoring requirements as Member States have to draw up suitable monitoring programmes to assess the effectiveness of the action programmes.³²

The Nitrates Directive combines the use of specification and process standards (in Annex II and III) with a planning element in the form of the designation of NVZs. Thus, it can be argued that the Nitrates Directive encourages a differentiated or tailored regulation in the sense that (strict) mandatory measures apply in NVZs, whereas less strict measures apply on a voluntary basis outside NVZs. This differentiation is, however, partly undermined when a Member State adopts a whole territory approach even though the result is mandatory requirements in the entire territory. There is no direct requirement under the whole territory approach to establish a linkage between the mandatory measures and the ecological needs of, e.g. particularly sensitive water bodies, even though additional measures are required in Article 5(5). As demonstrated by Keesen et al., differentiation may, however, also be an option under a whole territory approach.³³ Yet, it is unclear to what extent this is actually

²⁸ C-322/00 *Commission v Netherlands*, ECLI:EU:C:2003:532.

²⁹ C-237/12 *Commission v France*, ECLI:EU:C:2014:2152.

³⁰ C-322/00 *Commission v Netherlands*, ECLI:EU:C:2003:532, paragraph 166.

³¹ Joined cases C-105/09 and C-110/09 *Terre Wallone*, ECLI:EU:C:2010:355.

³² On monitoring requirements in the Nitrates Directive and other EU Directives, see B. Beijen, H.F.M.W Rijswijk and H.T. Anker, *The Importance of Monitoring for the Effectiveness of Environmental Directives A Comparison of Monitoring Obligations in European Environmental Directives*, *Utrecht Law Review* 10:2 (2014), 126–135.

³³ Keesen et al., *supra* n. 6.

being applied in the Member States. As will be demonstrated below, this has only been the case to a limited extent in Denmark.

The Nitrates Directive reflects an adaptive approach through the requirements for monitoring and the adoption of additional measures if the basic measures are insufficient to meet the objectives of the action programmes. The Nitrates Directive does not, however, require that environmental objectives should be specified in the action programmes and environmental quality objectives do not follow clearly from the Directive itself. *Howarth*³⁴ and *Boyle*³⁵ have argued that the lack of environmental quality standards or performance standards in the Nitrates Directive is a deficiency, although this deficiency is now acknowledged in the WFD. Since 2000, the WFD has set an overall environmental objective and prescribed the establishment of environmental objectives and environmental quality standards for water bodies. A crucial point is, of course, to what extent the Member States will succeed in linking and tailoring the measures under the Nitrates Directive to the environmental objectives of the WFD and the River Basin Management Plans.

3.2 Water Framework Directive

The key elements of the EU Water Framework Directive in relation to nitrates are the setting of environmental objectives for water bodies as well as the identification of the necessary measures to meet these objectives in the so-called programme of measures. The setting of environmental objectives as well as the identification of appropriate measures must take place as part of

the river basin management approach and be (at least) summarised in the river basin management plans (RBMPs). An important element in the river basin management approach is the six-year monitoring and revision structure, which implies a continuous adaptation of objectives as well as measures.

The overall environmental objectives in the WFD are to achieve good surface water and groundwater status by December 2015, cf. Article 4, however, with the possible use of exemptions. Member States must also prevent the deterioration of the status of all water bodies.³⁶ Good surface water status means that both the ecological status and the chemical status are at least “good,” while good groundwater status means that both the quantitative and chemical status are at least “good.” What constitutes “good” ecological status is determined more precisely by the Member States in accordance with Annex V of the WFD. In general, “good” ecological status can be described as no or limited deviation from undisturbed conditions, e.g. that nutrient concentrations do not exceed the levels established to ensure the functioning of the ecosystem and the values specified for certain biological quality elements. Thus, nitrate pollution is an important element of good ecological status, although the acceptable nitrate level can be difficult to quantify. Good chemical status of groundwater has been defined more precisely in the 2006 Groundwater Directive (GWD)³⁷ which lays down a maximum threshold of 50 mg nitrate/l for all

³⁴ William Howarth, *Diffuse Water Pollution and Diffuse Environmental Laws. Tackling Diffuse Water Pollution in England*, Report by the Comptroller and Auditor General HC 186, Session 2010-2011, 6 July 2010, *Journal of Environmental Law* 23:1 (2011), 129–141, at 132.

