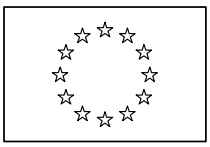

COMMISSION OF THE EUROPEAN COMMUNITIES

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REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

On implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources for the period 2000-2003

{SEC(2007)339}

1. INTRODUCTION

Council Directive 91/676/EEC (hereafter referred to as the Nitrates Directive) concerning the protection of waters against pollution caused by nitrates from agricultural sources was adopted on 12 December 1991.

Article 10 of the Nitrates Directive requires that Member States submit a report to the Commission every four years following its notification. This report should contain information pertaining to codes of good agricultural practice, designated nitrate vulnerable zones (NVZ), the results of water monitoring and a summary of the relevant aspects of action programmes drawn up in relation to nitrate vulnerable zones.

The aim of the present report is to inform the European Parliament and the Council on the state of the implementation of the Nitrates Directive, in accordance with its article 11. It is based on the information transmitted by EU 15 Member States in the period 2004-2006 (3rd reporting exercise 2000-2003) and is accompanied by aggregated maps of pressure from nitrogen from agricultural sources, of water quality data and of designated nitrate vulnerable zones. It, therefore, deals principally with EU 15, but, in order to provide a wider picture, also includes an outline of steps towards implementation in the enlarged European Union.

2. EVOLUTION OF PRESSURES FROM AGRICULTURE SINCE THE LAST REPORTING PERIOD

In agriculture, the trend towards greater intensification and higher productivity during much of the past fifty years was accompanied by a significant increase in the use of both inorganic nitrogen (N) and phosphate fertilisers. However, since the mid Eighties, a progressive reduction in fertiliser consumption has been recorded and this trend has continued in the period 2000-2003.

At EU 15 level, the reduction recorded in the period 2000-2003 compared to the previous period 1996-1999 was 6% for nitrogen and 15% for phosphate fertilisers respectively, with downwards trends continuing also in 2004 and 2005.

Animal numbers also increased during the past fifty years, contributing to a greater overall nitrogen burden through manure. Changes in agricultural policy notably in 1984 and 1992, have since contributed to stabilising or reducing cattle, sheep and goat numbers, but pig and poultry numbers continued to expand. A comparison between the periods 2000-2003 and 1996-1999 indicates continuing declines in cattle and sheep numbers and also in poultry numbers but stability in pig numbers, with an estimated overall decline of 5% in manure nitrogen burden.

The trend towards concentration continued, with animal numbers on individual farms expanding: over 50% of the EU's dairy herd is currently held on farms of more than 50 cows while the vast majority of the breeding pig herd is on holdings with more than 100 sows.

Globally the nitrogen "pressure" on EU 15 agricultural soils from animal husbandry (mainly cows, pigs, poultry and sheep) is estimated at approximately 7,6 million tons annually spread on agricultural soils. Therefore, the total diffuse nitrogen "pressure", when the additional 8,9 million tons nitrogen from mineral fertilisers is added, was approximately 16,5 million tons in 2003, compared to almost 18 million tons in 1999 and 17,4 million tons in 1995.

Regionalized estimates of the application rate of nitrogen from manure (Map 1) show amounts exceeding 170 kg/ha year in Belgium (Flanders) and the Netherlands, but, also, at local level, in Italy, France (Brittany), Spain and Portugal. Manure nitrogen application rates at regional level between 120 and 170 kg/ha are also found in Denmark, United Kingdom (England), a few counties of Ireland and in Southern Germany. All the above mentioned areas also have the highest phosphorus application rates from livestock manure (above 90 kg phosphate per hectare per year for the most intensive areas, Map 2) and total nitrogen and phosphorus application rates (manure plus chemical fertilisers) with values exceeding respectively 240 kg nitrogen and 90 kg phosphate per hectare per year (Maps 3 and 4).

An indicator of nitrogen pressures from agricultural sources is the "gross nutrient balance", which represents the difference between nitrogen inputs (from mineral fertilisers, manure, atmospheric depositions, fixation by leguminous crops and other minor sources) and nitrogen outputs (uptake by crops, grassland and fodder crops) per hectare of utilised agricultural land. According to European Environmental Agency calculations, the gross nitrogen balance at EU 15 level in 2000 was 55 kg/ha, a decline of 16% compared to 1990, with a range from 37 kg/ha (Italy) to 226 kg/ha (the Netherlands). Gross nitrogen balance surplus decreased in all Member States except Ireland and Spain (EEA, 2005 a).

