Water Framework Directive

- WFD Implementation in a European Perspective

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Report from a workshop at the
Royal Swedish Academy of Agriculture and Forestry
29 November, 2005

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At a previous KSLA conference on the WFD held in January 2005 it was demonstrated that the number of water bodies not maintaining *Good Ecological Status* is dependent on how the characterisation is performed and that the methodology includes many subjective and political considerations.

In this report focus is put on how some European countries implement the WFD and how EU will treat the differences. Special emphasis is put on the characterisation process and to what extent this includes public participation.

Background

The EU member states are presently performing the characterisation of their water bodies according to the EU Water Framework Directive (WFD). Due to different national conditions concerning the natural status of and the anthropogenic pressures on water bodies, the member states are allowed to perform the characterisations differently.

At the KSLA conference on the WFD in January 2005 it was demonstrated that the number of water bodies not maintaining "good ecological status" will be dependent upon how the characterisation is performed. The methodology includes many subjective and political considerations. Hence it can be foreseen that the EU member states will handle the characterisation step differently, which will have tangible implications for the national management and action plans and thereby on most sectors affecting water quality, for example agriculture, forestry and aquaculture.

This second KSLA workshop on the WFD focuses on how some EU-members implement the directive and how EU will handle differences in implementation among its member states. Special emphasis is put on the characterisation process and to what extent it includes public participation.

An overview of River Basin Districts (RBDs) in Europe

Sindre Langaas, the County Administrative Board in Stockholm. Based on data from Susanna Nilsson, KTH

Article 3 of the Water Framework Directive (WFD) demands that all individual river basins should be identified and assigned to river basin districts (RBDs). This process should have been finalized by the end of 2003. International river basins - and there is quite a few of these in Europe - should be assigned to international river basin districts. Furthermore, member states are encouraged to establish cooperation and manage international water resources on the basin level.

Mantra East is a research project, basically aiming at evaluating to what extent this has been achieved. How many river basin districts have been established? How large are they?

RIVER BASIN DISTRICTS IN EUROPE

Figure 1. 105 river basin districts have been defined and reported as requested in the WFD. The largest one is the Danube, covering 806 000 km². The smallest one is Malta (333 km²). One third of the reported RBDs are international. In spatial terms, international RBDs cover 70 % of the total area.

How many are international and how are they trying to establish cooperation and work transnationally or transboundary? The data presented here are some of the results from the Mantra East project.

A number of EU countries did not report their RBDs to the Commission in due time, and as shown in figure 1, two countries had still not done so by June 2005. Up to date, 105 river basin districts have been defined and reported as requested in the WFD. The largest one is the Danube, covering 806 000 km^2. The smallest one is Malta (333 km^2). One third of the reported RBDs are international. In spatial terms, international RBDs cover 70 % of the total area. However, these figures can be disputed, since there is no clear definition of what an international river basin district is.

Figure 2 presents the geography of international RBDs, using a definition developed by the Mantra East Project. This definition is not legally binding for the member countries, and

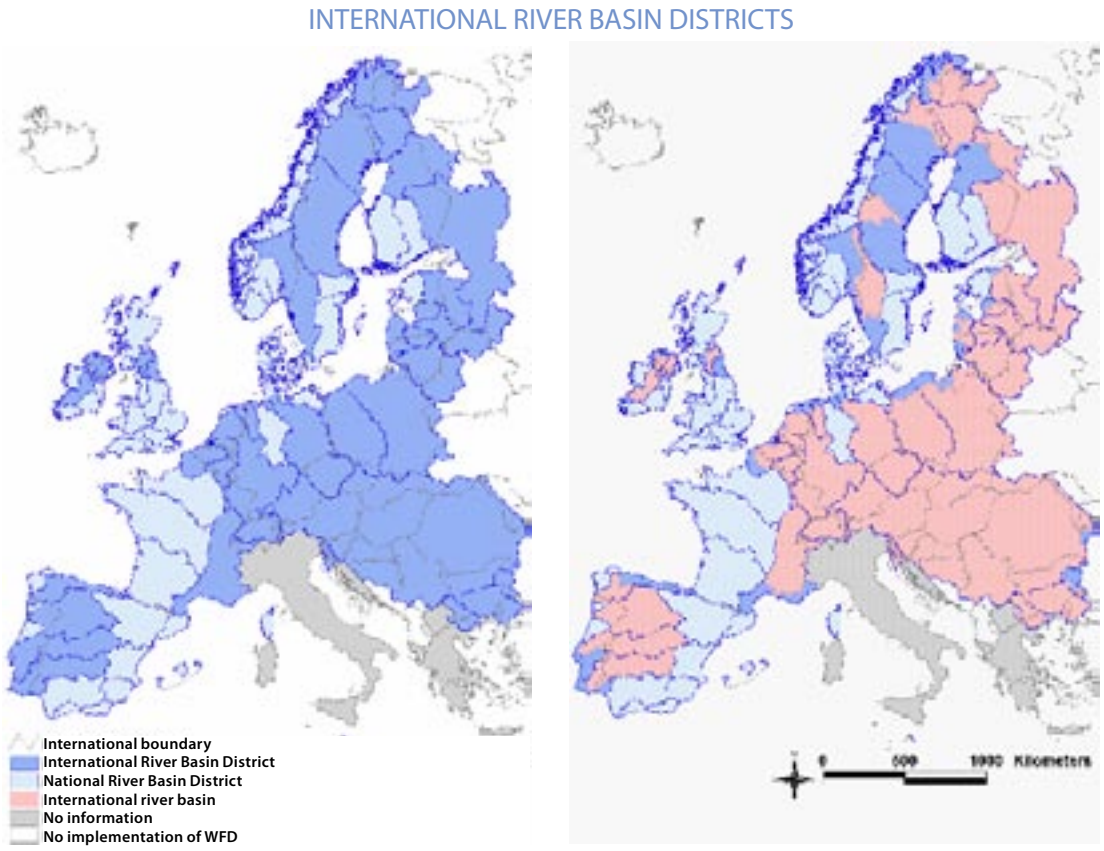

Figure 2. The geography of international RBDs, using a definition developed by the Mantra East Project. This definition is not legally binding for the member countries, and in some cases the interpretation of international RBDs as shown on the map has been disputed.

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In most cases the international river basins and the matching districts are quite similar. However, there are cases where an international river basis only is a small part of a district. The northernmost Swedish RBD is an example of this. It covers a number of national river basins but also one – the Torne älv – which is international.

Just about half, 51 %, of the international RBD involves EU member states only, while 9 % involves member states and candidate countries like for example Bulgaria and Romania.

If we instead look at this in a statistical way and try to characterise those river basin districts that are international and national respectively, 51% of the international RBDs are entirely within the EU. There are 9 % that include member states and candidate countries (for example Bulgaria and Romania), and 31 % that include both member states and countries outside the EU, like Russia and Belarus. There are also more complicated cases.

In most cases (63 %), the international RBDs involve only two countries. However, 14 % involves three countries, another 14 % involves four and the remaining 9 % involves five or more countries.

Study on the interface between WFD planning and spatial planning systems in the countries around the Baltic Sea

Patrick Lindblom, Nordregio

Inevitably, implementation of the WFD implies confrontation with established legislative and planning systems. What will happen when we implement the directive in the context of spatial planning? This question may be answered by the Trabant project, an activity within the Baltic Sea Region Interreg IIIB project. The research project will run between autumn 2005 and June 2007, under the supervision of the Finnish Environmental Institute SYKE. Thirteen partners are involved in the project. Nordregio and KTH (The Royal Institute of Technology in Sweden) will carry out studies concerning the interface between the directive and the spatial planning systems in the countries in concern.

Major questions that will be addressed by the Trabant project are:

- How will the systems adopt through the implementation of the WFD?
- How are the systems integrated?
- What are the experiences in different countries concerning the implementation of the Water Framework Directive?
- What are the main problems in the countries in this concern?

The projects involve two kinds of studies. The first one is a comparative study of the eleven different countries within the Baltic Sea Region (Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Northwest Russia, Belarus, Poland and Sweden). This study will be carried out by Nordregio and focus on how the directive will affect the spatial planning in these countries.

