



'Capacity Building on the European Community's Environmental Policy'

EU Legislation on river basin management and the reduction of nutrient pollution

Background Paper

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1 Water Pollution

A poor water quality is a serious threat to human health and economic development. Generally the water quality across Europe is good and improving, nevertheless there are some problems, especially linked to emissions from **agriculture** (EEA 2003a). The importance of the pollution sources varies widely between catchment areas and depends on the degree of urbanisation, the standard of sewage treatment, and the nature and intensity of agricultural practices¹ (WRc 2002).

The water-related legislation has largely focused on emission controls from **point-sources**, such as waste water discharges from industry and from urban areas. This consequently has led to substantial improvement in the quality of many water bodies across Europe. Notable was the reduction of phosphorus in rivers, lakes and coastal waters in Europe. Less success has been achieved controlling **diffuse sources** of water pollution, such as agricultural use of fertilisers and pesticides. As a result nitrate levels constantly exceed the limit values due to **intensive agricultural production** in the EU. Thus, the significant nitrate pollution of groundwater, being a major source of drinking water, is the most challenging problem in EU countries (EEA 2003b).

Given the large influence of the agricultural sector on water quality, the abundant use of fertilisers and pesticides is still a crucial problem to be solved. Nutrients, particularly **nitrogen** and **phosphorus** are central elements of fertilisers due to their vital importance for the metabolism of plants. Accordingly, they are also essentially influencing the productivity of water plants and algae in freshwaters and hence the **trophic status** of water bodies (Vollenweider 1976, Twinch 1986 in WRc 2002).

1.1 Nitrogen Cycle

The nitrogen cycle represents one of the most important nutrient cycles found in terrestrial ecosystems (Figure 1). The gaseous nitrogen (mainly N_2) in the atmosphere is the most abundant form of nitrogen. The other main storage pools of nitrogen are the living organisms as well as organic matter in soil and the oceans. Almost all of the nitrogen found in the terrestrial ecosystem stems originally from the atmosphere.

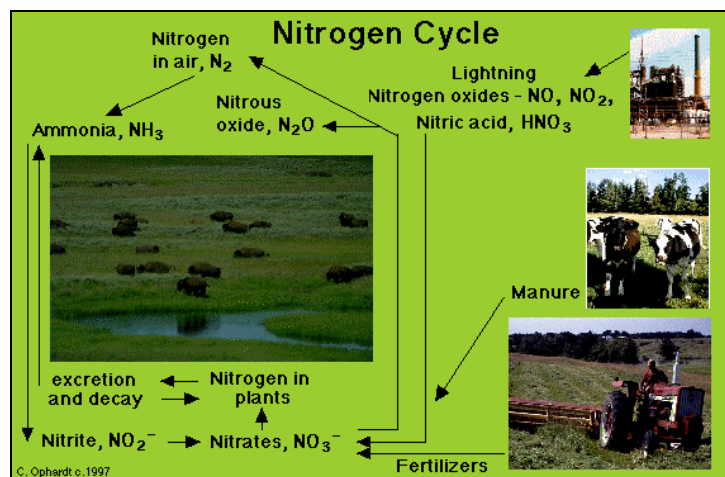


Figure 1: Nitrogen cycle (Ophardt 1997a)

Despite its abundance in the atmosphere, nitrogen is often the most limiting nutrient for plant growth. This is because most plants can take up nitrogen just in a solid form, mainly as **nitrate** ion (NO_3^-). Nitrate is the most water-soluble form of nitrogen as well as the form least attracted to soil particles and thus easily transported within the hydrologic cycle (e.g. through **leaching** into the water bodies). Manure of livestock in contact with water result in **ammonium** (NH_4^+).

In contrast to nitrate, ammonium is immobile in most soils and is transported through **run off** and

¹ I.e. whether animal husbandry or vegetable crops.

erosion attached to sediments. Therefore, ammonium may contribute to surface water pollution, but generally does not impact groundwater. The human activities have severely altered the nitrogen cycle, disturbing the natural balance (Figure 1).

1.1.1 Anthropogenic Sources and Impacts

The human-induced nitrogen enters water bodies mainly via diffuse sources. The agricultural sector, by excess use of nitrogen fertilisers and manure from animal husbandry, is the main source of diffuse pollution of nitrogen to water bodies. To a lesser extent, atmospheric sources contribute as diffuse sources to the nitrogen load in water by fuel combustion and forest fire.²

The use of nitrogen fertilisers causes increased rates of denitrification and leaching of nitrate into groundwater. The additional nitrogen enters the soil system and the hydrologic system through leaching and eventually flows into streams, rivers, lakes and estuaries. In these water bodies, the excess nitrogen can lead to eutrophication.

In most EU countries, there is a large nitrogen surplus in the agricultural soils that can potentially pollute both surface and groundwater. Even though nitrate concentrations in rivers have remained relatively stable since the 1990s, they are highest in Western European countries where agricultural activities are most intensive. In the North Sea and the Baltic Sea, loads of nitrogen have decreased since the 1980s. However, nitrate in drinking water stays a common problem across Europe, particularly from shallow wells (EEA 2003a).

1.2 Phosphorus Cycle

Phosphorus is an essential nutrient for plants and animals in the form of **phosphate** ions PO_4^{-3} . Phosphorus can be found in water, soil and sediments. Unlike the compounds of other matter cycles phosphorus cannot be found in air in the gaseous form. Phosphates are dissolved from deposits on land and transported via surface water runoff to a water environment. (Figure 2).