Relatively small surpluses in nitrogen gross balance at national level underestimate surpluses in specific regions. An estimate of gross nitrogen (N) balance calculated at regional level by the CAPRI[1] database with reference to year 2001 (http://www.agp.uni-bonn.de/agpo/rsrch/dynaspat/dynaspat_e.htm) shows the heterogeneity between EU regions, with surplus ranging from 0 up to 300 kg N/ha, the maximum being reached in areas with a high density of livestock rearing but also in regions of intensive fruit and vegetable cropping, or cereals and maize with unbalanced fertilisation (Map 5).

The highest national nitrogen surpluses are found in regions of the Netherlands and Belgium (> 150 or 200 kg N/ha). The same levels of surplus, however can be found in Brittany (France) and in Vechta Cloppenburg (Lower Saxony, Germany). Surplus of the order of 100-150 kg N/ha year are also found in Member States with relatively low national surplus such as Spain (Catalonia), Italy (Lombardia), the United Kingdom (Northern Ireland, Wales and West England).

[1] CAPRI (Common Agricultural Policy Regional Impact) is an agricultural sector model covering both the whole of EU27 and Norway at regional level (250 regions) and global agricultural markets. It allows to analyse the impact of the different elements of the Common Agricultural Policy, of environmental or trade policies on EU agriculture at regional level. In the field of environment it allows to estimate indicators such as gas emissions and N, P, K balances at regional level.

Greater livestock density leading to increased animal housing, manure storage and spreading, has resulted in more ammonia volatilisation and atmospheric deposition on neighbouring soils and waters with values up to 50-60 kg nitrogen per hectare per year being recorded in such regions (Figure 1).

Agriculture is a significant nitrogen contributor to the aquatic environment. According to recent studies (EEA, 2005b; JRC, 2006), updating information on the contribution from the different sectors to water pollution, it is typically responsible of 50-80% of the total load (Map 6).

The relevance of nitrogen discharge from agriculture into the natural environment has been confirmed by the data reported by several Member States (Belgium, Germany, Denmark, Finland, France, Luxembourg, the Netherlands and United Kingdom) in their reports on implementation of the Nitrates Directive. Agriculture represents approximately 62% of nitrogen load to surface water, (from a minimum of 18% in Portugal to a maximum of 97% in Denmark). Higher proportions are found for Member States which have established efficient urban wastewater and industrial wastewater treatment systems, thereby drastically reducing nitrogen loads from those sources.

The contribution of agriculture to nitrogen and phosphate losses to water is also confirmed by reports under the Water Framework Directive. (http://forum.europa.eu.int/Public/irc/env/wfd/home). In 2005 several Member States identified eutrophication and related contributions from agricultural sources as among the major threats to the achievement of good water status.

3. OVERVIEW OF COMPLETENESS OF THE REPORTS SUBMITTED BY MEMBER STATES

All Member States submitted a formal report to the European Commission in 2004-2005. Further missing data, in particular regarding water quality, nitrate vulnerable zones and agriculture have been provided during 2006.

Most Member States followed the outline of the reporting guidelines prepared by the Commission in 2000, but, given the different level of detail and format of data, further work was required to integrate data on water quality and nitrate vulnerable zone designation at EU 15 level. The United Kingdom, which had not reported in the previous reporting period 1996-1999, provided information over both reporting periods.

The reports provided by Member States generally address the items listed in annex V of the Nitrates Directive. The level of detail and completeness of information improved compared to the previous reporting period. However gaps remain in relation to water quality, in particular regarding the eutrophication of fresh and coastal waters, the forecasting of water quality evolution via agricultural data, such as nitrogen usage in nitrate vulnerable zones and evaluation of effectiveness of action programmes.

4. WATER QUALITY, STATUS AND TRENDS

Monitoring network

Networks of sampling stations have to cover groundwater (even if not used for drinking water), rivers, lakes and dams, coastal and marine waters, as required by article 6 of the Nitrates Directive.

