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The Importance of Monitoring for the Effectiveness of Environmental Directives

A Comparison of Monitoring Obligations in European Environmental Directives

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1. Introduction

The goal of environmental directives is to protect the environment and public health. In order to achieve this goal, environmental directives contain different instruments, such as quality standards or emission standards. Complying with these standards should result in a healthy environment. It is therefore crucial to ensure that Member States actually comply with these norms. In order to do so, many directives contain additional instruments, such as the obligation to set up action programmes, a licensing system, mandatory or voluntary best practices or the obligation to monitor and report the results to the European Commission. These obligations are essential for directives to be effective, but the form and contents of these obligations differ. This paper focuses on monitoring obligations. Monitoring is crucial in order to determine whether environmental quality standards are being complied with, whether additional measures or adaptations of action programmes are necessary, and to assess which measures are effective. Some directives contain quite strict norms with detailed information on when and where to monitor, whereas other directives leave the Member States much more freedom.

This may seem like a minor difference, but in the end it can be decisive for the assessment of the effectiveness of the directive. Accurate information concerning the effectiveness is necessary to gain insight into the need to adapt the measures taken. This need to adapt the measures taken is a particular challenge in modern environmental law dealing with complex and dynamic ecosystems.

The way in which a Member State monitors the state of the environment and the effect of measures strongly determines the monitoring results and the comparability between Member States. For example, research shows that under the previous air quality directives there were differences between the Member States in the assessment of air quality, which led to substantially different results in adjacent areas on the two sides of the same border.[1] It is clear that such results do not reflect the factual situation. However, the results could lead to additional measures in one Member State, without measures being taken in the other Member State.

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1 C.W. Backes et al., 'Transformation of the first Daughter Directive on air quality in several EU Member States and its application in practice', 2005 *European Energy and Environmental Law Review* 14, no. 6, pp. 157-164.

The aim of this paper is to identify and analyse different methods of monitoring in EU environmental directives and explain different approaches towards monitoring obligations. This will enable us to make recommendations for the design of monitoring obligations that produce the best results in relation to the various goals of monitoring. The focus on adaptiveness in environmental directives is a recent development. It is important to assess the role of monitoring efforts in relation to adaptiveness. Especially in relation to the often transboundary issues in water law, the monitoring of differences between Member States is important.

This paper will start with a description of monitoring and its objectives. Next, monitoring obligations in different environmental directives will be described. We will focus on differences between those directives and the role of monitoring with regard to flexibility and a programmatic approach that enables adaptive environmental protection.

2. Monitoring

Monitoring is not an objective in itself, but is a means to help reach an objective. Monitoring requirements may serve different objectives. Not every objective is equally important in a monitoring system; this may vary between directives and between various monitoring obligations. However, it is important to know why monitoring is prescribed in a directive. And it is particularly relevant to determine the most appropriate design of the monitoring requirements.

A first and very important objective of monitoring is to check compliance with the norms. Many environmental directives contain environmental quality standards. The only way to evaluate the effectiveness of these directives is to monitor environmental quality in the Member States. The monitoring data can provide the necessary information to establish whether a Member State complies with the environmental quality standards prescribed in a directive.

A second objective of monitoring is that a database filled with yearly monitoring results allows the detection of trends in the development of environmental quality in a certain area, i.e. to see whether environmental quality has improved or deteriorated.

A third objective, related to the first two, is the comparability between Member States. Monitoring results from different Member States may allow comparison of environmental quality. Environmental quality standards are not only meant to improve the environment, but also to create a level playing field. If a Member State does not comply with the norms, this may create economic advantages for companies that do not have to comply with strict environmental standards. Monitoring results may contribute to the discovery of such differences. This goal is therefore closely connected with compliance checking, but more from the point of view of protecting other Member States than of protecting the environment.