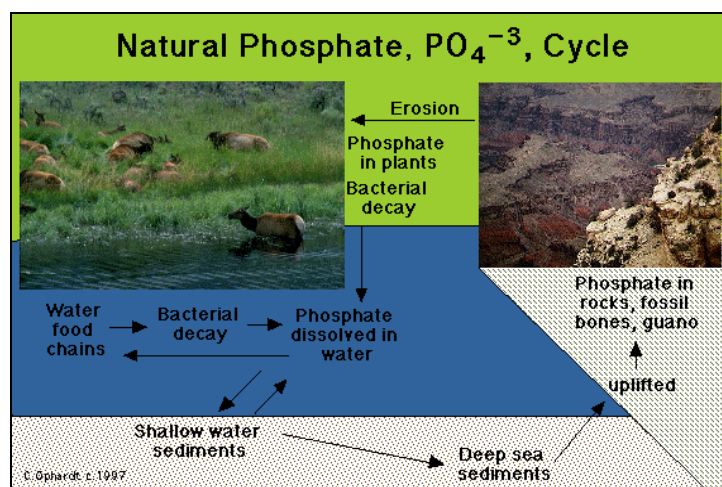


Figure 2: Natural phosphate, PO_4^{-3} , cycle (Ophardt 1997b)

In freshwaters, the majority (about 70 per cent) of phosphorus retains in living or dead biomass (as organic phosphates in sediments). Therefore, the sediments (due to the high phosphorus buffering capacity of sediments) are a very important storage pool in the phosphorus cycle (Twinn 1986 in WRc 2002). The remaining phosphorus is either soluble or particulate. The majority of phosphorus enters water bodies in non-bioavailable form (i.e. bound to particulate matter) and only around 5 per cent in soluble bioavailable form (Wetzel 1983 in WRc 2002).

² Combustion processes release a variety of solid forms of nitrogen.

1.2.1 Anthropogenic Sources and Impacts

Human-induced phosphorus enters surface water bodies via diffuse sources such as agricultural runoff and animal husbandry, as well as from point sources such as municipal and industrial waste water discharges. The inputs of phosphates in the form of fertilisers and animal manure, sewage sludge as well as run off and erosion change the natural phosphorus cycle (Figure 3). Industrial sources are considered to contribute a smaller overall load to surface waters than either agriculture or municipal waste water (WRc 2002). In recent years, point-source pollution from urban waste water treatment plants has decreased across Europe. However, diffuse pollution of phosphorus from agricultural sector continues to be a problem (EEA 2003a).

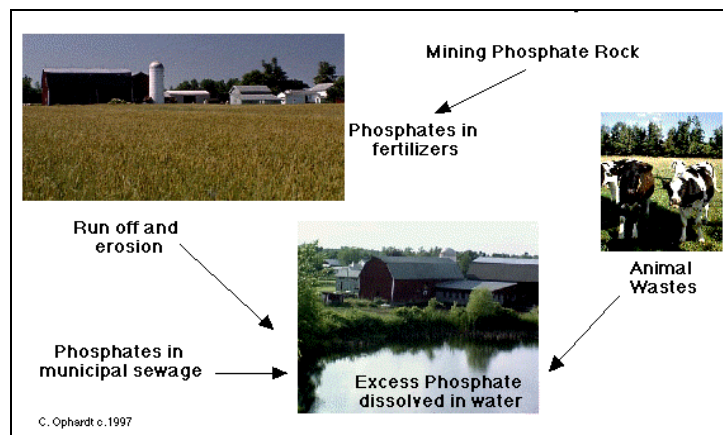


Figure 3: Human influence on the phosphate cycle (Ophardt 1997b)

Phosphorus is commonly considered to be the limiting nutrient for aquatic plant growth and thus implicated in the eutrophication of fresh waters (Vollenweider 1976, Twinch 1986 in WRc 2002).

In EU countries, the concentration of phosphorus has noticeably reduced in many water bodies due to improved control of pollution point sources. Phosphorus concentrations in lakes are lowest in the Northern countries mainly due to lower population density and lower agricultural intensity. In the Western and Central and Eastern European countries phosphorus enrichment in lakes is a great problem due to diffuse pollution, particularly from agriculture (EEA 2003a).

2 EU Policies on Prevention and Reduction of Pollution into Water Bodies

As the nutrient pollution of water bodies by point and diffuse sources is a cross cutting environmental problem, several policy areas are addressing this field including policies related to water, waste and agriculture. At the European level, the Water Framework Directive, the Waste Framework Directive and the Common Agricultural Policy can be regarded as the most important legislation and policies addressing diffuse as well as point sources of water pollution. Currently, the European Commission is developing a European Strategy for Soil Protection addressing various threats for soils, while the contamination of soils is one of the main threats. In the past, the main focus of water and waste related EU legislation was concerned with emission controls from point-sources, such as waste water discharges from industry and urban areas.³ The CAP-related legislation deals mainly with strategies addressing diffuse water pollution.⁴ The implemented policies have successfully led to the improvement of water quality in many water bodies across Europe, especially due to the reduction of pollution from point sources. However, diffuse sources remain the major problem and will need to be tackled in future implementation measures.

³ Urban Wastewater Directive (91/271/EEC)

⁴ Regulation (2003/1783/EC) on Support for Rural Development.

An overview of the relevant legislation on prevention and reduction of pollution into water bodies on European level is provided in Table 1. Many legislation address both point and diffuse sources (see tick). As for this paper the legislation related to water are most important, these are listed first.