In addition, three or four case studies will be carried out, addressing issues of special interest. KTH will take the lead in the case studies, specifically three of them. There will be a focus on the four pilot river basins of the Trabant project (Vuoksi, Daugava, Narva and Nemunas). In addition one case study on international RBDs (not yet defined) will be carried out.

The outcome from the Trabant project will be presented and discussed at two workshops. Furthermore, a web-based network of knowledge on the implementation of the directive

and how it affects spatial planning in the Baltic Sea Region will be set up. In addition the results will of course be presented in a report.

The Trabant project will provide a broad picture of the "New European Water Management Geography".

Water framework directive implementation in six countries

Finland

Seppo Rekolainen, SYKE (Research Department of the Finnish Environmental Institute)

Legislation and administration

In Finland, the WFD has been transposed to national legislation (*Lag om vattenvårdsförvaltninge*n). The report giving background data on the water districts was submitted to the Commission as required in article 5 of the WFD. Furthermore, a lot of preparatory work has been carried out, for example classification and monitoring, definition of heavily modified water bodies and river basin management plans. However, this far no final decisions have been made concerning how these things will be implemented in Finland.

So far no government funding at all has been assigned for implementing the WFD. In Sweden there has been a discussion on the Polluter Pays Principle and how it can be used for funding the implementation of WFD. This is not too complicated as long as we are dealing with point polluters. For quite some time an established system for making point polluters responsible for the costs for wastewater treatment has existed. However, there is no such system for other kinds of polluters, for example the agricultural sector, and there have been many discussions on what kind of system is needed.

Eight River Basin Districts have been established in Finland. Three of them are international, covering river basins that Finland shares with Sweden, Norway and Russia. (Figure 3.)

Concerning the decision-making process and the responsibility for implementation of the directive, the Ministry of Environment is to take the lead. On the government level the Ministry of Agriculture and Forestry will also have a say, especially on WFD issues related to water resources, fish and fisheries. The Finnish Environment Institute is also mentioned in the legislation, but no specific responsibility is laid upon the institute. The Ministry of Environment will supervise and give tasks to the Institute. The same is true for some other research institutes, especially The Game and Fisheries Research Institute, which will be supervised mostly by the Ministry of Agriculture and Forestry.

The 13 Regional Environment Centres, governed by the Ministry of Environment, are responsible for the initial characterisation of water bodies and other preparatory work as listed in article 5 of the WFD. This work is almost completed, and summaries of the characterisation were included in the article 5 report submitted to the Commission in March 2005.

The Regional Environment Centres are also responsible for:

- Pressure and impact analysis
- Economic issues
- Preparing classification
- Organising monitoring
- Preparing river basin management plans and programme of measures

Some of these tasks are new to the centres. There has been a lot of cooperation between them, and it has been an important task for the Finnish Environment Institute to support them with knowledge and expertise. The institute has put a lot of effort into establishing harmonized procedures in order to maintain the compara-

bility of the work of the regional environmental centres.

However, it must be stressed that the role of the scientists and the scientific bodies is advisory only. Even the regional environmental centres will only have the task to prepare decisions on classification of water bodies. The legal framework is still not in place, but the preparatory work indicates that the final decisions on classification, defining reference conditions and heavily modified water bodies will be made by the government.

There has been some political debate on the implementation of the WFD in Finland, and different interest groups have been active in the process. Representatives from interest groups are also participating in working groups preparing the new legislation, and one can expect a rather intense political debate once the final proposals are put forward.

RIVER BASIN DISTRICTS IN FINLAND

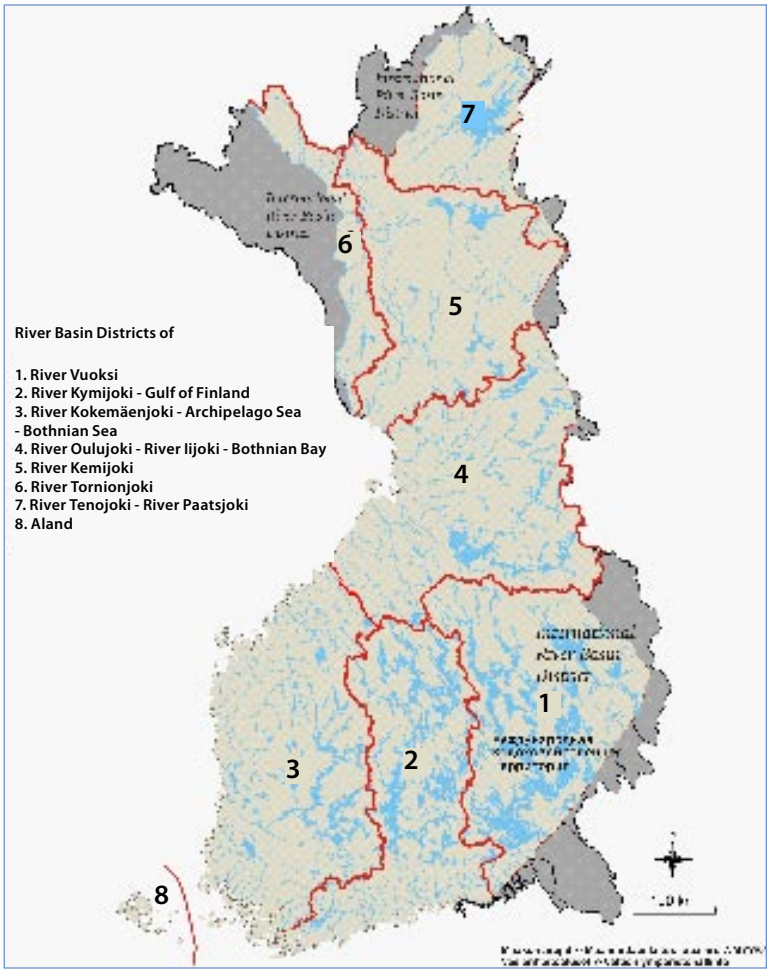


Figure 3. Eight River Basin Districts have been established in Finland. Three of them are international, covering river basins that Finland shares with Sweden, Norway and Russia.

Characterisation of water bodies

The article 5 report submitted to the Commission by the Finnish government is unfortunately only available in Finnish.

The Ministry of Environment decided to report only lakes larger than 40 km2, which excludes a vast number of small lakes. The same goes for the rivers, where only river basins exceeding 1 000 km2 are included. This means that many rivers in southwestern Finland, though heavily polluted especially by agriculture, are not included in the report. In general, there are bigger problems with the small rivers and small lakes than in the larger water bodies.

The WFD should be implemented for all water bodies regardless of size. Therefore it is not certain that the Commission will be accept the exclusion of smaller water bodies in the Finnish report.

Finland has also reported preliminary types of lakes, rivers and coastal waters. The report also includes preliminary definitions of heavily modified water bodies. However, there are no reported reference conditions, only an outline of some basic principles on how reference conditions could be defined. Pressures are reported rather comprehensively, identifying main sources and including quantification of the pressures within every single river basin district. Impacts are only reported briefly, but there are preliminary estimations of water bodies at risk.

Defining reference conditions

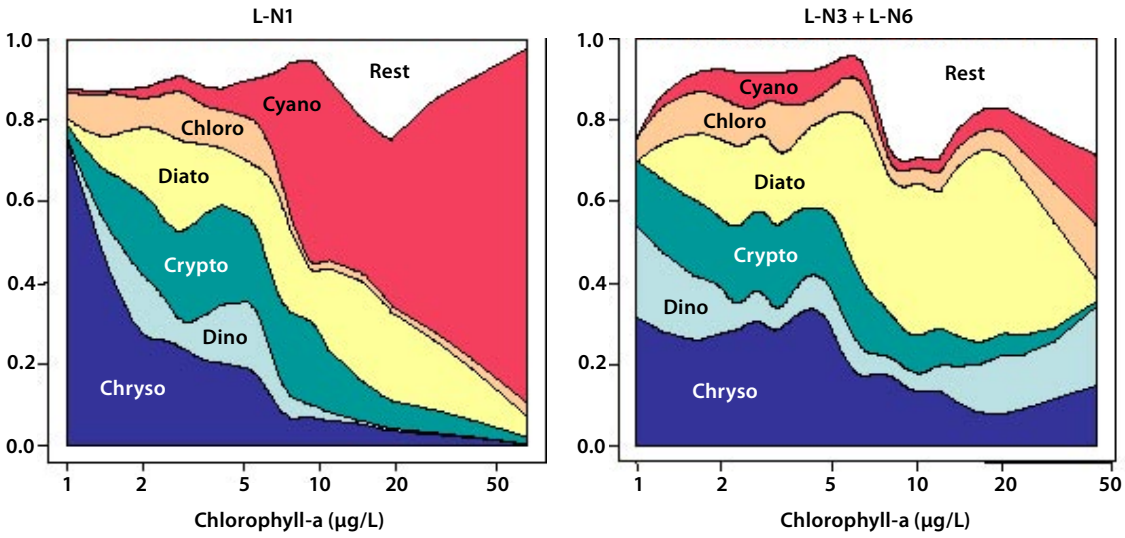
Scientists at the research institutes mentioned above have made some proposals on how the reference conditions could be established. The starting point is the national water quality database, managed by the Finnish Environmental Institute. It contains data from all Finnish lakes where more than three water quality samples have been analyzed during the period 1980–2000. More or less all chemical and many biological samples are collected in the database. The database could be used to define reference conditions, provided the following water bodies were excluded:

- Sites with the water quality classified worse than satisfactory (based on a Finnish national classification).
- Sites situated downstream from point source pollution.
- Sites where the basin holds more than 20 % agriculture in terms of land use, in consistence with the limit suggested by the reference guide document.
- Sites where there are a high number of households not connected to sewage treatment systems.
- Sites showing deteriorative trends in water quality.

Coastal water bodies are a different story. There certainly are many kinds of coastal waters where reference sites cannot be found. The same may be true for some lowland rivers and some lakes. In these cases, other techniques must be developed. Modelling might be useful. As concerns coastal waters there is some very old data that might be useful, but in the end expert judgements will be decisive in this case.

In establishing the classification system we have to quantify the class boundaries. The intercalibration exercise is going on, the deadline according to the directive is at the end of 2006. The member states are waiting for the results of this process before they decide on the final boundaries and the classification system. This is understandable, since any country establishing a classification system that is very different from that of other member states will have a problem.

Figure 4 shows some results from one Nordic Geographic Intercalibration Group (GIG). The group has been analyzing phytoplankton data from all countries belonging to GIG, looking at how phytoplanktons are reacting when the



Phytoplankton in Nordic lakes: Shallow, non-humic lakes

Phytoplankton in lakes: Shallow, humic lakes

Figure 4. When chlorophyll, phosphorus, phosphorus loading, biomass etc increase there are dramatic changes in the phytoplankton composition and even some sharp drops or increases in certain groups can be seen and these sharp changes are now used as approximations for rapid changes which could be considered as natural thresholds. They could be proposed to act as boundary values between good class and bad class.

pressure is increasing. As can be seen in the graphs there seem to be some natural thresholds that may be used to define boundary values. However, the graphs also show that different lake types react in different ways on increasing nutrient load. This gives a clear indication that a classification system that is universal for all kinds of lakes cannot be developed.

Classifying water bodies

Once a classification system is established another big problem arises. How is a water body classified? This is the next step in implementing the WFD. In Finland the regional environment centres are more or less solely responsible for this, and they must be able to handle a considerable amount of uncertainties.

When sampling a lake – are we always sure of getting the true picture? No, there is a whole range of uncertainties. If we take ten samples it is not unlikely that we get ten different values of any given parameter. If all samples are within the "good" class there is not a problem. If all samples are within the "moderate" class (or worse) it is still fairly simple: the lake belongs to a class where a program of measures must be developed. But what if we get another picture? Let us say that 10 % of the samples are in the "high" class, 60 % of the samples are "good" and 30 % worse than good. Then another question must be answered: how big a risk is there for misclassification and to what extent can misclassification be accepted?

One must also discuss the "One out, all out-principle", which means that the poorest of the quality elements assessed should alone

define the classification of a water body. There have been discussions on this in the European countries, but there seem to be a common understanding that this principle should apply. In general this means that the larger the number of quality elements (QEs) that we assess, the bigger the risk of misclassifications. A small study on this has been performed in Finland. The study showed that if we look separately at four QEs (fish, macrophytes, benthos and phytoplankton) there is a 20-30 % risk of misclassification. Using the same data and the "one out, all out-principle" gives a 50 % risk of misclassification. In principle, the idea that different biological elements are sensitive to different pressures may be good, but still it seems that the more elements we bring in the higher risk of misclassification.

Sweden

Björn Sjöberg, the County Administration Board of Västra Götaland, and the Water Authority of Skagerrak and Kattegatt area, Sweden

Legislation and administration

Initially, Sweden had rather much of a "wait-and-see-attitude" towards the implementation of the WFD. We did not engage in the pilot river basin project and cannot claim to have been a leading partner in the preparatory work or in the development of the common implementation strategy. However, this has changed. Today, there are clear signals from the central political level expressing that the directive is not only to be considered as an important international undertaking, but also as a major tool by which we can reach some of our national environmental targets.

Out of this change of attitude a national strategy for implementing the WFD has evolved. It consists mainly of three elements:

- An administration as small as possible, maximum use of existing structures and resources.
- Integration with ongoing work related to water management and environmental objectives.
- Long-term commitment for the benefit of sustainable water management rather than a "quick and dirty-attitude" aiming only at fulfilling the reporting requirements using as little effort as possible.

The FWD has been partly transposed into the Swedish legislation, primarily through an amendment to the Environmental Code, and a special Regulation on the Administration of the Quality of the Water Environment. The legal status of environmental objectives and the possibility to enforce decided programmes of measures are still uncertain, basically due to possible conflicts between the Environmental Code and the Building and Planning Act. Two reports related to this question are at the moment under consideration by relevant authorities, and a third report will be published soon. It is uncertain when we can expect these issues to be clarified.

As concerns financing, it seems that Sweden is better off than Finland. Year 2005 there was a 50 million SEK government grant for implementing the directive. About half of this has been distributed among the County Administrations in accordance to population, water resources and environmental pressure. The water authorities have received 16 million SEK, while the EPA (Environmental Protection Agency) and the Geological Survey has got 3 million each for compiling the article 5 report and giving general support to the water authorities. For year 2006 there is a proposed increase to 70 million SEK. Still this is only half of what has been estimated as a minimum to fulfil the WFD requirements.

On the government level, the Ministry of Sustainable Development is in charge of the implementation of WFD. The ministry also houses the Swedish water director. The Swedish EPA is the central governmental agency for environmental policy and nature protection, at the EU- and at international levels. The EPA is also responsible for national reporting to the commission and it has the authority to develop advice and regulations regarding most aspects of the directive, with the exception for ground water related issues, which is the responsibility of the National Geological Survey. In addition this government board also provides geological data and information necessary for the characterisation of water bodies.

At the regional level, the 21 County Administrative Boards are responsible for regional environmental monitoring and supervision of all waters and for inspection and enforcement of all activities that may have an impact on water quality or water resources. They have been given the main responsibility for administrating and implementing the directive.

At the local level, the municipalities share the responsibility with a number of governmental agencies for ensuring compliance with legislation in the environmental area, particularly with regard to water supply, water treatment and waste management.

Sweden has been divided into five regional River Basin Districts (RBD), each draining into one of the major sea basins surrounding Sweden. Furthermore, five County Administrations have been appointed the regional water authorities.

It is important to note that that no government body has the authority to coordinate the work of the five regional water authorities. The Swedish EPA and the Geological Survey of Sweden are the only central agencies that have a specific role in the implementation process. Still, there are of course many other central agencies and government bodies that must contribute to the work if the aims of the directive should be reached. It has been a strategy among the water authorities to identify relevant governmental bodies and initiate a dialogue with them, aiming at defining areas of responsibility. Some examples are the Swedish Board of Agriculture, the National Board of Fisheries, the National Board of Forestry and the Swedish Meteorological and Hydrological Institute (SMHI).

Each regional water authority is governed by a committee, chaired by the county governor. The members of the committees are appointed by the government on a non-political basis. The committees are exclusively responsible for decisions on environmental objectives, programs of measures and river basin management plans in their respective RBDs.