Last but not least, monitoring may contribute to adaptiveness. This goal of monitoring is related to all of the objectives mentioned above. In order to comply with environmental quality standards, in most cases it will be necessary to take certain measures, in the form of an action programme or otherwise. Results of monitoring may show whether these measures have been effective. If environmental quality standards are complied with or environmental quality is at least improving, measures have been (relatively) effective. Comparing the situation with that in other Member States may show that some measures are more effective than others, although this of course also depends on environmental circumstances. This information on the trends in environmental quality, linked to measures taken in an action programme for example, is very valuable for the assessment of the effectiveness of those measures. This information is very helpful for Member States that do not yet comply with the environmental quality standards and have to adapt their action programme in order to take more effective measures.

As will be pointed out in this paper, the goal of a monitoring programme must be kept in mind in the design of the monitoring programme and therefore the design of the monitoring obligations in environmental directives.

However, not only the objectives of a monitoring system are important in the design of monitoring obligations. The need for flexibility, for possibilities to combine monitoring with existing monitoring systems in the Member States or for monitoring against reasonable costs may also play a role in the design.

3. Monitoring in the Nitrates Directive

The Nitrates Directive[2] stipulates as its overall objective the reduction of water pollution caused or induced by nitrates from agricultural sources and the prevention of such pollution (Article 1). In order to achieve this objective, the Member States can choose two approaches. First, Member States may identify waters which are (likely to be) affected by nitrate pollution from agricultural sources and designate land which drains into these waters as nitrate-vulnerable zones (Article 3(1)-3(4)). For these vulnerable zones, action programmes must be established (Article 5). The second option is that Member States apply the action programmes established following Article 5 throughout their territory, in which case the identification of vulnerable zones is not necessary (Article 3(5)). Minimum requirements for the action programmes are laid down in Annex III of the Directive. It follows from Article 5(5) that additional measures shall be taken by the Member States if the basic measures are insufficient to achieve the overall objective of reducing and preventing nitrates pollution.

To be able to check whether the objectives of the Directive are actually attained, monitoring is necessary. The Directive contains different obligations for monitoring. In the first place, the level of nitrates pollution must be monitored. The monitoring requirements for this purpose depend on the system chosen by the Member State. For Member States which have designated vulnerable zones, Article 6 contains a monitoring obligation for the designation and revision of these zones. It must be safeguarded that all vulnerable zones are designated, which means that the monitoring cannot be limited to the designated zones only. The Member States must be able to prove that outside the designated areas, there is no actual nitrates problem.

For Member States which apply the action programmes to their entire territory, the Directive contains an obligation in Article 5(6) to 'monitor the nitrate content of waters at selected measuring points which make it possible to establish the extent of nitrate pollution in the waters from agricultural sources'. This requirement means that it is not sufficient to establish only nitrates levels, but the source of this pollution must be identified as well.

A second monitoring obligation concerns the effectiveness of the action programmes. This obligation is contained in Article 5(6) as the 'obligation to draw up and implement suitable monitoring programmes to assess the effectiveness of action programmes established pursuant to this Article'. This obligation is addressed at both Member States with designated vulnerable zones and Member States using the whole-territory approach. The only difference is that for the first group of Member States the action plans are only drawn up for the designated areas and the monitoring can therefore be limited to those areas, whereas the second group is obliged to apply the action programmes in their whole territory, so they must monitor the effectiveness in the whole territory as well. The outcome of this type of monitoring may result in adaptations of the action programme, if it proves to be ineffective.

The monitoring of nitrates levels has as its main goal the checking of the compliance with the Directive, whereas the monitoring of the effectiveness of the action programmes is more focused on adaptiveness: if the measures taken are not effective, the action programmes must be adapted.

For the monitoring of the effectiveness of action programmes, the Nitrates Directive does not contain very clear or precise criteria. The Member States are free to set up their own monitoring programme, as long as this programme is 'suitable to assess the effectiveness of action programmes'. There are no obligations as to the frequency of sampling, the density of the monitoring network, the methods used et cetera. This resulted in significant differences between the Member States, as shown by a report on the monitoring of the Nitrates Directive.[3]

The most apparent difference between the Member States is the choice between the upscaling approach and the interpolation approach. For the upscaling approach, a limited number of representative areas is identified. This approach is used in Denmark and the United Kingdom for example.[4] The data gathered

2 Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources, OJ L 375, 31.12.1991, p. 1.

