EXECUTIVE SUMMARY

Study for the PETI committee

European Parliament

Monitoring of nitrogen in water in the EU[1]

Legal framework, effects of nitrate, design principles, effectiveness and future developments

ABSTRACT

This study, commissioned by the Policy Department for Citizens' Rights and Constitutional Affairs for the Committee on Petitions , provides an overview of the legal and environmental context in which nitrogen emissions to water are measured in the EU, and how the European Commission makes sure that monitoring systems and their results are comparable throughout the EU.

Emissions of nutrients and pesticides have proved to be a major source of pollution of both drinking water resources and aquatic ecosystems in Europe. Agriculture is a major emission source, but there are other sources, such as emissions of human and industrial waste water. This study focuses on nutrient emissions by agriculture. Extensive EU legislation has been developed as '*water is not a commercial product like any other, but rather a heritage that must be protected and treated as such*' (WFD, 2000/60/EC). Protection and remediation of both surface water and groundwater from agricultural pollution remains a challenge.

Scope and objective

The focus of this study is on the Nitrates Directive (ND), but placed in the wider context of water legislation such as the WFD. The ND includes both health-based objectives related to resources for drinking water, and ecologically based objectives related to eutrophication of surface waters (rivers, lakes, coastal waters). The study addresses both objectives and describes monitoring requirements in groundwater and surface water.

Nutrients (N&P), nitrogen and nitrate

Nitrogen (N) and phosphorous (P) are nutrients from manure, chemical fertilisers and compost that are released to air, soil and water in various chemical forms. Depending on the environmental compartment and function to be protected (drinking water, groundwater, air quality, surface water) a specific nutrient or its chemical form is relevant for the evaluation. For the protection of drinking water resources, levels of nitrate and nitrite are relevant as they may give rise to health risks. To avoid eutrophication from surface water and to protect ecological water quality, levels of nitrogen (N) and phosphorous (P) need to be assessed.

[1] Full study in English: https://www.europarl.europa.eu/RegData/etudes/STUD/2022/734713/IPOL_STU(2022)734713_EN.pdf

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Legal framework

Focusing on emissions to soil and water, the most relevant directives to protect the environment from agricultural pressures are the WFD , the ND, the Groundwater Directive (GWD) and the Drinking Water Directive (DWD).

Recent studies show that national implementation often takes place sectorally, within the water policy domain or within the agricultural domain and although efforts have been made to create linkages between directives, requirements such as monitoring and reporting may be different. Implementation would benefit from more advanced cross-referencing. A good example of advanced cross-referencing is the recent revision of the DWD, which includes objectives that are linked to the objectives of the WFD.

Effects of nitrate on health and environment

Excess amounts of nitrogen compounds in groundwater and surface waters can affect human health and natural ecosystems. Excess nitrate consumption can lead to cyanosis, a blueish skin hue due to the lack of oxygen. Infants and pregnant women are most at risk for these effects. Other possible adverse health effects are related to colorectal cancer and reproductive outcomes. Eutrophic waters are susceptible to the formation of harmful algae blooms which produce toxins with adverse health effects for bathers. This can also have an indirect impact on physical-chemical water quality characteristics (transparency, oxygenation), with reduced biodiversity as a result. Standards for nitrogen to prevent eutrophication are much more stringent (4-5 times) than the standard set for drinking water.

Monitoring networks for groundwater and surface water

From 2008 to 2019, the number of monitoring stations for nitrogen monitoring of groundwater and surface waters steadily increased in the EU, but there is a large variation in station density and sampling frequency between countries.

The EC does not require Member States (MS) to have the same monitoring systems but aims to ensure full compliance with the ND and related directives. The differences in monitoring systems mean that the comparability of the datasets is not straightforward. Differences in concentration levels, total agricultural area, variation in type of agriculture and variation in natural soil, aquifer and surface water characteristics can be regarded as design criteria, and as such contribute to differences in the setup of the monitoring networks between MS. As a result, the current data set at EU level is less suitable for the production of figures and maps on water quality and trends. To obtain a data set that meets the requirements, would require a coordinated formulation of the monitoring goals, using a selection of national monitoring stations with the help of national experts.

Development of nutrient emissions

Since the introduction of the ND, nutrient emissions from agriculture have been reduced substantially, but seem to have stabilised in the last decade. Groundwater quality has improved as well but seems to have stagnated since 2012. Trends in the development of eutrophication cannot be provided at EU level - not all MS provided this information in their last progress reports. Moreover, MS use a wide variety of parameters, which complicates comparison.

The Biodiversity and the Farm to Fork Strategies within the European Green Deal aim to reduce nutrient losses to the environment by at least 50% by 2030. Recent studies show that this level of ambition is also necessary to comply with the objectives of the ND. To achieve this requires more structural policy choices. Economic pressure in agriculture severely limits local room to manoeuvre to further improve water quality. Improved nutrient management and other innovative solutions could limit production losses. EU support for research, innovation and sustainable practices is indispensable, and a further revision of the CAP would be required.

Implementation of EU policy

Based on information from various EU projects and international expert exchanges (H2020 WaterProtect, H2020 Fairway, EIP Water, EIP Agri, joint DWD and WFD expert meeting), several recommendations can be made.

Coherence and consistency: Improve effectiveness through increased cross-referencing

Policy and cost-effectiveness will improve through increased cross-referencing across different directives and policies and further harmonisation of monitoring and reporting requirements.

More focus on the interdependence between the WFD, the GD, the DWD, the ND and the CAP will contribute to a more effective nutrient policy. Requirements from the DWD and GWD relating to institutional frameworks could be included in the WFD. As such, the programmes of measures implemented under the WFD would be better harmonised with the thresholds and relevant requirements in the DWD and GWD, including timeframes and monitoring.

Coherence and consistency: cross-sectoral approach

Complexities and inconsistencies of EU legislation become most explicit at local level, where different sectoral policy objectives must be implemented simultaneously. The cascading of governance arrangements from EU level down to farm scale often results in a plethora of policy and legal instruments to control nutrient emissions. The perception of local governance stakeholders has often diverged from the intention of the original directives. A lack of knowledge of the overall legislative framework, the complexity of water systems' responses, and the role of often competing interests obstruct cross-sectoral approaches. Well-designed feedback mechanisms could support connections between local/regional challenges.

The complexity of nutrient policy demands sufficient knowledge and means to support a transdisciplinary and cross-sectoral approach, also across scales. A combination of top-down and bottom-up approaches will give extra impetus and improvement. The EU could support local capacity building by facilitating international and intersectoral learning.

Trade-offs funding mechanism under the Common Agricultural Policy

Existing funding incentives may lead to competition between initiatives aimed at stimulating farming communities to become more economically sustainable and to sacrification of sustainable practices to engage competitively in markets. Guidelines or additional peripheral requirements for the CAP and RDR are needed to uphold the underlying principles of other directives, including the ND (e.g. Article 4.1 related to a code of conduct), to improve the effectiveness of the overall framework.

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External Authors:
Susanne WUIJTS, RIVM (National Institute for Public Health and the Environment)/Utrecht University, Centre for Water, Oceans and Sustainability Law, the Netherlands
Dico FRATERS, Sandra BOEKHOLD, Richard VAN DUIJNEN, RIVM

Research Administrator responsible: Jos HEEZEN Editorial assistant: Sybille PECSTEEN de BUYTSWERVE
Contact: poldep-citizens@europarl.europa.eu

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