³⁵ Boyle *supra* n. 6.

³⁶ In C-461/13 *Bund für Umwelt und Naturschutz Deutschland*, ECLI:EU:C:2015:433 interpreted the concept of “deterioration” as “meaning that there is deterioration as soon as the status of at least one of the quality elements... falls by one class...” (para. 70) and stated that a project authorization should be refused if it may cause deterioration of the status of a water body (para. 51).

³⁷ European Parliament and Council Directive 2006/118/EC on the protection of groundwater against pollution and deterioration (2006) OJ L 372/19.

groundwater bodies. The general environmental objectives of the WFD (and the GWD) as well as the more specific environmental quality standards supplement the Nitrates Directive. This is reflected in the so-called combined approach of WFD Article 10 according to which Member States must not only ensure the proper implementation of, e.g. the Nitrates Directive, but also the setting of more stringent emission controls if needed to meet the water quality objectives or standards of the WFD.

According to the WFD, a programme of measures must include a description of the measures necessary to achieve the environmental objectives, cf. Article 11 – the first programmes were to be established by December 2009 with the measures becoming operational by December 2012. This includes a number of “basic” measures, i.e. regulatory measures to prevent or control point as well as non-point source pollution. Furthermore, “additional” measures must be included if the basic measures are insufficient to achieve the environmental objectives, cf. Article 11(5). Additional measures may include a range of different initiatives including the restoration of wetlands, codes of good practice, etc. The basic measures include a direct reference to the Nitrates Directive and it could be argued that this in fact also includes additional measures in accordance with Article 5(5) of the Nitrates Directive. Furthermore, it also follows from the “combined approach” in the WFD that additional or supplementary measures should be adopted if the “basic” measures of the Nitrates Directive are insufficient to achieve at least good ecological status and good chemical groundwater status. In this way, it could be argued that the WFD necessitates a differentiated (and more adaptive or tailored) approach to nitrate regulation also in Member States that have adopted a whole territory approach.

It is unlikely that the “basic” measures of the

Nitrates Directive will be sufficient to meet the relevant objectives of the WFD as specified in the RBMPs.³⁸ Consequently, it is likely that there will be a need to adopt additional measures in view of the sensitivity of the individual water bodies or river basins including the option to differentiate the mandatory measures of the Nitrates Directive. Additional measures could include different regulatory instruments, e.g. informative measures, voluntary measures as well as incentives/subsidies, e.g. as provided under the EU Rural Development Programme.³⁹ The only requirement according to the Nitrates Directive and the WFD with regards to additional measures is that they should be suitable to meet the environmental objectives and quality standards considering also their effectiveness and their cost relative to other possible preventive measures. Thus, there is a relatively high degree of flexibility so that Member State can choose among different types of regulatory instruments or approaches when it comes to additional measures. On the other hand, the Nitrates Directive offers little flexibility with regards to the mandatory specification standards that, in accordance with the rulings of the Court of Justice, must be implemented quite precisely at the national level. Hence, it appears appropriate to build a tailored or differentiated

³⁸ According to the EEA 2015 report, *supra* n. 4, p. 64 good ecological status is estimated to be achieved in 53 % of surface water bodies and concerns about the ecological status are most pronounced in areas with intensive agricultural practices and high population densities.

³⁹ Boyle argues that the cross-compliance scheme under the EU Common Agricultural Policy (CAP) holds a significant unmet potential to make real reductions in agricultural pollution, Boyle *supra* n. 6, p. 19. Yet, it must be noted that art. 4 and 5 of the Nitrates Directive are part of the mandatory cross-compliance requirement, which includes not only the “basic” measures of the Nitrates Directive, but also those additional measures that are needed to fulfil the objectives. This means that all measures necessary for the implementation of the Nitrates Directive should in fact already be part of the cross-compliance schemes in the Member States.

approach upon the basic measures of the Nitrates Directive, e.g. by differentiation of specification standards such as the maximum load of animal manure or standards for fertiliser use – and then to use additional measures to deal with more severe restrictions on farming practices.⁴⁰