Each water authority has a secretariat lead by a water management director. Their task is to do preparatory work for decisions in the committees and to organize the work within the district. All RBDs are subdivided into two or more districts, with a county responsible for organizing the work within each. All counties have obligations, equal on all level, being responsible for information and contributions from their own counties.

The water authority organize work on district level, developing guidelines and strategies with input from other authorities and consultative groups representing different areas of interests. The county administrations are responsible for collecting necessary information within their districts, and for initiating regional and local cooperation and engagement in Water Councils.

Sweden had the same intention as Denmark (see below) as concerns integrating the implementation of the WFD with the habitat directive (Natura 2000) and our national environmental objectives.

There is a disagreement between the municipalities and the government on where the final decisions on classification etc. are to be taken. Today the RBDs and their governing committees are in charge, but the last word on this has not yet been said. The National Organisations of Municipalities have the right to appoint members to the committees, but have not yet done so, for two reasons. One is that they claim that if they should be on the committees, they should be in power, i e have the majority, because they are the ones that eventually would have to pay much of the costs of measures taken. Their position is that either they should be given the authority, or all decisions regarding monitoring, objectives and measures should be taken on the governmental level.

Cooperation and coordination

Right from the start the five water authorities have recognized that cooperation is of great importance. There are several obvious reasons for this. The implementation of the directive will be strengthened if there are no differences between the districts as concerns interpretation of what the directive requires. This is because many of the parties and actors involved will have interests in two or more districts. Cooperation will also strengthen the water authorities in relation to central authorities and agencies.

The cooperation between the five water authorities has been very informal. It has worked very well, but it might be useful in the future if the EPA took more formal responsibility for coordinating the work of the RBDs.

Cooperation with different authorities will be of importance during different phases of the WFD implementation, as shown in figure 5. For the time being, the focus is on those who can support the water authorities during the characterisation phase, like for example the Swedish Meteorological and Hydrological Institute (SMHI) and the Swedish University of Agricultural Sciences (SLU). However, discussions have also been initiated with agencies that can be instrumental in supporting measures later on, like the National Board of Agriculture and the National Board of Fisheries.

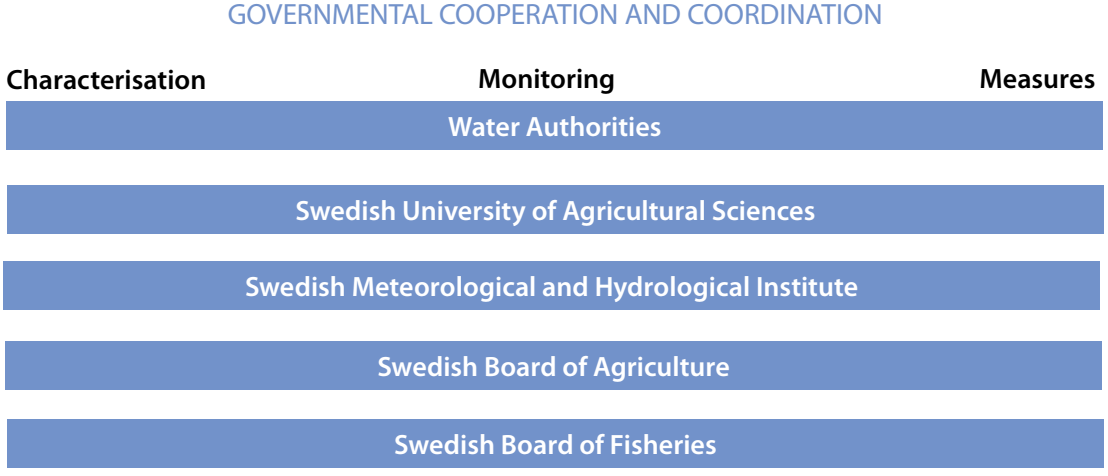


Figure 5. Cooperation with different authorities will be of importance during different phases of the WFD implementation.

The water authorities have developed a common information and communication strategy. Among other things the strategy will include a graphic profile and a website. This is an efficient way of spreading knowledge about the work and about the directive. The website will also guarantee that the districts make all plans and documents publicly available, as required by article 14 of the WFD.

Characterisation of water bodies

The article 5 report submitted to the commission was preliminary and does not fulfil all the requirements in the directive. For example, the risk assessment is not made on the water body scale and the initial characterisation of groundwater is incomplete. Water bodies were defined as lakes larger than 1km2, rivers longer than 15 km and ground water bodies with extraction capacity larger than 1 l/s in areas with high pressure and 25 l/s elsewhere.

A new characterisation of water bodies will be completed during 2007. The results from the article 5 report will be used as a basis for this work, but a new and refined characterisation will be carried out. Focus will be on areas at risk. The characterisation will be based on the current definition of water bodies supplied by SMHI. Even if the Water Councils will be involved, it is expected that the counties must handle much of the practical work, since they generally have more competence and resources available.

A number of pilot projects to develop guidelines for characterisation, monitoring and the development of programmes of measures have been initiated.

Characterisation and risk assessments will be done using information from the water bodies as well as from the associated drainage area.

Reference conditions and good ecological status will be defined in dialogue with water councils using national information, based on existing environmental quality criteria as well as regional and local information. Revision may be necessary when the new environmental quality criteria are established. Scientists under the direction of the EPA are currently developing them. The characterisation will include chemical, biological as well as hydro-microbiological conditions. The issue of "one out, all out", mentioned by Seppo Rekolainen, is one of the questions discussed in this process.

The EPA is currently evaluating the national environmental monitoring programmes. These programmes will assumingly satisfy the requirements of WFD with regard to the survey and monitoring. The bulk of the local and regional monitoring, which in WFD wording is called operational, is performed by the water quality associations. These are monitoring associations, formed by municipalities and companies whose activities might affect the water. The associations carry out monitoring on behalf of their members. These programmes must be adopted to the directive through active discussions between the county administrations and the associations. This process will take several years.

Public participation

A strategy for public participation has been developed, based on a common understanding that the FWD will not be successfully implemented if not all parts, stakeholders as well as the public, are engaged in the process. A central part of the strategy is the establishment of Water Councils on local and regional levels. How large area each council should cover depends on local conditions. It is expected that existing water quality associations could be developed into water councils, at least in the south. In northern Sweden there are a very few water associations, and here new water councils have to be created.

It is essential that each council engage all stakeholders in the area. Large municipalities or groups of municipalities may initiate the up building of the water councils or it can be initiated by the County administration or the water authorities. The level of engagement of the councils will vary due to different conditions, but it is essential that they at least to some degree engage in the entire process, from characterisation to the evaluation and reporting.

Critical questions

Based on the Swedish experiences of implementing the WFD this far, a number of critical questions can be identified:

- **Access and availability of data**. Basic geographical data and data copying are not free in Sweden. Data costs and complex license agreements can be a real threat with regard to local and regional cooperation, which requires a free exchange of data.

DRAWING THE LINE

The issue of classification of water bodies was discussed in some depth by the participants, after input from the presentations of Seppo Rekolainen and Björn Sjöberg. Focus of the discussion was on defining the borders between the classes of water bodies. Can or should the border between for example "good" and "moderate" status be defined by an exact figure, or do we need more flexible definitions of the classes – i e operating with ranges rather then exact figures?

Sindre Langaas pointed out that this question is important not only from a scientific point of view, but also as concerns the possibilities for local municipalities to influence on the settings of standards and the classification of waters.

According to Björn Sjöberg it is very essential that we do not define exact numbers. The borders between the classes must be set in dialogue with the stakeholders. We cannot claim that we want public participation and dialogue with stakeholders if we do not leave any room for discussions. There must be a degree of freedom when it comes to classifying the water bodies.

Malin Gunnarsson, Swedish EPA, said that the agency for the time being is considering defining the classes by exact figures. However, figures must be used together with information on the range of the statistical uncertainty. The intercalibration process is of great importance in this and no final decision will be made until we have seen the outcome of that process.

Seppo Rekolainen remarked that from a scientific point of view it would be easier to handle the uncertainties with exact figures as class boundaries, while considering the uncertainty when evaluating monitoring data. Using this approach, we just have to decide what risk we will accept when making our decisions. If we work with ranges as class boundaries we still have to handle the uncertainty in monitoring data. In other words, we will have two uncertainties to handle and combine when we do the classifications, which will not make things easier.