Member States have established monitoring networks which give a good overview of water status and trends. Their extent and quality has improved since the second reporting period, both for ground and surface waters. A total of approximately 20.000 groundwater monitoring stations were operational in 2000-2003 compared to 16.000 in 1996-1999. The number of common sampling stations between the two reporting periods was approximately 11.100 permitting the results to be used for trends assessment.

Groundwater sampling density was on average 12,5 sampling points per 1000 km^2 in EU 15. The highest density was in Belgium-Wallonia (50 sampling points per 1000 km^2) and in the Netherlands and Austria (25-30 sampling points per 1000 km^2). Relatively low sampling density in Finland and Sweden (respectively 0,19 and 0,33 sampling points per 1000 km^2) reflects the high percentage of natural areas there. Some Member States (Denmark, the Netherlands) transmitted groundwater monitoring data for different monitoring depths. However the Netherlands provided aggregated data (14 aggregated figures related to 358 monitoring stations) for the depth 0-5 meters. Greece did not transmit groundwater quality data with its report, but later provided data from monitoring carried on in 2003. Belgium (Flanders) reduced groundwater monitoring stations from 392 to 97 in 2003.

Some Member States taking a whole country action programme approach, such as Germany and Finland established a specific network to assess water quality status and trends in areas with a prevalence of intensive agricultural activities in addition to the general countrywide network for groundwater monitoring.

A total of approximately 22.000 surface water monitoring stations, were established in 2000-2003 compared to 14.000 in 1996-1999; 12.000 common sampling stations between the two reporting periods have enabled the assessment of trends. Sampling density varied greatly (from a minimum of 0,8 monitoring stations per 1000 km^2 (Greece) up to 59 (Belgium-Flanders) and 33 (United Kingdom, England) monitoring stations per 1000 km^2.

Member States (except Spain, Greece and Ireland) provided details on their monitoring programme regarding frequency. Monitoring frequency ranges from 12 to 24-26 times per year for surface waters to 1 to 6 times per year for groundwater.

Member States reported geo-referenced data in a format compatible with EC Geographic Information System (GIS)[2], using harmonised codes and classifications as developed by the reporting guidelines prepared by the Commission in 2000[3]. Therefore, aggregated maps of water quality at EU level could be drawn regarding nitrates.

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[2] Contextually to the submission of the report or later on, during 2005 and 2006

[3] EEC, DG Environment, 2000. Nitrates Directive (91/676/EEC); Status and trends of aquatic environment and agricultural practices. Development guide for Member States' report

Information on eutrophication, improved compared to the previous reporting period, but not all Member States reported on criteria used to assess eutrophication, and only a few provided the results of assessment of individual water bodies, river or lakes (Austria, limited to lakes and the Danube, Belgium, Denmark, Greece, Finland, Ireland, Luxemburg and Portugal) and coastal and marine waters (Ireland, Denmark, the Netherlands and Finland). Some Member States reported on some of the following eutrophication parameters: total nitrogen, total phosphorus, orthophosphate, Chlorophyll a.

Results of water quality survey

Groundwater

In the period 2000-2003, 17% of EU monitoring stations (average values) had nitrate concentrations above 50 mg NO_3/l, 7% were in the range 40 to 50 mg NO_3/l and 15% were in the range 25-40 mg NO_3/l. Approximately 61% of the groundwater stations had a concentration below 25 mg NO_3/l[4] (Maps 7 and 8).

In individual Member States, large differences were found depending on the depth of monitoring stations and the type of monitoring. Belgium (Flanders), the Netherlands (0-5 m[5], aggregated data), Portugal, Spain and Luxemburg reported the highest percentage of groundwater sampling sites exceeding 50 mg NO_3/l (from 60% to 20% of the monitoring stations). Germany and Finland also reported a high percentage of sites exceeding nitrate concentration of 50 mg NO_3/l in their agricultural site monitoring networks. The threshold of 40 mg NO_3/l was exceeded in France and United Kingdom (England) in more than 20% of sampling points (Figure 2).