4. Danish nitrate legislation

Nitrate regulation in Denmark includes a variety of different regulatory instruments and measures – predominantly based on a command-and-control approach.⁴¹ Danish nitrate regulation has been steered by a number of political agreements since the mid-1980s. The first Aquatic Action Plan adopted in 1987 established a reduction target of 49 per cent regarding nitrogen leaching from agriculture and stipulated a number of measures to achieve this objective. The Danish nitrate regulation, thus, pre-dates the 1991 EU Nitrates Directive,⁴² but has gradually been adjusted and strengthened to ensure implementation of the Nitrates Directive and more recently the Water Framework Directive. Denmark has chosen a “whole territory” approach under the Nitrates Directive applying mandatory measures in the entire country and not only in designated NVZs. Nevertheless, some differentiated or tai-

lored measures have been applied as additional measures and as part of individual permits for livestock installations. Thus, a distinction can be made in Danish nitrate regulation between general fertiliser standards applying to (almost) all farmers, e.g. on fertiliser use, cultivation practices and nutrient management schemes, and individual measures applying to some farmers, e.g. individual orders or restrictions on cultivation practices at the farm level or permit conditions for livestock installations. In Denmark, since 2007, permits for livestock installations have not only included controlling pollution from the installation, but also nitrate pollution resulting from the application of manure on land and cultivation practices.

The relatively detailed and comprehensive nitrate regulation resulted in the target of a 49 per cent reduction in nitrogen leaching from agriculture being achieved in 2003.⁴³ There has also been a general improvement in the aquatic environment – in particular in watercourses, whereas improvements in coastal waters have been lagging behind.⁴⁴ Thus, further reductions and restrictions have been deemed necessary, e.g. to fulfil the Water Framework Directive. However, there has been no significant reduction in nitrogen leaching in the last ten years despite new reduction targets and a tightening of the regulation. In 2009, a political Green Growth Agreement was made which set a new (additional) reduction target of 19,000 tons N

⁴⁰ See also Boyle, *supra* n. 6 p. 20 arguing for tailored specification and process standards as well as tighter GAEC rules, i.e. rules on Good Agricultural and Environmental Conditions (GAEC) under the EU Common Agricultural Policy.

⁴¹ For a more detailed analysis of Danish nitrate regulation, see L. Baaner & H.T. Anker, *Danish Law on Controlling Emissions of Nutrients in the Baltic Sea Region* (2013), available at <http://www.su.se/ostersjocentrum/english/beam/legal-aspects-of-the-ecosystem-approach/country-studies>. The following is partly based on this report.

⁴² On the potential influence of Danish and Dutch nitrate policies on the Nitrates Directive, see Andersen, M.S. & Liefferink, D., Introduction. *The Impact of the Pioneers on EU Environmental Policy*, in Andersen, M.S. & Liefferink, D. (eds.), *European Environmental Policy. The Pioneers*, Manchester University Press (1997), pp. 1–39.

⁴³ Ruth Grant and Jesper Waagepetersen, *Vandmiljøplan II – Slutevaluering, Danmarks Miljøundersøgelser, Miljøministeriet*, 2003, p. 31. More precisely, a 48 per cent reduction was achieved in nitrogen loads from agriculture based on estimated figures of a nitrogen load of 311,000 tons in the mid-1980s to a total load of 162,000 tons in 2003.

⁴⁴ Natur- og Landbrugskommissionen (2012), *Statusrapport*, p. 324, available at: http://www.naturoglandbrug.dk/statusrapport_2012.aspx?ID=51058. See also Riemann et.al., *supra* n. 8.

and identified the measures necessary to achieve at first a 9,000 tons N reduction.⁴⁵ This included mandatory 9–10 m riparian zones along all watercourses (50,000 ha),⁴⁶ 140,000 ha additional catch crops as well as the (re-)establishment of 10,000 ha wetlands – the latter to be achieved by voluntary agreements or public purchase. Both the reduction target as well as the measures have, however, been challenged by farmers claiming, in particular, that the environmental effectiveness of the measures lacked documentation and that they violated private property rights. Currently, a court case on the riparian zones is pending before the Eastern High Court. Meanwhile, a 2014 Growth Agreement⁴⁷ resulted in the riparian zone being halved to cover only 25,000 ha, while the additional catch crop requirement was abolished. Furthermore, the new liberal government, which came into power in June 2015, has announced their intentions to abolish the riparian zones entirely, as well as to ease the general standards on fertiliser use.