- **National coordination and the engagement of governmental agencies.** Experiences from work with enforcement of national, regional environmental targets tells us that it is essential to engage all relevant authorities and to create cross sector cooperation.
- **Participation and engagement of the municipalities.** Since they are locally responsible for planning their involvement it is both necessary and desired and of special importance with regard to measures.
- **Pricing policy and financing.**
- **Status of programmes of measures and environmental objectives.** This can probably be resolved as soon as the relative status between the environmental code and the plan and building act has been clarified and tested.

Estonia

Rene Reisner, Ministry of Environment, Water Department

Five years ago, when Estonia was involved in a cooperation project with Sweden on water issues, our Swedish colleges said to the Estonian minister of Environment that Estonia would not be able to implement all the water related legislation required by the WFD. This was because Estonia would not have the manpower or the financial resources needed, but also because there are far too many small municipalities in Estonia. It would be almost impossible to involve all these in the implementation of the directive.

Today, we are not able to present any long-term strategies concerning the Estonian implementation of the WFD. Neither can I give you lists of problems identified and possible solutions to these. However, it is a fact that Estonia has submitted its Article 5 report to the commission, even if it was done two months after deadline and even if the report is no more than a 72-page document.

In Estonia we tend to be quite pragmatic, and this is certainly the case with the WFD.

Legislation and administration

In Estonia, the WFD has been transposed to national legislation through changes and amendments of the Water Act. In fact, the act has been changed a number of times over the last few years and a more thorough revision is still to come.

The Ministry of the Environment has the overall responsibility for implementing the WFD. As seems to be the case also in Finland, the obligation that has been given to the ministry is very general: it only says that the ministry is responsible, it does not say anything specific on what it is responsible for or how the work should be organized.

If other ministries need to be involved or if authorities or institutions should take on tasks in the implementation process, it would still be the responsibility of the Ministry of Environment to make this happen.

An important institution in this context is the Estonian Environment Information Centre (EEIC), which may be similar to SYKE in Finland or the Swedish EPA. However, it is a very small body and it serves merely as a database. It collects and stores environmental data and can provide data on request, but not much more than that. It means that most of the work must be done either in the ministry or in the county environmental department, which is a part of the ministry.

On the regional level, there are the County Environmental Departments, one for each of the 15 counties. The County Environmental Departments are in fact county level units of ministries, which mean they have the responsibility as the ministry itself, but on a county level.

Furthermore, there are eight Responsible County Environmental Departments under the

Water Department, and these are responsible for the implementation of the WFD in the eight river basin sub-districts (figure 6). The reason why the three RBDs in Estonia have been divided into eight sub districts is that it has made it easier to establish public participation and involvement in the process.

There are of course other relevant regional and local authorities, like the Environmental Inspection. Its main task is to control environmental permits and make sure that permit holders do not violate the emission limits.

There are two international river basin districts in Estonia, one involving Russia and the other Latvia. There is a joint commission or working group to cooperate with Russia, while there is no such body for cooperation with Latvia. The cooperation in this case is in fact rather poor. In practice also the cooperation with Russia has met many difficulties.

Characterisation of water bodies

The main difficulties in the process of characterisation of water bodies turned out to be the reference conditions. They were too complicated to be operational for the Responsible County Environmental Departments. The same problem occurred with the typology of lakes, rivers and coastal waters. To handle this problem cooperation between the county authorities and scientists was established.

Other difficulties encountered in the characterisation process were:

- Availability of data and relevant information.
- Quality of data.
- Reliability of results.
- Administrative capacity
- Reluctance from certain institutions to engage in the WFD implementation. Some officials and influencal consultants

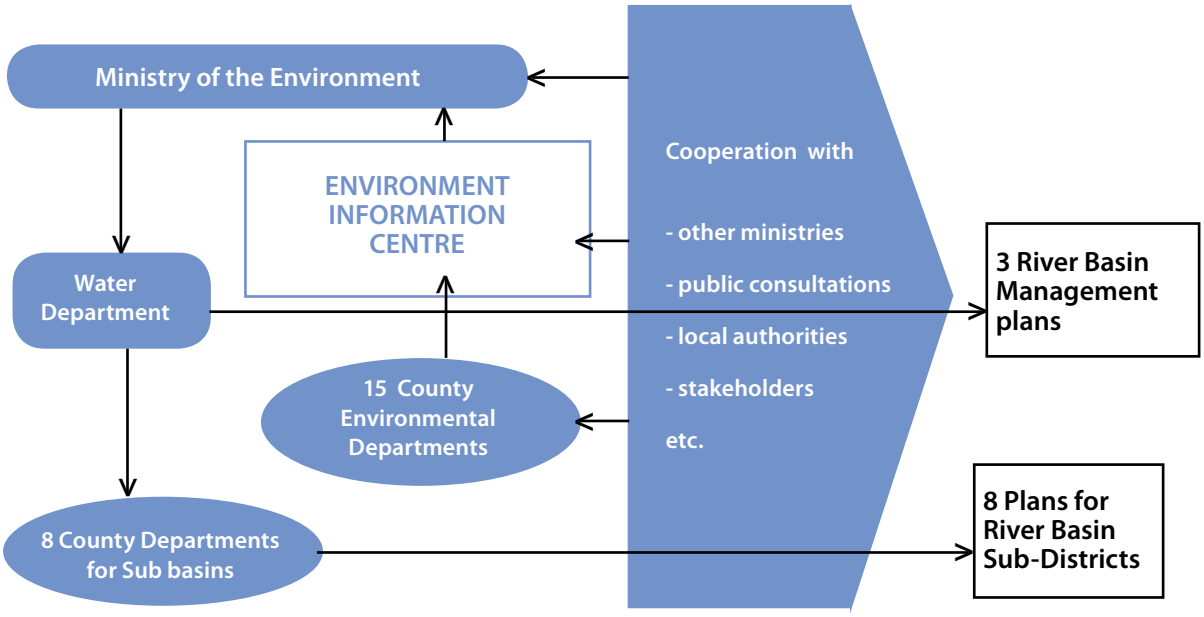


Figure 6. The Ministry of the Environment has the overall responsibility for implementing the WFD in Estonia.

understandably think that it is better to work to solve well-known problems than to carry out a total survey of all possible problems in all water bodies.
- Adjusting to the changed principles of river basin management introduced in the WFD.

A number of things need to be done to overcome these problems. We have to work to increase the understanding of WFD and its principles among all stakeholders. An information campaign has been launched to start this process. We have to harmonize data in different databases and make them easily available. Efforts have been made in this field during the last five years, and it seems that we are now close to a solution. Furthermore, more work has to be done on the typology and reference conditions based on outcome of the intercalibration process.

The outcome of the characterisation process in Estonia is presented in table 1a and b. It was more difficult to develop the typology for lakes than for the rivers, but finally eight lake types were characterised, where lake size is the most important parameter. Only rivers with a catchment area larger than 10 km^2 and lakes larger than 0.5 km^2 have been included. As concerns the lakes this limit means that only 72 lakes were included, while 1419 smaller lakes were excluded. This, in turn, of course means that the characterisation does not give a complete picture of the situation in Estonian lakes.

The classification of heavily modified water bodies and artificial water bodies was partly based on the categorisation of water bodies in the national database. Water bodies categorised as "main ditches", "ditches", "canals" and "reservoirs" were generally characterised as heavily modified, as were rivers with hydropower

CHARACTERISATION OF ESTONIAN WATER BODIES

RIVER BASIN DISTRICT	NUMBER OF SURFACE WATER BODIES	AREA OF THE RIVER BASIN DISTRICT, KM^2
West-Estonian River Basin District	481	23 478
East-Estonian River Basin District	199	19 047
Koiva River Basin District	48	1 335
TOTAL	**728**	**43 860**
RIVER BASIN DISTRICT	**NUMBER OF HEAVILY MODIFIED**	**NUMBER OF ARTIFICIAL WATER BODIES**
West-Estonian River Basin District	148	49
East-Estonian River Basin District	144	37
Koiva River Basin District	10	0
TOTAL	**302**	**86**

Table 1a. The classification of heavily modified water bodies and artificial water bodies was partly based on the categorisation of water bodies in the national database.