Table 1: EU Policies on prevention and reduction of pollution into water bodies

Policy	Relevant Legislation	Diffuse pollution	Point pollution
Water	Water Framework Directive (2000/60/EC)*	√	√
	Directive concerning the protection of waters against pollution caused by nitrates from agricultural sources (91/676/EEC)*	√	√
	Directive concerning the quality required for surface water intended for the abstraction of drinking water in the Member States (75/440/EC)*	√	√
	Directive on the Quality of Water Intended for Human Consumption (98/83/EC)*		√
	Directive concerning the quality of bathing water (bathing water directive, 76/160/EEC)*	√	√
	Directive on the Quality of Fresh Waters Needing Protection or Improvement in Order to Support Fish Life (78/659/EEC)	√	√
	Directive on the Quality Required of Shellfish Waters (79/923/EEC)	√	√
	Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (76/464/EEC)	√	√
	Urban Wastewater Directive (91/271/EEC)*		√
	Directive on the protection of groundwater against pollution caused by certain dangerous substances (80/68/EEC)	√	√
Other	Directive on the Landfill of Waste (99/31/EC)*		√
	Directive on Sewage Sludge (86/278/EEC)	√	
	Towards a Thematic Strategy for Soil Protection COM(2002) 179 final	√	√
	Integrated Pollution Prevention Directive (96/61/EC)		√
	Major-Accident Hazards (Seveso) Directive (96/82/EC)		√
	Cadmium Discharges (83/513/EEC)		√
	Mercury Discharges (82/176/EEC)		√
	Council Regulation (EC) establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers (1782/2003/EC)	√	
	Council Regulation (EC) on Support for Rural Development (2003/1783/EC)	√	
	Pesticides Licensing Directive (91/414/EEC)	√	

Aiming to contribute to the ongoing discussions on the diffuse pollution at the EU level, the purpose of this paper is to analyse the relevant water-related legislation that deals with the control of pollution into water bodies from diffuse sources. Since numerous directives have already been presented in the previous papers⁵ (marked with an asterisk in table 1), this paper will focus on the following legislation:

⁵ Hansen Wenke, Maria Christopher and Maic Verbuecheln 2002: EU Waste Policy and Challenges for Regional and Local Authorities. Background Paper for the Seminar on Household Waste Management. December 2002
Hansen Wenke and Nicole Kranz 2003: EU Water Policy and Challenges for Regional and Local Authorities. Background Paper for the Seminar on Water Management. April 2003

WFD (programme of measures), Directive on Sewage Sludge and the CAP. Furthermore, the results of a study dealing with phosphates and alternative detergent builders will be outlined.

2.1 Water Framework Directive (2000/60/EC)

2.1.1 General Objective

The 'Directive establishing a framework for Community action in the field of water policy' (*short* Water Framework Directive, WFD) entered into force on 22 December 2000. It effects far-reaching changes in the water policy and management in the EU Member States. The main goals can be summarised as follows:

- All waters, including surface waters, groundwater and coastal waters, are to reach a good status⁶ until 2015, water bodies of good or high status are to be maintained at that level;
- The establishment of a water management approach based on river basins. This approach considers not only the water itself but the entire catchment area and thus all factors influencing water quality.
- Planned measures to protect water resources are to be selected under the consideration of cost-efficiency criteria;

Unlike before, the water body and its overall ecological quality is now constituting the centre of water policy and not only the use of water as a resource. Within the Water Framework Directive all environmental pressures are addressed, such as water abstractions, morphological changes and water pollution. This includes also pollution **from point and from diffuse sources**.

The WFD's ambitious goals have to be reached within a relatively short period. The transposition into national law needs to be accomplished by December 2003. By the end of 2004, a status report has to be completed including an analysis of the characteristics of each river basin, register of protected areas, a review of anthropogenic stresses and an economic analysis of water uses. This information will provide the necessary input for the monitoring programmes (by 2006). Based on the status report and the monitoring results, the programmes of measures have to be identified and a River Basin Management Plan published by 2009. By 2012, the programmes of measures have to be operational and finally, by 2015 the environmental objectives achieved.

2.1.2 Programme of Measures and River Basin Management Plan

Based on the status report and the results of the monitoring programmes, the authorities responsible for the river basin are required to set environmental objectives (Article 4, WFD) aiming to determine goals and targets. The setting of the environmental objectives can be considered as one of the core components of the implementation of the WFD and its planning process making a distinction between what is defined as objectives in the WFD itself and what is at the discretion of the river basin authority (Interwies et al. 2003). In order to attain these environmental objectives, the WFD mandates the establishment of a programme of measures by the end of 2009 (Article 11, WFD).

The **programme of measures** can be considered as the principle mechanism for implementing the environmental objectives required by the WFD by 2015 and the specific environmental objective of each river basin district. The programme of measures includes basic and supplementary measures.

Basic measures (minimum requirements) include the so-called combined approach for **point and diffuse sources** (Article 10, WFD). This means that water policy should be based on using control of

Hansen Wenke and Anna Leipprand 2003: EU Policy on Specific Waste Streams, Challenges for Regional and Local Authorities. Background paper for the seminar "Certain Aspects of the EU Waste Policy and Role of Municipalities": November 2003

⁶ Surface waters: good ecological and good chemical status; groundwater: good chemical and good quantitative status.

pollution at source through the setting of emission limit values and of environmental quality standards. Article 10 (1), WFD, refers to a range of directives such as Integrated Pollution Prevention and Control (IPPC) (96/61/EC), Cadmium Discharges (85/513/EEC), Mercury Discharges (82/176/EEC) and Nitrate Directive (91/676/EEC), and any future relevant directives. Controls required by these directives must be established by 2012 at the latest (the same date that programmes of measures must be operational), unless otherwise specified in the legislation concerned. A definition and a list of basic measures are provided in Article 11(3), WFD.

If the basic measures are not sufficient for achieving the environmental objectives, **supplementary measures** shall be taken (Annex VI, Part B, WFD). The Directive provides a non-exclusive list of such measures, which are aimed at either reinforcing the provisions or setting up new provisions. This includes measures such as economic and fiscal instruments, negotiated environmental agreements, codes for good practices, voluntary agreements, demand management measures, efficiency and re-use measures, rehabilitation projects and research, development and demonstration projects. To achieve a "good" status of waters, a more intensive monitoring, the establishment of environmental quality standards for the pollutants concerned and investigations of polluting sources as well as an immediate review of all relevant authorisations is required. This should be followed by actions on the basis of the level or risk involved. Competent authorities have to determine this (EC 2003).