3 B. Fraters et al., *Developments in monitoring the effectiveness of the EU Nitrates Directive Action Programmes. Results of the second MonNO3 workshop, 10-11 June 2009*, RIVM Report 680717019/2011.

4 RIVM, *Optimalisatie van het basismeetnet van het Landelijk Meetnet effecten Mestbeleid*, RIVM Report 680717027/2012, pp. 44-45.

in these areas are used to calculate nitrate loads in the rest of the country. The interpolation approach on the other hand is based on samples taken throughout the country on many different locations. The Netherlands and the Flanders region of Belgium apply this approach.[5] Both approaches can provide for a suitable monitoring programme. However, it is difficult to compare data from the two approaches. This limits the possibilities for comparison between Member States with different approaches. At the same time, a switch in a Member State from one approach to the other is quite complex. Firstly, a whole new system and network must be established, but moreover such a switch would result in a discontinuity in measuring data. This makes it impossible to compare data from one year to the other, thus rendering it virtually impossible to detect trends and to assess the effectiveness of the action programmes. In order to assess the effectiveness, it is of course necessary to compare the situation before and after the actions of a specific action programme are implemented. This is more important than the possibility to compare data with another Member State.

However, the choice for the upscaling approach or the interpolation approach is not the only difference; Member States using the same approach can still opt for different sample frequencies, different densities of the monitoring network, monitor at different depths or in different periods, et cetera. All these differences complicate the comparison of data even between Member States applying the same approach. For comparability of data from different years within one Member State, continuity in the monitoring network is highly important. Changes in the network, in sample frequencies et cetera make assessing the effectiveness of an action programme more difficult, although the Directive does not as such prevent adaptation of the monitoring programme. In some cases adaptation may even be necessary to gather enough relevant information.

Although the Directive does not contain detailed requirements for monitoring, the European Commission did try to give guidelines for monitoring. This resulted in the Draft Guidelines for the monitoring required under the Nitrates Directive.[6] However, these Guidelines, dating from 2003, have never been officially adopted and even if they had been adopted, they would still only have been guidelines and thus not binding on the Member States. There is only a draft version of the Guidelines and this version cannot be found on the website of the European Commission. Section 6 of these Draft Guidelines concerns the monitoring of the effectiveness of action programmes. The Guidelines recommend combining this monitoring with the monitoring of the designated areas or of the complete territory, and if necessary add other samples. In order to assess the effectiveness of action programmes, changes in agricultural practices must be determined. Monitoring should focus on areas with intensive agricultural activities and elevated nitrate levels.

The Member States may use these Draft Guidelines as an inspiration for establishing their monitoring programme, but the European Commission cannot enforce this. The Member States are only obliged to comply with the requirements of the Directive, which implies that other monitoring programmes are allowed as well, as long as they are 'suitable'. It is primarily a technical question whether or not a monitoring programme can be regarded as 'suitable' and what sample frequency and density of the monitoring network is necessary to gather representative results.

It is important to note that the Nitrates Directive contains the possibility to apply for a derogation of the norms for the use of livestock manure and fix a higher level of manure per hectare (Annex III, Paragraph 2(b)). Many Member States actually opted to use this possibility, which results in a Commission decision.[7] Such a decision does not only contain the possibility to use larger amounts of manure, but also additional requirements concerning the administration of manure application. Farmers may be obliged to draw up fertilization plans and keep fertilization accounts if they wish to use the derogation. The derogation decisions also contain additional monitoring requirements. These requirements are adapted to the approach chosen by the Member State for their regular monitoring programme. For the Netherlands and Belgium, the monitoring prescribed in the derogation decision is based on the interpolation

5 RIVM, *Optimalisatie van het basismeetnet van het Landelijk Meetnet effecten Mestbeleid*, RIVM Report 680717027/2012, pp. 41-42.
6 European Commission, *Draft Guidelines for the monitoring required under the Nitrates Directive*, 2003.
7 See for example, Commission Decision of 5 February 2010 amending Decision 2005/880/EC granting a derogation requested by the Netherlands pursuant to Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources (2010/65/EU), OJ L 35, 6.2.2010, p. 18.

approach,[8] whereas the derogation decisions for Denmark and the UK prescribe the upscaling approach.[9] The derogation decisions contain much more specific monitoring requirements than the Directive itself and these requirements are tailored to fit into the existing systems. This means that for Member States with a derogation, the possibility to change their existing monitoring network are limited, since they will at least have to comply with the requirements from the derogation decision.