Hence, Danish nitrate regulation is currently highly contested and stands at a cross-roads. As mentioned above, calls have been made for a tailored or differentiated nitrate regulation,⁴⁸ but so far not much has happened, although it is quite clear that the current legislation is not well-suited to achieving the environmental objectives for individual water bodies under the WFD (or the EU Habitats Directive).⁴⁹ In the following, the main elements in Danish nitrate regulation are

analysed focusing on the options for a tailored or differentiated regulation.

4.1 General fertiliser regulation

The general fertiliser regulation is centred around a mandatory fertiliser management – or account – system at the farm level in the Act on Fertiliser Use and Plant Cover.⁵⁰ The fertiliser management system mainly aims to ensure compliance with the requirement of balanced fertilisation under the Nitrates Directive. In addition to the fertiliser management system, the general regulation includes mandatory requirements regarding catch crops, cultivation practices, maximum application of manure as well as the more recent – but highly contested – mandatory riparian zones (9 m) along watercourses and lakes. Thus, the Danish fertiliser regulation combines fairly detailed specification and process standards.

According to the fertiliser management system, it is mandatory to prepare and submit an annual fertiliser account documenting that the total fertiliser consumption does not exceed a calculated nitrogen quota for the farm.⁵¹ The nitrogen quota is based on information on crops and their corresponding nitrogen norms as well as a nitrogen forecast determining how much nitrogen is available for the crops at the start of the growth season, e.g. depending on past climatic conditions. This means that for each farm, accounts must be made of the crops grown on individual fields and their associated nitrogen norms as well as the amount of fertiliser, including manure and other organic fertiliser, available.

⁴⁵ Aftale om Grøn Vækst, June 2009.

⁴⁶ Since 1992, a mandatory 2 m cultivation free zone has applied along natural watercourses.

⁴⁷ Aftale om Vækstplan for Fødevarer, April 2014.

⁴⁸ Natur- og Landbrugskommissionen, *Natur og Landbrug – en ny start* (2013), available at: http://www.naturoglandbrug.dk/slutrapport_2013.aspx?ID=52071.

⁴⁹ In Denmark, approximately 85 % of the land areas drain to (aquatic) Natura 2000 sites most of which do not meet the environmental objectives.

⁵⁰ Consolidated Act 500/2013 (lov om jordbrugets anvendelse af gødning og plantedække).

⁵¹ The management system is mandatory for farmers with an annual turnover above 50,000 DKK *and* who have a minimum level of livestock or receive more than 25 t manure or other organic manure. Other farmers with an annual turnover above 20,000 DKK may register under the system and will then be exempt from a fertiliser tax.

The general regulation of agricultural nitrate pollution has gradually been strengthened over the years as a result of political agreements – i.e. the aquatic action plans – based on a perceived need for further reduction of agricultural nitrate pollution. Currently, it is estimated that the nitrogen norms are set 14–18 % lower than the calculated optimal norm for the crops. Furthermore, the general catch crop requirement has been tightened to 10–14 % catch crops at the farm level and new measures have been introduced including the contested the riparian zones in 2011.

Although the current general regulation of fertiliser use is based on a certain level of scientific knowledge, e.g. for the purpose of setting nitrogen norms for crops, the system does not include specific knowledge about the ecological sensitivity in local areas or the retention capacity of the soil. Thus, the current general fertiliser regulation is not tailored or differentiated with the purpose of achieving environmental objectives and quality standards at the catchment or water body level. Moreover, recent scientific knowledge indicates that, in some areas, there is no or limited justification for the tightening of the nitrogen norms, e.g. due to a high retention capacity of the soil.⁵² Thus, the general fertiliser regulation appears to be inadequate to address site-specific needs for further reduction of nitrogen loads, whereas in other areas the regulation is likely to be stricter than needed for environmental purposes. This clearly calls for a tailoring of the Danish nitrate regulation. So far, however, such a tailored or differentiated regulation has only been part of the individual regulation at the farm level as is explained below.