CHARACTERISATION OF ESTONIAN WATER BODIES

CATEGORY AND TYPE OF THE SURFACE WATER BODY	NUMBER OF IDENTIFIED SURFACE WATER BODIES BY TYPES IN EVERY RBD		
	West-Estonian	East-Estonian	Koiva
RIVERS			
Type IA: Small rivers with high organic content	117	30	22
Type IB: Small rivers with low organic content	253	120	14
Type IC: Small and calcareous rivers	29	0	0
Type IIA: Medium-sized rivers with high organic content	18	6	1
Type IIB: Medium-sized rivers with low organic content	49	36	11
Type IIIA: Large rivers with high organic content	4	0	0
Type IIIB: Large rivers with low organic content	11	5	0
Type IV: Very large rivers	0	2	0
LAKES			
Type 1: Lakes with hard water	0	1	0
Type 2: Lakes with medium-hard nonstratified water	14	15	1
Type 3: Lakes with medium-hard stratified water	4	11	3
Type 4: Lakes with soft and dark water	5	2	0
Type 5: Lakes with soft and clear water	1	2	3
Type 6: Lake Võrtsjärv	0	1	0
Type 7: Lake Peipsi	0	2	0
Type 8: Coastal lakes	8	0	-
COASTAL WATERS			
Type 1: Coastal waters of Narva Bay	0	2	-
Type 2: Coastal waters of Pärnu Bay	1	0	-
Type 3: Coastal waters of the western part of the Gulf of Finland	4	0	-
Type 4: Coastal waters of the open sea of West-Islands	3	0	-
Type 5: Coastal waters of Väinameri	5	0	-
Type 6: Coastal waters of the Gulf of Riga	1	0	-
TRANSITIONAL WATERS			
-	-	-	-

Table 1b. The outcome of the characterisation process in Estonia. It was more difficult to develop the typology for lakes than for rivers, but finally eight lake types were characterised, where lake size is the most important parameter. Only rivers with a catchment area larger than 10 km^2 and lakes larger than 0.5 km^2 have been included.

stations or dams. The result of this was that 25 % of the water bodies have been characterised as heavily modified (figure 7), which is a high number (compared to for example 8 % in Sweden). If we actually checked the status of these water bodies in the field I think that maybe not more than half of them actually should be characterised as heavily modified.

Defining reference conditions

A first set of reference conditions was defined by national regulation in 2001. However, they turned out to be inappropriate and new reference conditions have been drawn up during the last few years. The process is still going on. Three different research institutes are responsible for developing the reference conditions for lakes, rivers and coastal waters respectively. Most of the work is based on existing monitoring results.

The reference conditions for lakes are based on:

- Natural background values (natural conditions, from lakes database since 1960)
- Expert opinions
- Calculated natural P and N values
- Data on land use
- Buffering capacity of lakes
- Pollution load not considered
- Eutrophication as the only impact factor
- Biological indicators based on abundance, indexes, etc
- Sediment studies

Some difficulties in defining reference conditions for lakes have been lack of statistical data and the circumstance that it is difficult to fit lakes into the proposed typology – there are too many exceptions. In addition, there is need for research on how limnic ecosystems react to pressure.

Reference conditions for rivers are based on:

- Natural background values
- Expert opinions
- Calculated P and N natural values
- Data on land use
- Data from modelling
- Pollution load calculations used
- Biological indicators based on abundance, indexes, etc

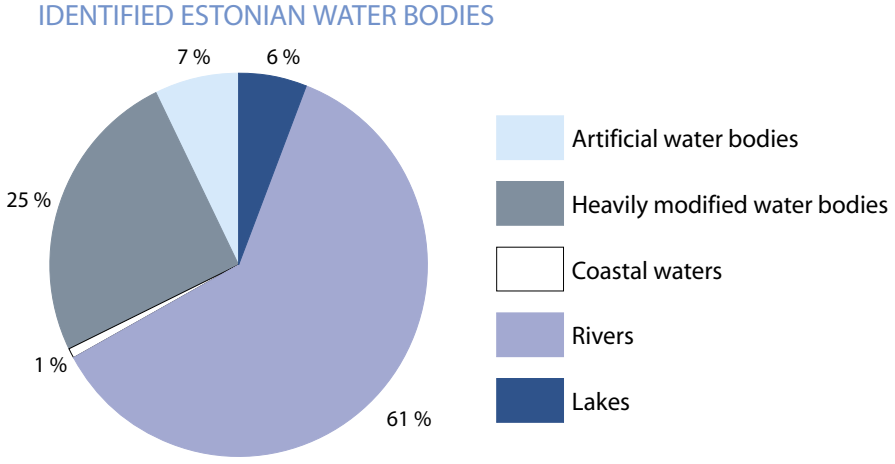


Figure 7. Water bodies categorised as "main ditches", "ditches", "canals" and "reservoirs" were generally characterised as heavily modified, as were rivers with hydropower stations or dams. The result of this was that 25 % of the water bodies have been characterised as heavily modified which is a high number (compared to for example 8 % in Sweden).

- Statistical data from reference sampling points

The main difficulty here has been lack of knowledge on how rivers react to environmental pressure.

Reference conditions for coastal waters are mainly based on modelling and statistical data from reference sampling points.

Good ecological status has been defined using the reference conditions as they are today. In general, it has been defined as a status that is close to the natural status of the water body. Of course the question on what is natural remains to be answered. The characterisation has been based mainly on phosphorus and nitrogen values, using data from regular and additional monitoring. Biological quality elements have been used only in cases where additional monitoring was made. Hydromorphology has been considered only indirectly, as a base for expert opinions.

In practical terms the general understanding is that good ecological status can be achieved by available technology and economically feasible measures.

Public participation

Unfortunately, there are not many good examples on public participation in the FWD implementation process that can be highlighted here. The few exceptions are related to the agricultural sector, which probably can be explained by the EU subsidies for environmental measures in agriculture. Farmers see participation in water management measures as a possibility to get access to these subsidies, which is the main driving force behind their interest.

A major problem in promoting public participation in the WFD implementation is that environmental awareness in Estonia generally is low. Public interest has been largely related to financial issues: is there funding for different water-related projects and how can additional costs be avoided? In the eyes of the public, the concept of river basin management is about long term piping and wastewater treatment projects. Furthermore, water management seems to be of minor importance to NGOs (non-governmental organisations). NGOs have been present in less than 5 % of public meetings on the WFD this far. The main target group for public participation is the municipalities. Nearly all municipalities are involved, partly because it is a legal obligation for them. Most of the public consultations that take place are on the sub-district level.

Denmark

Kurt Nielsen, National Environmental Research Institute

Legislation and administration

The implementation of the WFD in Denmark has been rather complicated, not only because the WFD in itself is challenging, but also because the responsibilities of regional and local authorities in Denmark as well as the administrative structure of the country will change by January 2007. The number of municipalities in Denmark will be reduced to 98, the number of regions will be reduced to 5, and 7 regional state offices will be established. The administrative role of the regions will decrease considerably. This reform of course has implications for the implementation of the WFD in Denmark.

In addition, political discussions on the WFD implementation have delayed the process.

The Danish Environmental Objectives Act of 2003 *(Miljømålsloven)* gives environmental objectives for water bodies and international nature protection areas. This act transposes not only the WFD into national legislation but also a number of other EU directives, such as for

WATER DISTRICTS IN DENMARK

Figure 8. Originally, 14 water districts were defined in Denmark. This has changed and from 2007 there will be only four districts, out of which one is international (shared with Germany). Water districts 1, 2 and 3 are separated by international waters.

example the Habitat Directive. In June 2005, the act was revised due to the overall change in responsibilities of local and regional authorities mentioned above. At this stage new regulations for the water districts and water district authorities was introduced and some changes in the planning process were made.

Originally, 13 water districts were defined in Denmark. This has changed and from 2007 there will be only four districts, out of which one is international (shared with Germany) (figure 8). The overall responsibility for implementing the WFD will be moved from the counties to the municipalities and the Ministry of Environment, and in the new administrative structure of WFD the role of the regions will be minor.

The expected future authority responsibilities (as from 2007) are outlined in figure 9. The regional state offices will be in charge of most of the monitoring and all planning, while the municipalities will have the main responsibility for action plans and measures. It is not yet clear if the actual decision-making power will lie on the municipalities alone, or if the regional state offices will have some influence here.