The portfolio of currently available measures and approaches in water management offers a multitude of possible solutions to water pollution. However, the WFD requires that the most cost-effective combination of measures have to be identified based on the information provided by the status report and the monitoring. Annex III of the WFD specifies that the economic analysis should contain sufficient information to allow judgements about the most cost-effective combination of measures to be included in the programme of measures. The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety has issued a handbook on this issue.⁷ Within this handbook, an **exemplary catalogue of applicable measures** and instruments is provided addressing the basic principles for selecting the most cost-effective combinations of measures, many of them addressing the reduction of **nitrogen** and **phosphate** discharges into surface waters and groundwater caused by **point** as well as from **diffuse** pollution (Interwies et al. 2003).

A summary of the programme of measures will be included in the **River Basin Management Plan** which can be considered as the main reporting mechanism to the Commission and to the public.⁸

2.2 European Environmental Policies Addressing Nitrogen and Phosphorus Pollution

As outlined in table 1 various EU legislation tackle pollution from diffuse pollution. The focus of the following chapter will be placed upon the Directive on Sewage Sludge and selected legislation of the Common Agricultural Policy which address pollution from diffuse sources. Both policy areas, sewage sludge and the Common Agricultural Policy, have large impacts on the nitrogen and phosphorus inputs in the environment.

2.2.1 Council Directive concerning the Protection of Waters against Pollution caused by Nitrates from Agricultural Sources (91/676/EEC)

General Objectives

The Directive aims at mitigating the negative effects of fertilisation on drinking water sources and ecosystems by limiting the input of inorganic fertilisers and manure on farmland. The Directive entered into force in 1991.

⁷ Interwies et al. 2003: Basic principles for selecting the most cost-effective combinations of measures for inclusion in the programme of measures as described in Article 11 of the Water Framework Directive. Handbook

⁸ The requirements of the RBMP are described in Article 13 and 15 of the WFD. The full contents of the plan are specified in Annex VII.

Specifications

The Directive details the specifications of water bodies potentially affected by pollution from nitrates. Among others, these include:

- surface waters, in particular those for the abstraction of drinking water,
- groundwater containing more than 50 mg/l nitrates,
- freshwater lakes, other freshwater bodies, estuaries, coastal waters and marine waters which are or may become eutrophic.

Based on a one-year monitoring programme, Member States have to identify vulnerable zones which contribute to the pollution. For these vulnerable zones, action programmes have to be developed, implemented and revised every four years. Annex III of the Directive sets out measures that Actions Programmes must contain.⁹ The Member States are required to report on the designation of vulnerable zones, the results of the water quality monitoring, the action programmes and the codes of good agricultural practice to the Commission on a four year basis.

State of Play

All the Member States have transposed the Directive, set up a monitoring network, drawn up a code of good practice and designated vulnerable zones (apart from Ireland). The impact of the Directive's implementation will only be felt in a few years' time, though positive results are already starting to be seen in some regions. The Directive is considered to be fully up-to-date and in no need of revision. However, actions to improve its implementation are crucial, such as cost-effectiveness studies on preventive measures, reinforced controls at field level and penalties for those who fail to comply with the Directive.

Interactions with other Directives

As regards the progressive implementation of the Water Framework Directive (WFD), synergies between the WFD and the Nitrate Directive should be taken into account such as:

- the harmonisation of water sampling points, networks, parameters and frequencies for quality monitoring;
- assessment of losses of nutrients to waters and of the breakdown of their origin;
- development of models correlating environmental impacts and causative factors.¹⁰

Codes of 'good agricultural practice' are not only required by the Nitrate Directive but also by the Water Framework Directive (Art. 11, WFD, programmes of measure) and for certain Regulations of the Common Agricultural Policy (see Chapter 2.2.3). While developing the codes of good agricultural practice the various requirements of the different Directives should be taken into account in order to establish a coherent and comprehensive code.

2.2.2 Directive on Sewage Sludge (86/278/EEC)

Sewage sludge originates from the process of waste water treatment. As sludge contains a high amount of nutrients, such as nitrogen and phosphorus, and contains valuable organic matter, it is regarded as a good fertiliser for agriculture. However, sludge can also show contamination with heavy metals, bacteria and viruses and a number of organic substances (EEA 2001a). The contamination of sewage

⁹ Setting up of periods when the application of certain fertilisers is prohibited and of limits on the quantities of fertilisers applied and on the application of livestock manure per hectare to an amount containing no more than 170 kg N or 210 kg N during the first four year basis of the action programme. Furthermore, conditions relating to the available storage capacity on farms for livestock manure and a code of 'good agricultural practice' have to be identified.

¹⁰ Commission report of 17 July 2002 on implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources. Synthesis from year 2000 Member States reports.

sludge, especially with bacteria and viruses, has caused a highly controversial discussion throughout Europe about the uses of sewage sludge for agricultural purposes with some countries favouring landfilling and incineration of sewage sludge and others preferring the use of sewage sludge as fertiliser on agricultural land.

General Objectives

The Directive 86/278/EEC on Sewage Sludge has two purposes:

- To ensure that human beings, animals, plants and the environment are fully safeguarded against the possibility of harmful effects from the uncontrolled spreading of sewage sludge on agricultural land;
- To promote the correct use of sewage sludge on such land.

Specifications

In order to prevent harmful effects on soil, animals, plants and human beings, the Directive differentiates between treated and untreated sewage sludge (Article 6)¹¹, sets limit values for concentrations of heavy metals (Articles 4 and 5)¹², regulates the application of sewage sludge depending on the crops grown as well as the time of their harvest¹³ and sets limits for areas designated for grazing¹⁴ (Article 7). Furthermore, it takes into account the nutrient needs of plants, the protection of surface and groundwater and the pH of the soil (Article 8). The Directive does not include limit values for **nitrogen** and **phosphorus**.

The Directive sets limit values for the concentrations of heavy metals in soils (Annex IA), sludge for use in agriculture (Annex IB) and regarding the amounts which may be added annually to agricultural land, based on a ten-year average (Annex IC). According to the Directive, sewage sludge application has to be banned whenever the concentration of one or more metals in the soils exceeds the limits set by the Directive. Member States have also to ensure that those limit values are not exceeded as a result of accumulation by using sewage sludge.