⁵² A.C. Erichsen et al. På vej mod et godt vandmiljø, *Vand & Jord*, Vol. 22:1 (2015), p. 13 indicating the variations in demands for reduction of nitrogen at the catchment level (from <10 to 75 per cent).

4.2 Individual restrictions

Individual restrictions on fertiliser use and cultivation practices with the purpose of reducing nitrate leaching exist in two different regulatory settings. The first set of rules dating back to 1998 is individual restrictions on existing fertiliser use or cultivation practices settled either by voluntary agreements or by an individual order accompanied by economic compensation for loss in accordance with the Environmental Protection Act.⁵³ The second set of rules is the option for setting individual restrictions on fertiliser use and cultivation practices in environmental permits for livestock installations according to the 2007 Act on Environmental Permits for Livestock Installations.⁵⁴ In both respects, the setting of individual restrictions is presumed to be based on a certain level of knowledge about the environmental sensitivity in the local area, i.e. a tailored or differentiated regulation.

The voluntary agreements or individual orders on fertiliser use or cultivation practices under the Environmental Protection Act only address drinking water issues, i.e. groundwater aquifers that currently, or in the future, could be used for drinking water abstraction.⁵⁵ There are no parallel rules with regards to the protection of surface water quality in general. It is a prerequisite that a local “action plan” (indsatsplan) is produced by the local authorities in areas designated as “action areas” (indsatsområder). Furthermore, it is a requirement that the restrictions on fertiliser use or cultivation practices are necessary to protect drinking water resources, i.e. reflecting the proportionality principle. According to the preparatory works, the extent to

⁵³ Consolidated Act 879/2010 (lov om miljøbeskyttelse).

⁵⁴ Consolidated Act 868/2015 (lov om miljøgodkendelse m.v. af husdyrbrug).

⁵⁵ See L. Baaner & H.T. Anker, *Indsatsplaner og grundvandsbeskyttelse*, *Tidsskrift for Landbrugsret* (2012), 88–101.

which the specific piece of land contributes to nitrate pollution should not necessarily be documented. It is sufficient to document that there is a nitrate problem in the area as a basis for the local “action plan.” In order to justify this view, the preparatory works of the Act refer to the requirement that compensation should be paid to landowners for loss as a consequence of an individual order. This compensation rule is based on the view that individual orders restricting existing cultivation practices may amount to an undue interference with private property rights, i.e. a “rule of reasonableness.”

Individual restrictions on fertiliser use and cultivation practices that are laid down as conditions in environmental permits for livestock installations under the Act on Environmental Permits for Livestock Installations⁵⁶ have, to a certain extent, replaced the need to issue individual orders under the Environmental Protection Act. A major difference is that compensation is not paid to farmers when establishing individual restrictions in an environmental permit. The reasoning behind this is quite clear in that it is not a direct restriction on existing fertiliser use or cultivation practices, but rather a condition that is linked to a permit for a new, expanded or otherwise restructured livestock installation. However, in some cases, it might be difficult to draw a clear distinction between such conditions for new or amended activities and the potential interference with existing fertiliser use or cultivation practices. In principle though, the farmer can avoid such new conditions by not expanding

or modifying the installation in which case a permit would normally not be required.

The environmental permits regulate point as well as diffuse pollution, e.g. nitrate and phosphorus to the aquatic environment, and the impact of ammonia on the surrounding environment including terrestrial nature areas. The acceptable level of pollution has been standardised in the form of so-called ‘protection levels’ in a Statutory Order on Permits for Livestock Installations.⁵⁷ The protection levels for nitrate stipulate a differentiation of the so-called livestock balance requirements in three “nitrate classes” designated on the basis of the sensitivity of the aquatic environment and the retention capacity of the soil. The livestock balance requirement primarily serves to implement the maximum load of 170 kg N/ha of the Nitrates Directive, which in Denmark varies between 140–170 kg N/ha depending on the type of livestock.⁵⁸ Within the designated nitrate classes, the livestock balance requirement is reduced to 85 %, 65 % and 50 % respectively of the 140–170 kg N/ha, i.e. expressing a differentiated specification standard to be included in an environmental permit.