As to the goals of the monitoring obligations from the Nitrates Directive, some comments are in order. In the first place, the broad description of the monitoring obligations leaves the Member States much freedom in the design of their monitoring programmes. This freedom makes it hard to guarantee the quality of the information gathered in all Member States. It can therefore be doubted whether the monitoring data give an accurate view of the environmental quality and of the compliance with the norms from the Directive. The monitoring programmes normally allow the assessment of trends in nitrate pollution within a Member State. However, this is only possible as long as no major changes are made to the monitoring programme. Otherwise, it will be difficult to compare the result from year to year. Comparison of monitoring results with other Member States is difficult, given the large discretion in monitoring and the resulting differences between the monitoring programmes and approaches in the different Member States. With regard to adaptiveness, the monitoring requirements are specifically designed for this purpose. The monitoring programme must be suitable to assess the effectiveness of the action programme. If monitoring results show that the action programme is not effective, it must be adapted. If another Member State shows a remarkably strong downward trend in nitrates pollution, this may also be a reason to see what measures have been taken in that Member State. If some measures appear to be very effective and may also work in other Member States, this may also be a reason to adjust an action programme.

4. Monitoring in the Water Framework Directive

The Water Framework Directive[10] (WFD) has a broad purpose: to establish a framework for the protection of water (including surface water and groundwater), which inter alia prevents deterioration and reduces pollution and discharges. In order to determine whether this purpose is being attained, the Water Framework Directive requires in Article 5 that for each river basin district or for the portion of an international river basin district falling within a Member State's territory, an analysis be made of its characteristics, the impacts of human activities on the status of surface water and groundwater, and an economic analysis of water use.[11] The WFD aims for an integrated approach of physical, climatological, environmental and societal changes, since the relations between organizational, environmental, instrumental and physical elements of a water system cannot be denied.[12] The causes of these changes and the physical, ecological or societal effects of these changes must be known before it is possible to react to these changes, which is the reason that Article 5 requires this analysis. This information is necessary to take adequate, proportionate and fair measures to improve and protect the status of water bodies. Knowing the cause of a problem makes it easier to tackle it.

8 Commission Decision of 5 February 2010 amending Decision 2005/880/EC granting a derogation requested by the Netherlands pursuant to Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources (2010/65/EU), OJ L 35, 6.2.2010, p. 18, and Commission Implementing Decision of 29 July 2011 on granting a derogation requested by the Kingdom of Belgium with regard to the region of Flanders pursuant to Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources (2011/489/EU), OJ L 200, 3.8.2011, p. 23.

9 Commission Implementing Decision of 23 October 2012 on granting a derogation requested by the Kingdom of Denmark pursuant to Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources (2012/659/EU), OJ L 295, 25.10.2012, p. 20, and Commission Decision of 29 May 2009 granting a derogation requested by the United Kingdom of Great Britain and Northern Ireland with regard to England, Scotland and Wales pursuant to Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources (2009/431/EC), OJ L 141, 6.6.2009, p. 48 (expired on 31 December 2012).

10 Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, OJ L 327, 22/12/2000, p. 1.

11 R. Brouwer et al., 'Integrated river basin accounting in the Netherlands and the European Water Framework Directive', 2005 *Statistical Journal of the United Nations Economic Commission for Europe* 22, no. 2, pp. 111-131.

12 H.F.M.W. van Rijswick & E.M. Vogelezang-Stoute, 'The Influence of Environmental Quality Standards and the River Basin Approach taken in the Water Framework Directive on the Authorisation of Plant Protection Products', 2008 *European Energy and Environmental Law Review* 17, no. 2, pp. 78-89.