Reference methods for analysing and sampling of sewage sludge and soils are specified in Annex IIA, IIB and IIC. Furthermore, comprehensive up-to-date records have to be prepared providing information on the quantities of sludge produced and used in agriculture, its composition and properties, the type of treatment, the names and addresses of the recipient as well as the sites where sludge is used. Member States are requested to send a consolidated report every four years to the Commission. These sectoral reports shall cover other waste legislation too.

State of Play

The European Commission is currently drafting a new Directive which has been subject to highly controversial discussions. The proposal is likely to be issued at the second half of 2004, at the same time as the proposals on soil monitoring and biodegradable waste and a Communication on soil erosion, decline of organic matter, and contamination are expected (Issue Tracker Dec. 2003).

The draft proposal aims to extend the definition of sewage sludge to cover sludge from urban waste water treatment plants, septic tanks, domestic waste water from dwellings, and certain industrial sectors¹⁵ and to require prior biological, chemical or heat treatment of sludge according to the specific use to be made of land. Besides imposing stricter limit values for concentrations of heavy metals¹⁶ in sludge, the proposal aims to introduce limit values for organic compounds, dioxins and for nitrogen leaching. By setting requirements for organic compounds, from which a large number contains

¹¹ Application of untreated sewage sludge is prohibited unless it is injected or worked into the soil.

¹² Cadmium, Copper, Lead, Mercury, Nickel and Zinc.

¹³ Application is banned on soil in which fruit and vegetables (except fruit trees) are grown as well as ten month preceding harvesting fruit and vegetables which are normally in direct contact with the soil and eaten raw.

¹⁴ A minimum period of not less than three weeks after the application of sewage sludge must be kept before harvesting or grazing can take place.

¹⁵ Food and drink (dairy, baking and confectionery, beverages), fibre and paper, and the leather industry.

¹⁶ Chromium will be included within the list of heavy metals.

phosphorus, and for nitrogen leaching, the new proposal addresses the **diffuse pollution caused by nitrogen as well as by phosphorus**. Currently discussed is also the objective to reduce the level of heavy metals and organic compounds going into the sludge at the source (before entering the sewer), with the aim of making 75 per cent of urban sludge suitable for landspreading within 20 years. Furthermore, new standard sampling and analytical methods will be incorporated (Issue Tracker March 2004).

Interaction with other Directives

Due to the progressive implementation of the Directive on **Urban Waste Water Treatment (91/271/EEC)**, many new treatment plants will come into operation by 2005¹⁷ resulting in a significant increase by 50 per cent of the amount of sewage in Europe.¹⁸ For some countries, the quantities of sewage sludge will increase by nearly 300 per cent by 2005, e.g. Ireland and Portugal. The expected increase is itself a challenge for waste management and the choices of treatment and disposal will have large economic and environmental implications. The increasing quantities of sewage sludge, the more strict requirements of the **Landfill Directive (99/31/EC)** regarding organic waste and of the forthcoming new **Directive on Sewage Sludge** will have a significant impact on whether sewage sludge is used for agricultural purposes, disposed by landfilling or used for incineration. It is expected that landfilling will fall by 24 per cent while incineration will increase by about 300 per cent (EEA 2001a).

2.2.3 Common Agricultural Policy (Cross-Compliance and Rural Development Programmes)

Due to the latest reform of the Common Agricultural Policy (CAP), adopted by the EU farm ministers on 26 June 2003, a fundamental step has been done to integrate environmental concerns into the agricultural policy. As regards the reduction of the **diffuse pollution of nitrates and phosphorus**, the introduction of a compulsory Cross-Compliance Scheme for all direct payments (2003/1782/EC) and the strengthening of the Rural Development Regulation (2003/1783/EC) are of the main interest. With the **Cross-Compliance Scheme**, environmental and nature conservation conditions will be attached to the payments received by farmers under the CAP. The **Rural Development Regulation**, a financial instrument of the CAP¹⁹, brings together a number of policy measures in one single instrument, including agri-environmental measures.²⁰ The Rural Development Regulation aims to put in place a consistent and lasting framework for guaranteeing the future of rural areas and promoting the maintenance and creation of employment.

The **Cross-Compliance Scheme** will be compulsory for all Member States and progressively introduced from 2005 onwards. Therefore, every farmer throughout the EU receiving payments under the CAP has to comply with a certain number of European legislation related to environment, food safety, animal health and welfare as well as occupational safety.²¹ In the case of non compliance, the total amount of direct payments will be reduced or cancelled. The focus of the scheme is:

- To support the implementation of statutory management requirements established by Community legislation in the fields mentioned above;
- To enforce the definition of good agricultural conditions by the Member States;

¹⁷ In December 2005, secondary treatment of waste water have to be established for agglomerations of between 10 000 and 15 000 p.e. and for agglomerations of between 2 000 and 10 000 discharging to fresh-water and estuaries.

¹⁸ http://themes.eea.eu.int/Environmental_issues/waste/indicators/sewage/index.html.

¹⁹ The financial instrument of the CAP is the European Agricultural Guidance and Guarantee Fund (EAGGF), The Rural Development Programmes are included in the Guarantee Section.

²⁰ The new regulation include the 'accompanying' measures of the 1992 reform (early retirement, agri-environment, afforestation and support for less-favoured areas) and measures to modernise and diversify agricultural holdings (farm investment, setting-up of young farmers, training, investment aid for processing and marketing facilities, additional assistance for forestry and the promotion and conversion of agriculture).

²¹ According to Annex III of the Regulation (2003/1782/EC), farmers have to comply with 18 Legislation until 2007

- To avoid land abandonment by introducing land management obligations.