Comparison with the data of the previous reporting period shows that, at EU 15 level, stable and decreasing trends are prevalent (64% of the monitoring stations, of which 30% with decreasing trends). However, 36% of the monitoring stations still show an upwards trends (Map 9 and Figure 3).

The Member States with increasing trends in more than 30% of monitoring stations were Belgium (Wallonia), France, Spain, Portugal, Germany, Ireland, United Kingdom, the Netherlands (depth 0-5 m) and Luxemburg. In general, however, with the exception of Spain, France, United Kingdom and Belgium, the percentage of stations with increasing nitrate concentrations is counterbalanced by a similar or even higher percentage with improving quality. Shallow groundwater in Denmark and the Netherlands showed a more pronounced improvement compared to deep groundwater. Denmark, Austria, Sweden recorded overall stable or decreasing trends. Trends could not be determined due to modification of the monitoring network and/or lack of data for Greece, Italy and Belgium (Flanders) (Figure 3).

Surface Water

Average nitrate concentrations (yearly average) below 10 mg NO_3/l were observed in 53% of the monitoring stations and equal or below 2 mg NO_3/l in 19% of monitoring

[4] Spatial distribution of monitoring stations was more even in the third compared to the second reporting period, with a better balance between polluted and unpolluted areas.

[5] Reflecting the concentration in the first meter of groundwater or water leaving the root zone

stations notably in mountainous areas. In 2,5% of the monitoring stations nitrate concentration exceeded 50 mg NO_3/l and in 4% recorded values in the range 40 to 50 mg NO_3/l[6]. Member States with the highest proportion of sampling points showing nitrate concentration above 50 mg NO_3/l were United Kingdom, France and the Netherlands (respectively 4,5%, 2% and 1,2%). Values above 40 mg/l nitrates were recorded in 11% and 7% of monitoring stations in the United Kingdom and France respectively. High values, over 25 and even 40 mg NO_3/l were observed in the agricultural plains of Denmark, the Netherlands, Belgium (Flanders) and north-west of France. In Luxembourg, Belgium (Wallonia), Ireland (south-west), specific areas of Spain (north-east, south), Italy (north–east) and Austria (north-east in the Morava-Dyje catchment) a significant proportion of values were between 10 and 25 mg NO_3/l, indicating already considerable nitrogen fluxes to lakes and seas and important potential eutrophication effects (Maps 10, 11, 12 and Figure 4).

The comparison with the 1996-1999 surveys shows that, in the large majority of surface waters, nitrate concentration is decreasing or stable (respectively 55% and 31% of the monitoring stations). This would confirm an overall decreasing trend observed in the previous reporting period, but further data would be needed to assess the influence of climatic conditions and urban wastewater treatment improvement in this evolution. In 14% of monitoring stations the concentration is increasing (mainly in Luxemburg, France, United Kingdom, Portugal and Belgium). Decreases or stable nitrate concentrations in surface water were reported as generalised trends (more than 90% of monitoring sites) in Denmark (freshwaters), Austria, Ireland, Sweden, Germany and the Netherlands (freshwaters). Incidence of sampling stations with increasing trends is particularly high in north-west and southern France, southern England, eastern Spain and northern Portugal (Map 13 and Figure 5).

Discussion and evaluation of trophic status of waters are greatly hampered by the different methods and criteria that Member States have used for the assessment of eutrophication. As a result, no maps of the eutrophication in EU 15 surface waters have been prepared. A satellite picture of chlorophyll concentration in EU seas (Map 14) highlights the area with strong phytoplankton development. The implementation of the Water Framework Directive is expected to overcome this difficulty by harmonising the criteria to define eutrophication through the assessment of ecological status and the intercalibration exercise (http://ec.europa.eu/environment/water/water-framework/objectives.html). In addition, a guidance document is currently under development in this respect (http://forum.europa.eu.int/Public/irc/env/wfd/library?l=/framework_directive/thematic_documents/13_eutrophication).