The analysis of the physical situation of river basins and the impact of human activities is combined with the obligation to establish programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of the water status in each river basin district (Article 8). The more detailed monitoring requirements are to be found in Annex V to the WFD. The monitoring programme has to cover the volume and level or rate of flow to the extent relevant for the ecological and chemical status of surface water. For groundwater, such programmes must monitor the chemical and quantitative status and for protected areas the monitoring programmes are supplemented by specifications following from the legislation on the basis of which they acquired their protective status. For instance for a natural area (e.g. a forest or a swamp), specific water objectives follow from the nature conservation objectives established by the nature management plan for the area. Monitoring programmes for surface waters should provide information for the effective design of future monitoring programmes and for the assessment of long-term changes (1.3.1), for the establishment of the status of water bodies at risk of failing to meet their environmental objectives and for changes in their status resulting from the programmes of measures (1.3.2). Groundwater monitoring must provide a reliable assessment of the quantitative and chemical status of groundwater bodies (2.2.1, 2.4.1 and 2.4.3) and information on long-term upward trends in pollution (2.4.1-2.4.4).

The monitoring data shall be used to update the river basin management plans in a 6-year planning cycle. If the monitoring data reveal that the objectives for the current planning period will not be met in time, they are used for intermediate revision of the programme of measures. The monitoring data must be reported to the Commission three years after the publication or update of each river basin management plan (Articles 11 and 15 (3) WFD). These interim reports are to describe progress in the implementation of the planned programme of measures. The Commission uses the national reports for its own report on the status of the WFD implementation for the whole EU.[13] Assessing the physical situation and human impacts and relevant changes is a good adaptive approach, but for real adaptive water management, there should be an obligation to act on the basis of this information. The WFD provides for such an obligation to act: Member States shall take the necessary measures to achieve the objectives and adjust their programmes of measures.

The monitoring obligations from the WFD therefore serve different purposes. In the first place, monitoring is important in order to gather information on water status and compliance with the norms. Annex V clearly shows that monitoring is also important in order to identify long-term trends. There is also a form of adaptiveness where monitoring data result in adjustments to the monitoring programmes, river basin management plans and programmes of measures. Furthermore, reports on the implementation of the WFD allow for comparisons between Member States.

5. Monitoring in other environmental directives

Of course the Nitrates Directive and the Water Framework Directive are not the only directives containing monitoring obligations. Many other environmental directives contain monitoring obligations as well, e.g. the directives in the field of air quality. Directive 2008/50/EC on ambient air quality[14] contains a chapter on the assessment of ambient air quality, which includes a differentiation between the assessment of ozone and of other substances. This Directive contains assessment criteria, criteria for determining sampling points and provisions concerning reference measurement methods. These provisions are elaborated in the annexes. Directive 2008/50/EC contains more detailed and less open-ended provisions on monitoring than its predecessor, Directive 96/62/EC on ambient air quality assessment and management[15] and its daughter directives. This is a positive development in order to gather comparable results. The possibility to use modelling techniques in addition to fixed measurements, however, still allows diverging monitoring results between the Member States. Different modelling techniques may result in apparent differences in air quality on the two sides of a border. This complicates comparisons of the air quality in different

13 See for example the EU Water Blueprint, COM(2012) 673 final.

14 Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe, OJ L 152, 11.6.2008, p. 1.

15 Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management, OJ L 296, 21.11.1996, p. 55.

Member States and does not give appropriate insight into whether and if so what additional measures could be necessary.

Other directives, especially in the field of water protection, contain monitoring requirements as well, e.g. Directive 76/160 concerning the quality of bathing water.[16] This Directive dates from another period in EU environmental lawmaking and has been replaced by Directive 2006/7.[17] But even the first Bathing Water Directive contained quite specific requirements considering sampling frequencies and methods of analysis (Articles 5 and 6 and the Annex). The new Bathing Water Directive is even more specific as regards monitoring points, frequencies et cetera (Articles 3 and 4 and Annexes I-V). Of course, the provisions concerning sampling and analysis are of a technical nature and do leave some space for interpretation. There may be differences in the execution of these provisions between the Member States.