As regards the reduction of **nitrogen** and **phosphorus**, the Cross-Compliance Scheme requires compliance with the following legislation:

- Council Directive 86/278/EEC on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture (compliance with Article 3);
- Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources (compliance with Articles 4 and 5).

Up to now, the Water Framework Directive is not included within the Cross-Compliance Scheme.

The **Rural Development Programmes** (Regulation 2003/1783/EC) have been strengthened by introducing new measures and increasing the funds. Member States have thus the opportunity to shift more funds to the Agri-Environmental Programmes that aim to enhance more environmental friendly agricultural production systems, and to introduce within these programmes specific measures in order to reduce the diffuse pollution of nitrogen and phosphorus from agriculture. Furthermore, the Rural Development Programme provide new support to farmers for compliance with demanding, newly introduced, Community standards, such as those resulting from the WFD.

It is expected that the enhanced integration of environmental concerns into the payments to the farmers will have positive environmental impacts such as, e.g. a reduction of nitrogen and phosphorus caused by agriculture.

Interaction with other Directives

Regarding the interactions between the Rural Development Programmes and the WFD, it has to be taken into account that for both legislation, Member States have to define codes on Good Farming Practices. The Codes of Good Practice required under the WFD should to be incorporated into or added to the codes on Good Farming Practice under the Rural Development Programmes of the CAP. Farmers receiving payments under the Rural Development measures should comply with the codes under the WFD.

2.2.4 Study on Phosphates and Alternative Detergent Builders

Introduction

Recognition of the relationship between increasing phosphorus inputs to surface waters and the subsequent increase in eutrophication of water bodies gave rise to public concern during the 1970's and 1980's and led to actions by some EU member states. The focus of the actions taken was placed upon the reduction of phosphorus loads from urban and industrial sources whereas agricultural as the second most important source was firstly neglected. The main actions that have been taken at the national level before EU legislation came into force in this field are the following:

- To reduce the amount of sodium tripolyphosphate (STPP) used in detergent builders and switch to 'alternative' non-phosphate based builders, such as Zeolite A;
- To improve waste water treatment.

In 1991, the European Urban Waste Water Treatment Directive (91/171/EEC) was adopted with its strict requirements regarding the water quality. The Directive has contributed significantly to the reduction of the amount of phosphates in surface water bodies.

The European Commission facilitated a research project²² addressing the current use of phosphates in detergents throughout the European Union, Switzerland and USA. Detailed case studies have been

²² Glennie E B et al. 2002: Phosphates and alternative detergent builders – final report. Report No.: UC 4011. 31 May 2002

General Information: <http://europa.eu.int/comm/environment/water/phosphates.html>

Study: <http://europa.eu.int/comm/environment/water/phosphates.pdf>

undertaken for eight countries.²³ The studies provide an overview of the relevant voluntary and legislative measures, an assessment of their environmental impacts, an overview of the phosphate and zeolite industries in Europe and a comparative life cycle analysis between STPP and Zeolite A based detergent builders. Furthermore, recommendations are provided regarding the most appropriate methods of reducing phosphorus concentrations in surface waters.

Results of the Study

According to the results of the study, the main sources of phosphorus entering surface waters are municipal waste water and agriculture. However, the relative importance of these sources varies widely between catchments, depending on the degree of urbanisation, the standard of sewage treatment and the nature and intensity of agricultural practices. These natural conditions as well as landuse activities have to be taken into account for developing and implementing the most effective measures.

Regarding detergent builders for household laundry, it was stated that STPP contributes to up to 50 per cent of soluble (bioavailable) phosphorus in municipal waste water. Several countries²⁴ implemented voluntary or legislative actions addressing the substitution of STPP with Zeolite A resulting in substantial reduction of this detergent builder since the early 1980's. In most other countries within the EU, a steady downward trend in STPP consumption could be stated although there was no formal action taken. This implies widespread acceptance of zeolite based detergents.

However, a ban on the use of phosphate based detergents such as STPP would bring about a phosphorus load reduction of up to 40 per cent, which is not sufficient in isolation to result in any substantial improvements. Furthermore, improvements in waste water treatment to fully comply with the Urban Waste Water Directive (91/171/EEC) would only result in a phosphorus reduction of around 30 per cent. In order to significantly reduce eutrophication and improve the trophic status of surface water bodies, a phosphorus reduction of 70-90 per cent is necessary.²⁵ To achieve this, a combination of measures has to be applied.

Recommendations

- Member States shall enhance the full implementation of the Urban Wastewater Treatment Directive (91/171/EEC);
- Identify and implement 'best management practices' for agriculture in order to reduce the amount of phosphorus;
- Identify measures on a regional or local scale taking into account the natural conditions (soil, vegetation, inclination), agricultural production systems (intensive versus extensive), the population density (rural areas versus agglomerations) and efficiency of the treatment plants;
- In rural areas with extensive agricultural production systems, measures focussing on the improvement of the wastewater treatment might be the most effective way to reduce the amount of phosphorus in surface waters;
- In areas with intensive agricultural production systems, specific measures have to be identified addressing the agricultural methods and promoting best land management practices;
- The most economical way of achieving a given target for reducing inputs of phosphorus is, according to the study, first to change to Zeolite A as detergent builder, while improvements in sewage treatment are carried out.

²³ Belgium (Walloon Region), France, Germany, Hungary, Italy, Netherlands, Switzerland and USA.

²⁴ Germany, Italy, the Netherlands and Switzerland.

²⁵ Compared to 100 per cent STPP based detergents and no nutrient removal from wastewater.

Future Development

The European Commission has asked the Scientific Committee on Ecotoxicity, Toxicity and the Environment to review STPP in detergents independently on the results of the presented study. Up to now, it is not decided whether a proposal to ban STPP as a phosphorus builder in household detergents will be issued (Issue Tracker March 2004).