In addition, the protection of aquatic Natura 2000 sites has led to the establishment of strict assessment criteria in a guidance note partly based on the decisions of the Nature and Environment Appeals Board. According to the guidance note, the livestock pressure in the area must not be increasing and the total nitrogen load from the farm must not exceed 5 % of the total load to the water body – or 1 % in the case of very nutrient sensitive water bodies.⁵⁹ If these criteria are not

⁵⁶ The Act on Environmental Livestock Permits sets the framework for issuing environmental permits for livestock installations. The act applies to farms with more than three livestock units (1 AU is equivalent to 100 kg N). Small farms, with fewer than 75 livestock units are, in most cases, subject to a simplified permit process, while larger farms are subject to a detailed and comprehensive environmental permit process.

⁵⁷ Statutory Order 1283/2014 (bekendtgørelse om tilladelse og godkendelse m.v. af husdyrbrug).

⁵⁸ An exemption to 230 kg N/ha has been granted for cattle farms complying with specific environmental requirements.

⁵⁹ The guidance is only accessible online on: www.mst.dk/husdyrvejledning.

met, a permit cannot be granted unless individual restrictions are established in order to ensure that nitrogen leaching does not exceed leaching from cultivation practices based on inorganic fertilisers.⁶⁰ The strict requirements for the application of manure can partly be replaced by alternative measures with the same effect in reducing nitrogen leaching. The use of catch crops may be one option, the use of alternative crop rotations another. Such measures are widely used in the permits in order for farmers to be able to obtain a permit and continue to spread the maximum amount of manure over their land.⁶¹

Thus, the individual permit system includes a detailed and differentiated regulation of manure spreading and cultivation practices at the farm level, which is based on a certain level of scientific knowledge primarily about the environmental sensitivity of water bodies and the retention capacity of the soil. However, this regulation is unlikely to meet the environmental objectives and quality standards of the water bodies as it only addresses the effects of animal manure application – and not the effects of fertiliser application in general, which in Denmark is considered to be the major contributor to agricultural nitrate pollution.⁶²

4.3 Differentiated nitrate regulation – regulatory challenges

As demonstrated above, the current Danish nitrate regulation is not well-suited to meeting the water quality objectives of individual water bodies or even at the river basin or sub-basin level. The general fertiliser regulation is not tailored

towards local conditions or ecological sensitivity, whereas the differentiated individual restrictions in the livestock permits only address the use of manure and not fertiliser use in general. A recommendation from the Nature and Agriculture Committee⁶³ in 2013 to introduce a differentiated fertiliser regulation initially gained broad political support as reflected in a 2014 political Growth Plan for Agriculture.⁶⁴ The core element in the recommendation was to differentiate the general fertiliser regulation, e.g. the nitrogen norms, on the basis of knowledge about the nitrogen retention capacity of the soil as well as the ecological sensitivity of water bodies. In its simple form, such a new differentiated nitrate regulation would transfer the system of differentiated “nitrate classes” used in the environmental permit scheme to the general regulation of fertilisers. This would imply that the differentiation based on local soil characteristics and ecological sensitivity would apply to all fertilisers and not only to the application of manure on farms with an environmental permit. At the same time, this differentiation would be combined with the nitrogen norms for different crops and the fertiliser account system. It was also recommended that the new regulation should allow the farmer to use flexible measures on a voluntary basis, e.g. catch crops or riparian zones, with the purpose of counterbalancing lower nitrogen norms in sensitive areas. Furthermore, the Committee stressed that other instruments, e.g. incentive schemes,

⁶⁰ MAD2011.2694 (Miljøretlige Afgørelser og Domme).

⁶¹ Natur- og Landbrugskommissionen (2012), *Natur- og Landbrugskommissionens statusrapport*, 355.

⁶² It has been estimated that the application of animal manure accounts for 37,000 tons N/year as opposed to 157,000 tons N/year from the application of all fertilisers (including manure), Natur- og Landbrugskommissionen (2012) supra n. 61 p. 343.