5. DESIGNATION OF NITRATE VULNERABLE ZONES

Member States are required to review, and if necessary revise, nitrate vulnerable zones at least every four years on the basis of the results of water monitoring

[6] It should be noted that a more balanced distribution of the sampling stations would be necessary to represent the overall EU15 picture. For instance, surface water monitoring stations in UK (England), which represent almost 30% of the total number of monitoring stations in the EU 15, with a relatively high percentage of values in the three classes above 25 mg/l, may bias the EU 15 frequency distribution.

according to article 6 of the Nitrates Directive. The first designations should have been completed by December 1993 with revisions thereafter every four years.

In the period 2000-2003 further progress has been made in nitrate vulnerable zone designation. Seven out of fifteen Member States took the option in the Nitrates Directive not to identify specific nitrate vulnerable zones, but to establish and apply an action programme through the whole territory. In addition to Austria, Denmark, Finland, Germany, Luxemburg and the Netherlands, Ireland established a whole territory approach in March 2003.

Other Member States increased, in several cases substantially, the nitrate vulnerable zones since 1999: United Kingdom (from 2,4% to 32,8% of the territory), Spain (from 5% to 11%), Italy (from 2% to 6%), Sweden (from 9% to 15%), Belgium (from 5,8% to 24%). Motivation for increased designation was not always provided. In the majority of cases it was based on groundwater nitrate pollution (*i.e.* in Southern Europe Member States) and surface water nitrate pollution (criteria A2 and A1 of Annex 1 of the Nitrates Directive); to a lesser extent it was based on eutrophication (for instance Sweden and Seine-Normandy in France).

Overall, in EU 15, designation of nitrate vulnerable zones increased from 35,5% of the territory at the end of 1999 to 44% at the end of 2003 (Table 1 and Map 14). From 2003 onwards further designations were made, in Italy, Spain, Portugal and United Kingdom, Northern Ireland (Map 15). Belgium has established the procedure to increase its designation to include 42% of Wallonia territory and all Flanders.

However, based on review of available information on nitrogen pressure and water quality, in particular, with regard to eutrophication and shallow groundwater there are still some gaps in designation. Work is necessary to eliminate these gaps.

6. ACTION PROGRAMMES

By the end of 2003, all Member States, with the exception of Ireland, had, albeit some rather belatedly, established one or more action programmes on their territory. Ireland finally established its programme in 2006.

Member States have provided information regarding the newly established action programmes since 1999 and on the modifications introduced as a result of the periodic review required by the Nitrates Directive.

The Nitrates Directive foresees the possibility to design and implement the action programmes on individual nitrate vulnerable zones or part of zones. France, Portugal, Spain, Italy, Greece, United Kingdom and Belgium took this option and, as a result, approximately 110 action programmes were in place by the end of 2003.

Although progress in the quality of action programmes is being made, many still show several areas of non conformity.

Several Member States failed to require compliance with the standard for manure nitrogen application (from 20.12.2002, 170 kg N/ha).

Another key measure, minimum storage capacity of livestock manure, was not established as mandatory in some action programmes; in other cases, required storage capacity is insufficient to cover the periods when manure application is prohibited or impossible due to climatic conditions. Storage capacity requirements established in action programmes range from 2 to 12 months, with large variations even in neighbouring regions with similar climatic conditions. Studies (ERM, 2001) suggest that minima ranging from 4 months (Mediterranean areas) to 9-11 months (boreal areas) should be established.

Balanced fertilisation so as to limit total nitrogen input with fertiliser (both manure and chemical fertilisers) to crop requirements, taking into account contribution from the soil and other inputs is also insufficiently implemented in several action programmes. The approach taken by Member States varies from a balance system, providing a methodology for calculations on a farm by farm basis, to the definition of total nitrogen application standards for each crop or groups of crops (total nitrogen or "available nitrogen"). In several cases, however, provisions are very general and do not establish mandatory requirements for farmers.

Other critical aspects are:

– insufficient length or limited applicability (to specific fertilisers, crops or soil types) of the measures on restricted periods for fertiliser application;

– insufficient measures for fertiliser application near water bodies (absence of minimum distance for fertiliser application or too narrow width of unfertilised buffer strips);

– lack or insufficient restrictions for application of fertilisers to steeply sloping ground, although it is essential to prevent nitrogen losses from erosion, run-off and subsoil drainage;

– no restrictions on fertiliser application when soil conditions are unsuitable (water-saturated, flooded, snow covered and frozen ground).