3 Challenges for Regional and Local Authorities

3.1 Challenges Specific to the WFD and the Programme of Measures

Although the WFD affects national legislation in the first place, its implementation process might still have considerable implications for local and regional authorities, especially regarding the implementation and ongoing planning process of the programme of measures, as imposed by the WFD.

Legislation and Planning

- For the implementation and planning process of the WFD, an establishment of river basin management districts is required. As this new approach will likely collide with the traditional administrative structure for water management, there will be a need to restructure the administrations (regional, local);
- Based on the status report 2004/5 and the monitoring results, environmental objectives for all water bodies in each the river basin management district have to be defined including the goals and targets (local, regional);
- In order to achieve the environmental objectives, the competent authorities have to ensure the establishment of a programme of measures for the river basin management district by the end of 2009 (regional, local);
- Regarding the Programmes of Measures, the competent authorities have:
 - to define the relevant basic measures (minimum requirements) for achieving the environmental objectives as set in the Basin River Management Plans (regional, local);
 - if necessary, to define the relevant supplementary measures such as economic and fiscal instruments, codes for good practices, voluntary agreements or development and demonstration projects (regional, local);
 - to ensure that the most cost-effective combination of measures will be identified based on the information provided by the status report 2004/5 and the monitoring (local, regional);
 - to implement and to control the basic and supplementary measures (regional, local).

Co-operation

- For implementation and management of the programmes of measures, an enhanced co-operation and co-ordination among different levels of administration as well as among the different disciplines, stakeholders and the public is crucial from the very beginning of the planning process. This will also help to find the most cost-effective measure to be taken (local, regional);
- The competent authorities have to:
 - to develop a co-ordination network, work plan and a timetable indicating the various co-ordination steps within the planning process (local, regional);
 - to ensure that the public is involved by setting up the programmes of measures (local, regional);
 - to provide the relevant information to the public (local, regional);
 - to facilitate the consultation and active involvement of the relevant stakeholders (local, regional).

Analysis and Monitoring

- The competent authorities have to ensure a detailed and co-ordinated assessment of the characteristics of the river basins by the end of 2004 and co-ordinated monitoring programmes by 2006 (regional, local).

Financing

- The competent authorities have to provide the financing for the measures defined in the programme of measures. For this, funds from European and national level, e.g. the funds provided by the Common Agricultural Policy (see Chapter 3.2.2), can be used.
- Regarding the implementation of the Codes of Good Practice for agriculture under the WFD, the financial instruments of the Common Agricultural Policy can be taken into account. Under the European Agricultural Guidance and Guarantee Fund (EAGGF), the Guarantee Section finances within other measures the Rural Development Programmes including the Agri-Environmental Programmes (1783/2003/EC). As the development and implementation of the Rural Development Programmes lays within the responsibility of the Member States, specific measures addressing the reduction of phosphorus in agriculture could be integrated in the Agri-Environmental Programmes. Regional or local authorities will be responsible for setting up adequate monitoring systems and for controlling the compliance with these programmes.

3.2 Challenges Specific to the Sources of Pollution

3.2.1 Challenges specific to the Nitrates Directive

Legislation and Planning

- Establishment of a monitoring programme (national);
- Designation of vulnerable zones (regional, local);
- Establishment of an Action Programme addressing the vulnerable zones (national);
- Identifying the measures of the Action Programme taking into account the specific conditions of the vulnerable zones (regional, local);
- Development of a code of good agricultural practice while taking into account
 - the requirements of the Water Framework Directive and the Regulation of the CAP (Cross-Compliance, 2003/1782/EC and Rural Development Programmes, 2003/1783/EC);

- the specific regional and local conditions;
- Providing the relevant information and education to the farmers (regional, local).

Monitoring and Reporting

- Monitoring and controlling of the compliance with the Directive (regional, local);
- Identifying synergies between the Nitrate Directive and the Water Framework Directive regarding the harmonisation of water sampling points, networks, parameters and frequencies for quality monitoring (national, regional, local).

3.2.2 Directive on Sewage Sludge

Legislation and Planning

- Improving the collection and treatment of sewage sludge as it is required by the Sewage Sludge Directive and the Urban Waste Water Treatment Directive (91/271/EEC) (national, regional, local);
- Select methods and specifications of limits for heavy metals in sludge and soil (national);
- Designation of competent authorities to regulate the spreading of sludge on agricultural land, e.g. those created for the Waste or Water Framework Directive (national);
- Setting up restrictions on cropping and sludge use in accordance with the Directive (national);
- Identify areas where sewage sludge will be spread (regional, local);
- Sludge producers have to deliver the relevant information²⁶ to the authority and to the landowners where sludge will be applied (national, regional, local);
- Optional implementation method: Establishment of a prior authorisation procedure requiring a permit to spread sludge on farmland. In issuing permits, consideration should be given to the linkages between sludge disposal and potential for transmission of pathogens to the human food chain, and into water courses or supplies through nutrient leaching (national, local).

Monitoring and Reporting

- Ensure analysis and monitoring of soils and sludge (national, regional, local);²⁷
- Ensure the analysis of soils and sludge for the following parameters:
 - Sludge: Cadmium, Copper, Lead, Mercury, Nickel, Zinc, pH, Nitrogen Phosphorus, Organic substances and dry matter; and
 - Soil: Cadmium, Copper, Lead, Mercury, Nickel and Zinc, pH.
- Establishment of an appropriate laboratory system, data recording and reporting systems (national, regional, local);
- Sampling of the soil in each proposed spreading area at a frequency determined by the competent authority (regional, local);
- Controlling producers and users of sludge (local);

²⁶ Comprising information on the quantities of sludge produced and used in agriculture, its composition and properties, the type of treatment, the names and addresses of the recipient as well as the sites where sludge is used.

²⁷ Frequency for carrying out sludge analysis: every 6 months.

Frequency for carrying out soil analysis: Decision taken by the Member States can decide taking into account the metal content of the soil prior to the use of sludge, the quantity and composition of the sludge used and any other relevant factors.