Where for other directives, the monitoring requirements are not often the subject of infringement procedures, this is different for the Bathing Water Directive. France was convicted by the ECJ, inter alia for failing to carry out sampling operations in conformity with the obligations from the Directive.[18] The Netherlands was convicted for a similar failure in monitoring,[19] as were Sweden[20] and Denmark.[21] This may relate to the strict monitoring requirements. It is easier to prove that a minimum sampling frequency from a directive has not been met than to prove that a monitoring programme is not 'suitable'.

6. Differences in requirements concerning monitoring

In conclusion, there are several environmental directives containing provisions regarding monitoring, especially in the fields of water and air quality. These provisions differ in the level of detail concerning sample points, sample frequency and methods of analysis. However, differences in Member States' monitoring methods may lead to incomparable monitoring results and improbable differences in environmental quality on two sides of a border. Especially when the monitoring results are linked to action programmes or when the non-compliance with environmental standards leads to the obligation to take additional measures, it is important that monitoring results are reliable in order to improve the effectiveness of environmental directives and to maintain a level playing field. This relates both to adaptiveness and comparability, as monitoring goals. If a Member State can avoid the obligation to take additional measures not because the standards have been met, but because of the monitoring system, this would obstruct a level playing field and lead to lower environmental quality. At the same time, monitoring operations are often rather expensive and time consuming. It is understandable that Member States may wish to keep their monitoring systems as low-key and simple as possible, and that they prefer to avoid non-compliance and having to take additional measures.

As has been shown in the previous paragraphs, the Nitrates Directive contains rather open norms regarding monitoring. This has led to different monitoring approaches in the different Member States. As long as a Member State sticks to the same system, monitoring results over different years can be compared in order to establish trends in nitrate levels. This comparison is especially important in order to determine the effectiveness of action programmes and decide whether additional measures must be taken. The comparability with data from other Member States is limited because of different approaches, but also within the same approach differences in frequencies, density of the network et cetera may exist. This comparability between Member States is not required by the Directive, but would be useful in order to determine the effectiveness of measures taken in other Member States. Such information could be valuable when deciding on additional measures in the action programmes. Comparison of monitoring results and the effectiveness of action programmes are particularly relevant in the field of

16 Council Directive 76/160/EEC of 8 December 1975 concerning the quality of bathing water, OJ L 31, 5.2.1976, p. 1, replaced by Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC, OJ L 64, 4.3.2006, p. 37.

17 Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC, OJ L 64, 4.3.2006, p. 37.

18 ECJ 15 March 2001, C-147/00, *Commission v. France*, [2001] ECR I-02387.

19 ECJ 19 March 2002, C-268/00, *Commission v. the Netherlands*, [2002] ECR I-02995.

20 ECJ 14 June 2001, C-368/00, *Commission v. Sweden*, [2001] ECR I-04605.

21 ECJ 30 January 2003, C-226/01, *Commission v. Denmark*, [2003] ECR I-01219.

water management, since river basins are often transboundary. The failure of an action programme in one Member State may have immediate effects on the status of waters in the rest of a river basin or in adjacent marine waters.

Whereas comparability of data from different Member States would generally be useful, comparability of data from different years within one Member State is necessary. The trend in nitrates pollution over the years must be visible in order to assess whether or not the action programme is effective. This renders it difficult to apply major changes to the monitoring system, or at least requires transitional measures to make the transition smoother and ensure a certain level of comparability of data.

The WFD contains extensive provisions concerning the monitoring of both surface waters and groundwaters in Annex V. This Annex is very comprehensive and detailed and contains many preconditions for monitoring. Member States still do have some margin of discretion in setting up their monitoring systems, but their freedom is more limited than under the Nitrates Directive.

In general we see a growing need and attention for adequate monitoring. In the field of air quality, the new Directive 2008/50/EC contains rather detailed criteria for monitoring and also leaves the Member States less freedom in using calculations and correction factors than its predecessor.

The Bathing Water Directive contains very detailed monitoring requirements. Several Member States have had to face infringement procedures for failure to carry out their monitoring programmes in conformity with the obligations from the Directive.