However, notwithstanding the need for further improvement, in 2000-2003, progress was made through design and implementation of new action programmes and improvement of the measures of the existing action programmes in the context of the periodic revision. Further progress is now being made with improved quality of the measures. An overview of recent progress on action programme measures is provided in the Annex.

7. DEROGATIONS

The Nitrates Directive allows for the possibility to avail of derogation in respect to the maximum amount of 170 kg nitrogen per hectare per year applicable with livestock manure, provided that it is demonstrated that the directive's objectives are still achieved. Derogations require a Commission Decision following the positive advice of the Nitrates Regulatory Committee, which assists the Commission in implementation. Appropriate designation of nitrate vulnerable zones and action programmes fully in conformity with the Nitrates Directive are prerequisites to any

derogation and the derogations themselves apply only for the duration of the action programme. A list of the derogations granted until December 2006 is provided in the Annex.

8. FORECAST ON WATER QUALITY

Almost all Member States, with the exception of Italy, Portugal and Greece, provided at least some elements on assessment methods (simulation models and trend analysis) for the evaluation of trends in agricultural pressures and/or water quality evolution.

However, few Member States provided quantitative information on the time scale during which either a stabilization of the present level of pollution or a recovery of the water quality (both for nitrate and eutrophication) is forecast to be achieved. The difficulty to draw conclusions depends on the many uncertainties regarding, for instance, climate and transport processes in soils.

A general conclusion is that it will take several years before improvements in water quality can be observed as a result of the implementation of the measures of the action programmes and modification of the agricultural practices (including reduction of the number of livestock). In the few cases in which a timescale of restoration of water quality is provided (sometimes as a result of simulation for specific basins) it ranges from a minimum of 2-4 years to more than 30 years.

9. INFRINGEMENT PROCEEDINGS

At present, the implementation of the Nitrates Directive is still incomplete, as confirmed by several infringement procedures (7 over 15 Member States, Table 2), mainly for insufficient designation of nitrate vulnerable zones and non conformity of action programmes.

10. IMPLEMENTATION OF THE NITRATES DIRECTIVE IN THE NEW MEMBER STATES (EU 10)

Implementation of Nitrates Directive is ongoing in new Member States. According to the commitments taken in the negotiation for accession, new Member States fulfilled their obligation by ensuring transposition, having a water monitoring network in place and designation of nitrate vulnerable zones. Action programmes are now established in all new Member States. The Commission is analysing the designation and the action programmes to assess their compliance with the Nitrates Directive. Three out of ten new Member States (Malta, Slovenia and Lithuania) took a “whole territory approach” and therefore decided not to designate specific nitrate vulnerable zones, but to implement an action programme on the whole territory. Seven Member States designated as nitrate vulnerable zones a percentage of the territory ranging from 2,5% (Poland) to 48% (Hungary).

11. CONCLUSIONS

The third report on the implementation of Nitrates Directive for the reporting period 2000-2003 submitted by EU 15 Member States shows improvement in the quality of monitoring and reporting.

With regard to water quality, on groundwater, although the overall trend is stable or improving in 64% of sites, nevertheless an increase in nitrate pollution was observed in 36% of sites and 17% of sites showed nitrate concentration above 50 mg per litre. In surface waters stable or decreasing nitrate concentrations were observed in 86% of monitoring sites, confirming trends already seen in several Member States in the previous report. However, further data would be needed to assess the influence of climatic conditions and urban wastewater treatment improvement on this development.

Significant progress has been made in the recent years regarding both designation of vulnerable zones and action programmes. Vulnerable zones increased from 35,5% of EU 15 territory in 1999 up to the 44% in 2003, with further designations thereafter. However, based on review of available information on nitrogen pressure and water quality, the Commission considers that there are still gaps in designation which need to be filled.

Progress in the quality of action programmes has been significant in the recent years and should contribute to the improvement of water quality in future reporting periods.

The Commission's overall analysis is that significant progress is now being made in the implementation of the Nitrates Directive, but that considerable further work in improving designations and the quality of action programmes will be required in order to fully achieve the objectives of the Directive with regard to water quality. It looks to continued increasing cooperation from Member States in this work.