In the new planning process we try to integrate the WFD and the Natura 2000 process and develop integrated municipality action plans. The planning process is outlined in figure 10. In the next step we will try to bring this integration further, in combining the objectives of the conservation status according to the Habitat Directive with the ecological status according to the WFD. This is not easy, but a strong argument for trying is that it is the same water bodies we are dealing with.

AUTHORITY RESPONSABILITIES FROM 2007

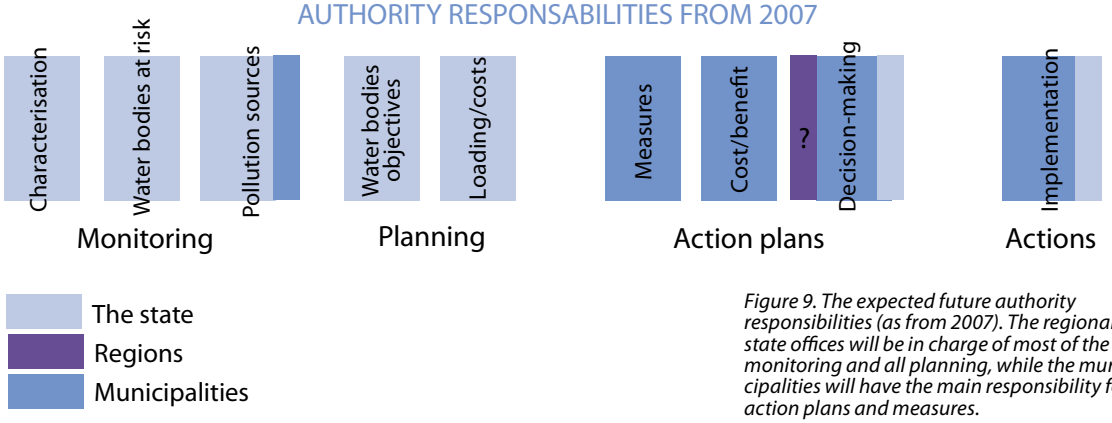


Figure 9. The expected future authority responsibilities (as from 2007). The regional state offices will be in charge of most of the monitoring and all planning, while the municipalities will have the main responsibility for action plans and measures.

Figure 10. The planning process in Denmark.

There have been monitoring programmes in Denmark since 1989, and there is a lot of data available that can be used in the WFD planning process. In order to fulfil the WFD requirements, however, further monitoring activities will be needed. A new programme for operational monitoring, DEVANO, is presently being designed by the Ministry of Environment. Programmes for investigative monitoring will be developed by the regional state offices.

In November 2005, there was no government funding specifically for implementation of the WFD, and the municipalities have not been given any promises as concerns financing of their obligations concerning the WFD. To a large extent this is due to the ongoing reorganizing of the administrative structure of Denmark mentioned above. The Ministry of Environment has 120 million Euro at its disposal for different purposes, but it is not clear to what extent this money will be used for implementing the WFD.

Characterisation of water bodies

The first part of the characterisation of water bodies took part in 2004. Concerning the typology, 3 types of streams, 16 types of lakes and 29 types of estuaries were defined. Water bodies of the different types were mapped. Heavily modified and artificial water bodies were preliminary identified. Groundwater quality and quantity was mapped and a preliminary identification of stress factors of the water bodies was carried out, based on available data.

The second phase of the characterisations is presently being carried out by the counties, based on objectives from the present Water Quality Plans (which in turn are based on guidelines from 1983). The counties will try to identify impact factors such as diffuse and point sources of nutrients, hazardous substances and hydrological and physical changes. They will also assess the expected impact of general measures in the National Action Plan of 2004 and specific measures in each river basin.

The criteria of these plans are highly variable, and this will very likely also be the case in the characterisation now underway.

Defining reference conditions

From a scientific point of view there are several challenges in implementing the WFD. The assessment of reference conditions is certainly one of them.

Several methods can be used to define reference conditions. Data on water bodies that are more or less undisturbed by anthropogenic pressure is of course extremely useful, but in many cases no or very little such data is avail-

able. Paleo ecological data from sediments in lakes can be used to gain knowledge on past status of water bodies. In some countries, there is also other useful historical data. Modelling is another approach.

In Denmark, there are a limited number of lakes showing reference conditions. Paleolimnological data are scarce and few historical data records exist. Instead, we have tried to define the difference between good and moderate status through statistical data analyses, using the shift from clear-water to turbid state as an indicator of the boundary. This shift takes place at different phosphorus concentrations in different lakes. We argue that turbid lakes are not natural in Denmark and that in turbid lakes the flora and the fauna are not in their natural state. It should be stressed that this indicator cannot be used for all types of lakes, for example not for humic lakes, and that it must be based on historical data.

Maximum phosphorus levels in lakes of good ecological status have been suggested both by the counties and by NERI, the National Environmental Research Institute. As can be seen in figure 11, for most lakes there is a very big difference between the two levels.

As concerns rivers, almost all streams in Denmark are influenced by human activities, and there is very little data on unaffected rivers. The only indicator that has been used this far is a standard method for assessing the invertebrate fauna (DVFI - Danish Stream Fauna Index). The results this far indicate that not more than

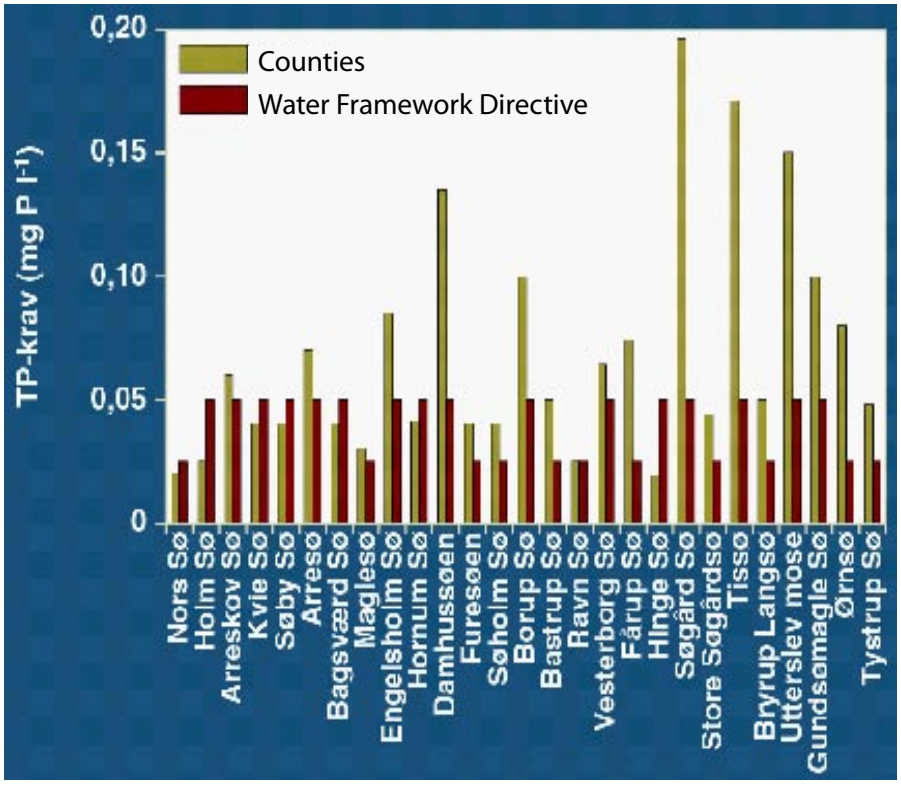


Figure 11. Maximum phosphorus levels in lakes of good ecological status have been suggested both by the counties and by NERI, the National Environmental Research Institute. For most lakes there is a very big difference between the two levels. (Søndergaard et. al. 2003)

GOOD ECOLOGICAL STATUS IN ESTUARIES
- SCENARIOS FOR DEPTH LIMIT OF EELGRASS IN SHALLOW ESTUARIES WITH LOW SALINITY

NON RESTRICTIVE	HIGH	GOOD	MODERATE
EQR	>0.9	0.90-0.75	0.75-0.55
Maximum depth (m)	>3.8	3.8-3.2	3.2-2.3
RESTRICTIVE			
EQR	>0.95	0.95-0.85	0.85-0.65
Maximum depth (m)	>4.0	4.0-3.6	3.6-2.8

Table 2. The ecological situation in Denmark's coastal marine areas is similar to that of our rivers. All coastal waters are euthrophicated. However, there are some historical data that can be useful, for example, data on the depths limits of eelgrass since the beginning of last century. Eelgrass is a good ecological indicator and this data can be used in establishing reference conditions, together with other methods. (EQR = Ecological Quality Ratio)

49 out of 122 Danish streams meet the objectives of reference conditions.