⁶³ Natur- og Landbrugskommissionen (2013) supra n. 17. A similar recommendation had been made by a previous committee established by Ministry for the Environment in 2010, see Husdyrreguleringsudvalget (2011), *Anbefalinger fra Husdyrreguleringsudvalget*, available at <http://mst.dk/media/mst/66628/Endelig%20rapport%20-%20Husdyrreguleringsudvalget%20pdf.pdf>.

⁶⁴ Aftale om Vækstplan for Fødevarer, april 2014. The Growth Plan noted that a new regulation should be based on a sound scientific assessment of the state of the aquatic environment as well as of the factors affecting water quality.

should be available to address the most sensitive areas. How more precisely a new tailored, differentiated and flexible regulation should be constructed was, however, not elaborated by the Nature and Agriculture Committee. Many difficult issues were left to the relevant ministries to elaborate, including the question of scale, e.g. geographical (river basin, sub-basin or water body level) and scope, e.g. the degree or span of differentiation.

Despite the initial broad support – also from farmer organisations – it appears that political support for such a new regulation has faded and the new liberal government, which came into power in June 2015, has announced its intentions to adopt less strict fertiliser standards for all farmers, without clear indications of how to meet environmental objectives at the same time. A key concern from a political point of view might have been how to justify the differential treatment of farmers, i.e. what level of scientific knowledge is needed to justify the differential treatment of farmers and how to cope with individual hardship for farmers in the most environmentally sensitive catchments with a low retention capacity in the soil.

Such concerns must be taken into consideration when designing a differentiated nitrate regulation and are likely to require a combination of different regulatory instruments – as also mentioned by the Nature and Agriculture Committee. It is important that other regulatory instruments are available to address those areas where more severe restrictions on fertiliser use and cultivation practices are necessary to achieve the environmental objectives. This could be in the form of different types of incentive schemes, e.g. under the EU Rural Development Programme, combined with voluntary agreements or public purchase obligations.

It is pertinent that a new tailored or differentiated fertiliser regulation steers clear of a poten-

tial interference with private property rights.⁶⁵ If the differentiated norms in effect severely restrict the cultivation of land and cause individual hardship, the question of potential interference with private property rights is likely to undermine the regulation. It is unlikely that a sufficient scientific basis for justifying severe restrictions of existing cultivation practices can be established as part of a general regulation. Furthermore, a general compensation rule to soften such requirements does not appear to be feasible either. Other individual measures, e.g. voluntary agreements, acquisition or expropriation, are likely to be necessary to deal with individual hardship in the most sensitive areas, where there is a need for severe restrictions in existing fertiliser use and cultivation practices.

Another important question is what level of scientific knowledge is needed to underpin a differentiated fertiliser regulation including the question of whether it would require a higher level of scientific knowledge than the existing system, i.e. the implications of shifting from differentiation based on individual conditions in permits for livestock installations, to differentiation following directly from the general standards. From a legal point of view, the mere shift in type of regulation – from individual conditions to general norms – does not necessarily imply a need for more scientific underpinning. This, however, depends upon the level of detail in the regulation – and in particular the span in differ-

⁶⁵ In a European context, law-makers normally enjoy a fairly wide margin of appreciation with regards to general restrictions and their potential interference with private property rights, e.g. as reflected in a decision of the European Court of Human Rights stating that a Dutch regulation reducing “pig entitlements”, i.e. pig production rights, with 15 % for all farmers did not conflict with the Protocol to the Convention for the Protection of Human Rights and Fundamental Freedoms, see *Lohuis a.o. v the Netherlands*, no. 37265/10, 30. April 2013.

entiation, i.e. the potential unequal treatment of farmers, and the intensity of the restrictions, i.e. the potential interference with private property rights. It is quite clear that a relatively large span in the differentiated norms would require a relatively high level of scientific underpinning to justify the unequal treatment. Hence, a full differentiation of specification standards on, e.g. fertiliser use does not appear to be feasible – at least not in a Danish context. Additional measures will continue to be necessary, e.g. incentive schemes, nature restoration, public purchase or expropriation, to address “hot-spots” where severe restrictions on existing cultivation practices are needed to meet the environmental objectives for ecologically sensitive water bodies.