This means that there are significant differences between directives in the way monitoring obligations are formulated and elaborated. In view of the subsidiarity principle, it makes sense to leave the Member States as much freedom as possible. However, it is to be expected that such freedom will lead to major differences between Member States, making it difficult to compare the situation in different Member States and to protect and improve the environment, especially in the event of transboundary effects. It is therefore up to the EU legislator to decide on the importance of monitoring and of differences in monitoring systems between the Member States. Provisions concerning monitoring should be included in the relevant directive itself and in its annexes. For the Nitrates Directive, an attempt was made to lay down rules in a guidance document, but in the first place this document was never officially adopted and in the second place a guidance document can never impose obligations on Member States. Such a document would therefore primarily be an aid to Member States struggling with the setting up of a monitoring programme, but adaptations of existing monitoring programmes to these 'requirements' are not to be expected.

An explanation for differences between monitoring requirements from different environmental directives may be found in the objective of the directives. Some directives, such as the Bathing Water Directive and the Drinking Water Directive, contain quality standards directly related to human health, whereas other directives, such as the Nitrates Directive and the Water Framework Directive, are mainly aimed at environmental protection in general. Where human health is concerned, it is more important that quality standards are met, and this could result in more detailed and stricter monitoring obligations. However, directives are often compromises between Member States, so other factors may be relevant as well. For example, the norms of the Nitrates Directive are quite strict and difficult to comply with for many Member States. A combination of strict norms and detailed monitoring obligations may have been a bridge too far. Another explanation may be that the directives analysed were drawn up in different periods, which may also influence legislative traditions.

7. Flexibility

Monitoring requirements can be flexible in various ways. In the first place, the requirements themselves may be highly detailed, or leave the possibility to adapt them to national circumstances. In the second place, they may trigger a need to make changes to an existing monitoring network in order to optimize the network. The Nitrates Directive does not contain clear standards for the monitoring methods or the number of annual measurements. This leaves the Member States some freedom and allows them to choose a system that best fits their existing networks. This may be applauded. On the other hand, it creates differences in the information available from the Member States, making it very hard or in fact

impossible to compare the situation and the effectiveness of action programmes in different Member States. As long as a Member State continues to use the same monitoring system, the effects of the measures from their action programme can be determined. However, comparing the effectiveness of measures taken in various Member States will be very difficult.

The most important incentive under the Nitrates Directive for the Member States to really gather all relevant information is probably the need for a derogation. Many Member States have trouble complying with the norms of the Directive. The European Commission's support is necessary to obtain a derogation, and that is the reason that it is wise to be cooperative and show a willingness to take the nitrates problem seriously. Taking monitoring seriously is one way to do so. Changing the monitoring system, for example to reduce costs, leads to a breach in results, blocking the possibility to compare results with those from previous years. This would render it impossible to detect any trends in nitrates pollution, whereas showing a diminishing nitrates problem is important in order to convince the European Commission that the derogation is only temporarily necessary and that the Member State will comply with the standard norms eventually.

Monitoring requirements should at least be flexible in such a way that good monitoring results may lead to fewer monitoring obligations in the future. In an area where the norms have been complied with for a long time, there is no need to keep up a high monitoring frequency. It is smarter to invest in monitoring in areas where environmental quality standards are regularly exceeded. The Nitrates Directive contains such a provision in Article 6(1)(b). In areas where the nitrate levels have been low in previous samples and if there are no factors likely to increase the levels, the monitoring programme for the designation of nitrate-vulnerable zones will only need to be repeated every 8 years instead of every 4 years.

In a European Union of 28 Member States, there are many differences between the Member States concerning geographic conditions, but also concerning existing legislation and monitoring systems. This implies that differentiation in norms and deadlines may be necessary to accommodate these differences. It may be much more difficult for certain Member States than for others to comply with certain norms because of their specific geographic characteristics. At the same time, monitoring requirements may impose a heavy administrative burden upon Member States. One way to diminish this burden is to allow Member States to combine the monitoring of a directive with existing structures. However, this may lead to undesirable differences between Member States, problems in comparing monitoring results and possibly differences between environmental protection levels in the different Member States. These interests must be balanced.