- Controlling the sludge from small plants which are exempted from treatment requirements, and from keeping records on composition or spreading location (local);
- Provide relevant information to competent authorities upon request, producers and users of sludge and the public (local).

Technical Standards and Guidance

- Provide a guidance note or a Code of Practice on acceptable methods of sewage sludge treatment and on use of land, grazing or cropping and spreading of sludge and the types of sludge permitted for certain crops (national, local).

Financing

- The main costs will arise for the establishment of adequate laboratories and procedures for analysis and monitoring of soils and sludge, and the provision of training programmes for producers and users of sewage sludge as well as for the administration.
- At the local level, the main costs can be expected for monitoring and controlling as well as for gathering and editing all relevant information. To comply with the requirements will be even more expensive as the proposal of Sewage Sludge Directive imposes stricter limit values for concentrations of heavy metals in sludge including newly introduced limit values for chromium, organic compounds, dioxins and for nitrogen leaching.
- Due to both, the requirements set by the Urban Waste Water Directive and the forthcoming Sewage Sludge Directive, treatments plants, spreading techniques as well as disposal facilities for sludge must be modernised or newly constructed. Regarding the treatment of sewage sludge, the proposal on Sewage Sludge requires prior biological, chemical or heat treatment of sludge according to the specific use to be made of land.
- Furthermore, it has to be taken into account that in areas where metal levels in sludge are found to be very high, or where the soil is very acidic or have a high metal content, it may not be possible to use the spreading route for disposal of sludge. In these cases alternative ways to deal with sludge have to be found, including landfill or incineration. This may lead to further high additional costs. Metal levels may be reduced by a better control of industrial effluents discharged to sewer, but additional costs will be incurred in the increased requirements for treatment by industry and by the inspection and enforcement regime controlling these effluents.
- In the case of the introduction of a permitting system, cost will arise for its establishment and implementation.²⁸

3.2.3 Common Agricultural Policy (Cross-Compliance and Rural Development Programmes)

Legislation and Planning

- To define and implement the requirements as imposed by the Cross-Compliance Scheme (national);
- To develop and implement Rural Development Programmes and thus Agri-Environmental Programmes (national, regional);
- To define codes for good agricultural conditions as required by the Rural Development Programmes taking into account the regional and local conditions (national, regional).

²⁸ European Commission 2003: Handbook for Implementation of EU Environmental Legislation.

Co-ordination and Co-operation

- Enhance co-operation and co-ordination among different levels of administration as well as among the different disciplines as the cross-compliance scheme as well as the rural development programmes address various stakeholders and imposes various requirements for controlling and monitoring (national, regional, local).
- While identifying and implementing the codes on Good Farming Practices under the Cross-Compliance Scheme and the Rural Development Programmes, the requirements of the WFD it should be taken into account. The Codes of Good Practice to be defined and implemented within the programmes of measures for the river basins districts should be incorporated into or added to the codes on Good Farming Practice under the Rural Development Programmes and the Cross-Compliance Scheme of the CAP (regional, local).

Monitoring and Reporting

- To implement monitoring and controlling systems as required by the cross-compliance scheme and the rural development programmes (regional, local);
- To react in the case of non compliance by setting penalties, such as the reduction or the cancellation of the direct payments (regional, local).

Conclusion

The nutrient pollution of water bodies by point and diffuse sources is a cross cutting environmental problem. At the European level, several policy areas are addressing this field including policies related to water, waste and agriculture. However, the Water Framework Directive, the Waste Framework Directive and the Common Agricultural Policy can be regarded as the most important legislation and policies. In the past, the main focus of water and waste related EU legislation was concerned with emission controls from point-sources, such as waste water discharges from industry and urban areas whereas the legislation related to the CAP have dealt mainly with strategies addressing diffuse water pollution. The implemented policies have successfully led to the improvement of water quality in many water bodies across Europe, especially due to the reduction of pollution from point sources.

Recently, various efforts have been made at the European level to address in a more comprehensive way the pollution from diffuse sources. With the new Water Framework Directive, EU water policy has moved from an approach based on emission and quality targets to more integrated strategies, establishing the ecological quality of water bodies as the main goal to be achieved. The programmes of measures to be established for each river basin will include basic and supplementary measures addressing point and diffuse sources of pollution.

Furthermore, the European Commission is currently drafting a new Directive on Sewage sludge aiming to introduce limit values for dioxins, organic compounds - from which a large number contains phosphorus - and for nitrogen leaching. On the other hand, the European Commission is developing a European Strategy for Soil Protection addressing various threats for soils, while the contamination of soils by diffuse pollution is one of the main threats.

In addition, diffuse pollution has been addressed in a stricter way by the latest reform of the Common Agriculture Policy. Due to the now obligatory Cross-Compliance Scheme, farmers have to comply with certain statutory requirements, such as the Nitrate Directive, in order to be eligible for the direct payments under the CAP. As regards the Rural Development Programmes, Member States will have more funds available for the Agri-Environmental Programmes and thus the opportunity to implement in a better way measures which directly address the pollution from nitrogen and phosphorus.

The implementation of the Water Framework Directive as well as the other directives and legislation pose a major challenge for all EU Member States and for the New Member States in particular. For the implementation, monitoring and control of the requirements, an enhanced co-operation and co-ordination among the different levels of administration as well as among the different disciplines and stakeholders is crucial. This will be especially important regarding the identification of the most cost-effective measures for each river basin and sub basin as required under the Water Framework Directive taking into account the specific regional and local, natural, economical and social conditions. A close co-operation and co-ordination is also important for financing the various measures required by the directives as well as the most effective allocation of available funds. For example, codes of 'good agricultural practice' have to be identified and implemented, as required by the Water Framework Directive, the Nitrate Directive and by certain Regulations of the Common Agricultural Policy. While developing the codes of good agricultural practice the various requirements of the different directives should be taken into account in order to establish a coherent and comprehensive code of good agricultural measures.

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