5. Conclusion

Despite the passing of almost 25 years since the adoption of the EU Nitrates Directive, agricultural nitrate pollution remains a major concern in many Member States. This is also the case in Denmark, although a fairly strict regulatory regime has resulted in almost a 50 per cent reduction in nitrogen leaching since the mid-1980s. Nevertheless, further efforts are needed particularly in ecologically sensitive areas. Nitrate regulation stands at a cross-road where there is a need for differentiated regulation tailored to meet ecological demands at the river basin, sub-basin or water body level. This is illustrated by the EU Water Framework Directive adding a new dimension to the Nitrates Directive through the setting of environmental objectives and more specific environmental quality standards for relevant water bodies. Thus, the site-specific performance standards of the WFD must be combined with the specification standards of the Nitrates Directive as well as any additional measures necessary to achieve the objectives. This calls for a new differentiated nitrate regulation tailored to meet ecological needs at the sub-basin or water

body level and continuously adapted according to monitoring results and perceived ecological demands for improved water quality.

The Danish nitrate regulation clearly illustrates the need for a differentiated and tailored regulatory approach. Denmark has adopted a whole territory approach under the Nitrates Directive and has focused on a continued tightening of general specification and process standards on fertiliser use in order to comply with the Nitrates Directive. This has resulted in the application of nitrogen norms for crops that are now 14–18 per cent below the calculated optimal level in the entire country, i.e. also in areas where there is no or limited ecological demand for further nitrogen reduction. According to farmers, the result is an unjustified loss of agricultural productivity and soil fertility. Calls have been made for a differentiation of the nitrogen norms based on knowledge of the retention capacity of the soil as well as the ecological sensitivity of the water bodies. Such a differentiated regulation is already used in the Danish permit system for livestock installations, albeit applying only to animal manure and not to fertiliser use in general. Nevertheless, it appears that the initial support for a new, differentiated fertiliser regulation has faded partly due to perceived regulatory challenges, e.g. with regards to the level of scientific knowledge needed to justify differential treatment of farmers as well as potential interference with the private property rights of farmers subject to the most severe restrictions.

As it has been argued in this article, such regulatory challenges depend on how a differentiated or tailored regulation is more precisely constructed. The need to justify the differentiated (or unequal) regulation of farming activities with reference to scientific knowledge will increase the more differentiated or “unequal” the regulation becomes – and in particular if the regulation results in individual hardship for some farmers, it

may interfere with the protection of private property rights. Hence, the use of differentiated specification standards on the use of fertilisers has its limitations regarding the scope of differentiation. It is unlikely that sufficient scientific knowledge at the field or farm level will be available to justify major differential treatment from one field or one farm to another. Furthermore, individual hardship in the form of severely restricted cultivation practices in most cases must be addressed through individual regulation at the farm level, e.g. voluntary agreements, incentive schemes, public purchase or possibly even expropriation. Thus, it is necessary to combine a differentiation of specification (and process) standards with additional instruments to address the most sensitive areas. The latter will often require a more flexible regulatory approach based on economic incentives and voluntarism, however, backed by command-and-control mechanisms if needed.

Thus, addressing agricultural nitrate pollution is likely to require a mix of regulatory approaches and instruments. Within the EU, the specification standards of the Nitrates Directive

must be complied with as a minimum, but it is feasible to differentiate or tailor such standards to meet the ecological needs at the river basin or water body level also where a whole territory approach has been chosen. It is unlikely that the NVZ differentiation between relatively strict mandatory requirements (within NVZs) and voluntary recommendations (outside NVZs) is sufficient to accommodate such needs. Rather, there appears to be a need to differentiate the mandatory specification standards of the Nitrates Directive. Furthermore, additional measures are needed to address the need for severe restrictions on fertiliser use or cultivation practices in the most ecologically sensitive areas in accordance with the Water Framework Directive – and in some cases also the Habitats Directive. Although, regulating farmers is known to be particularly controversial in many countries, it should be possible to strike an appropriate balance to avoid unnecessary restrictions on farming practices, while at the same time addressing the site-specific ecological sensitivity of river basins and water bodies.