In the Report of the Consultation of the Subsidiarity Monitoring Network on the Review of EU Air Quality and Emissions Policy,[22] respondents consider the flexibility of the existing air quality directives to be insufficient, especially in the light of specific meteorological or topographical conditions that cannot be influenced by the Member States. However, flexibility must be more than the postponement of deadlines. This call for more flexibility does not specifically concern flexibility in the monitoring requirements.

8. Programmatic approach

It can be rather difficult to comply with environmental quality standards, especially when every single decision in a project must take such a standard into account. Simply formulating environmental quality standards does not suffice. It is important to gain knowledge concerning the causes of quality standards being exceeded and to adjust the action programmes to the monitoring results, i.e. adaptive management. In this sense, the Nitrates Directive is a quite modern directive, even though it dates from 1991. Other directives, such as the WFD, but also the NEC Directive[23] and air quality directives, have adopted similar approaches. However, it is important to note that the Nitrates Directive cannot be seen as a very successful

22 <http://extranet.cor.europa.eu/subsidiarity/Documents/Air%20policy%20targeted%20consultation/Air%20Quality%20Final%20Report%20EN.pdf> (last visited 27 March 2014).

23 Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants, OJ L 309, 27.11.2001, p. 22.

directive.[24] Water quality and monitoring are improving, but only slowly. Many Member States still need a derogation from the norms in the Directive, allowing for higher amounts of livestock manure and for the WFD nitrate still seems one of the most difficult parameters to comply with. A reduction of input of nitrates does not necessarily result in measurable improvements of environmental quality in the short term. Water quality only improves with quite a long delay.

In recent years, more and more often a programmatic approach has been used as an aid to comply with the standards of a directive. The directive itself may prescribe the setting up of an action programme, or Member States may choose to do so in the implementation of a directive. In the Netherlands, in the field of air quality, a programme has been set up containing a list of projects with a positive or negative influence on air quality and an overview of the autonomous development of air quality. Projects listed in this 'National Cooperation Programme Air Quality' (*Nationaal Samenwerkingprogramma Luchtkwaliteit*) do not have to be tested against the air quality norms, since the complete programme has been accepted as being in accordance with these norms. The European Commission has approved the Programme and granted a derogation to achieve the limit values for NO_2 and PM_{10} at a later date.[25] For nitrogen, a similar programmatic approach has been formulated in the Netherlands.

The Water Framework Directive is fully based on an approach where programmes of measures, preferably transboundary ones, should support the achievement of the goals.

The backbone of a programmatic approach is a good, reliable monitoring system, because monitoring results indicate whether existing measures need to be adapted.

9. Conclusion

Environmental directives contain different kinds of provisions concerning monitoring. Some directives contain detailed requirements, whereas other directives contain more open norms, such as a 'suitable' monitoring programme. Both systems have their pros and cons. The advantage of an open system is the possibility for the Member States to adapt the monitoring system so as to fit with existing national structures. This decreases administrative burdens and offers more flexibility. On the other hand, open norms lead to differences between Member States, which makes it difficult to compare situations and the effectiveness of measures taken in different Member States. Especially with regard to transboundary issues this is highly important. Differences in monitoring methods may even lead to different conclusions concerning the question whether or not a Member State complies with the environmental quality standards stipulated in a directive. This may have consequences for the obligation to take additional measures and disturb the level playing field.

Monitoring is crucial in order to determine whether environmental quality standards are complied with, whether additional measures or adaptations of action programmes are required, and which measures are effective. This stresses the importance of clear provisions concerning monitoring. Open norms can be used, but their advantage must be balanced against the need for comparable data from different Member States.

We have seen an improvement in the design of monitoring obligations in EU environmental directives, with different requirements depending on the specific monitoring goals. We recommend that especially in cases where flexibility and adaptiveness are leading in an environmental directive, monitoring requirements should be designed in such a way that all monitoring objectives can be achieved, with specific attention for the design of monitoring requirements that aim to facilitate the adaptiveness of the particular legislation. In more recent legislation, the attention for the design of monitoring requirements seems to have increased. ¶

24 Report from the Commission to the Council and the European Parliament on the implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources based on Member State reports for the period 2008–2011, COM(2013) 683 final, pp. 10-11.

25 Decision C(2009)2560, 7 April 2009.