An option that has been discussed is to use data from rivers in the Baltic countries to develop other criteria for reference conditions. However, no decisions have yet been made.

The ecological situation in Denmark's coastal marine areas is similar to that of our rivers. All coastal waters are euthrophicated. However, there are some historical data that can be useful, for example, data on the depths limits of eelgrass since the beginning of last century. Eelgrass is a good ecological indicator and we will use this data in establishing reference conditions, together with other methods. Table 2 illustrates how this can be done.

Public involvement

In order to inform the public on the WFD and its implementation NERI has published scientific report as well as popular papers on different topics (see www.dmu.dk). This has in turn resulted in coverage in newspapers and other news media.

Conclusions

A conclusion from the Danish process that I would like to stress is that administration can benefit from research. Some of the contributions from science are:

- Development of new quantitative methods.
- Intercalibration of European methods.
- Cross-country analyses of European data - risk of identification of the smallest common denominator.
- Benefits from experimental research and analyses of long time series monitoring data.
- Development of models of varying complexity.
- Time scale for the implementation of measures aimed to raise the ecological status of water bodies.
- Analyses of options for administrative tools.

Research data from one country can be very useful in implementing the WFD in other countries, since the approaches used may be the same or similar even if the objectives differ between countries. There are joint European research projects in this field that have proven to be useful. In fact, the WFD has initiated better cooperation between European scientists in this field.

UK

Penny Johnes, Aquatic Environments Research Centre, University of Reading

Legislation and administration

In this context it important to be aware of the recent devolution of administration within the UK, where the Scottish Parliament, The Welsh assembly and the Northern Ireland Assembly have taken over some of the governmental power from the national government in their regions. In the EU, UK is acting as a single entity, but domestically the four regions are to some extent independent and Scotland, Northern Ireland and Wales have their own administrative bodies responsible for implementation of the EU Water Framework Directive.

A brief outline of the administrative structure is given in figure 12. It shows the different regional agencies responsible for the characterisation of water bodies in the four parts of the country.

There are nine River Basin Districts in England and Wales. This structure has been the basis for water management for the last 20 years, so the WFD has not entailed any changes in this respect.

The challenge for the UK

There are many waters of all different kinds in the UK, not the least coastal waters. Furthermore, UK is a very densely populated country and the population is unevenly distributed. England has the highest population density with 383 people

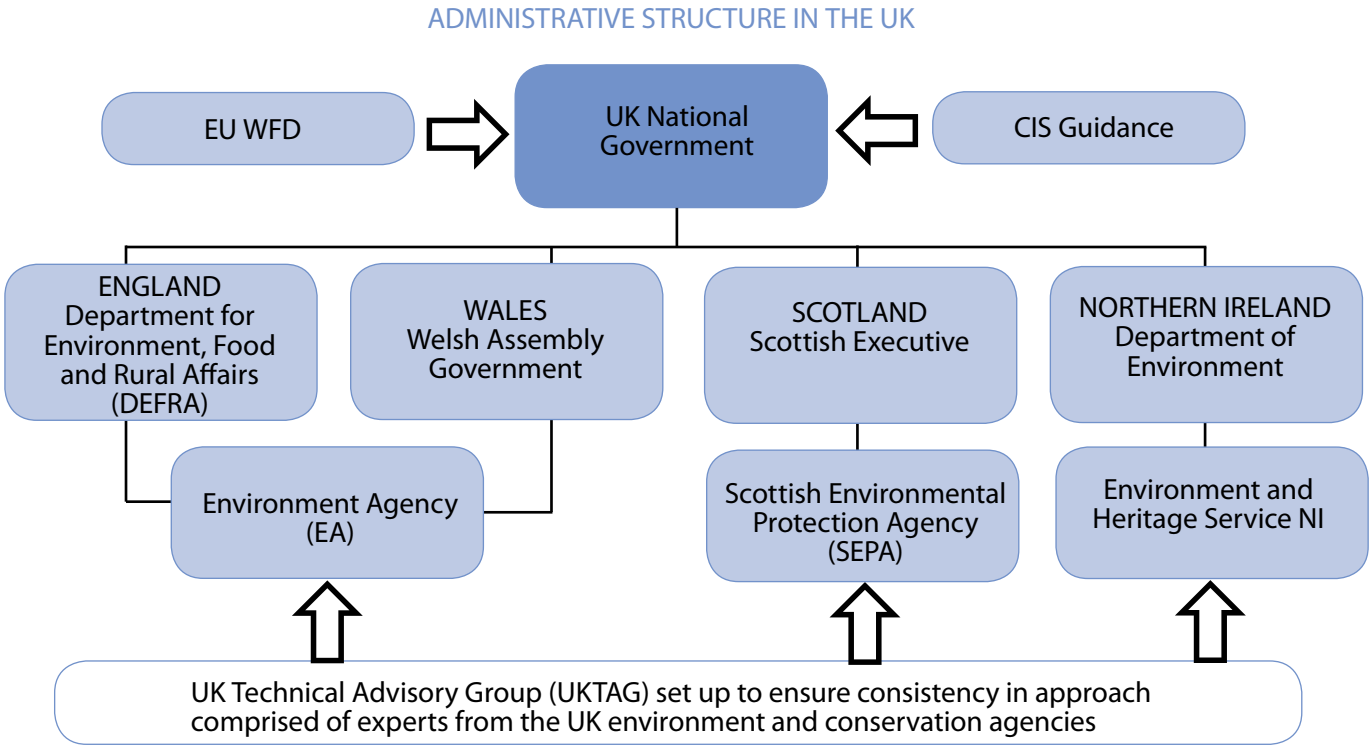


Figure 12. Outline of the administrative structure in the UK. The different regional agencies responsible for the characterisation of water bodies in the four parts of the country.

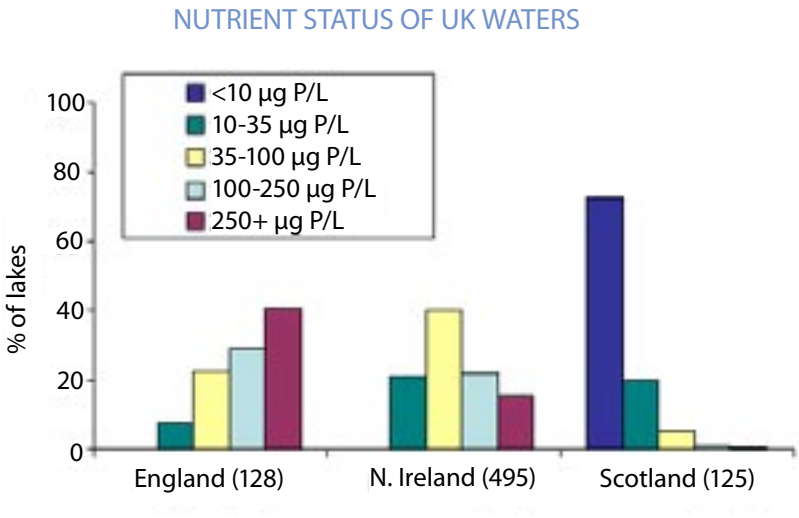


Figure 13. Lake total phosphorus concentrations in the UK. Numbers in parentheses refer to numbers of lakes. (Foy & Bailey-Watts, 1998)

per square kilometre. If you look at any of the simple modelling approaches that have been developed you will find that the higher the population density, the higher the point source pressure on the water bodies and the more intensive the agriculture will be. This gives you an idea of the problems the UK faces compared to other less densely populated countries in Europe. It is quite clear that even if all pollutant transport to UK waters were to be stopped immediately, many water bodies would still not recover to good ecological status until 2015.

One simple indicator, the total phosphorus concentration in UK lakes, gives a picture of the situation from the environmental perspective (figure 13). There are huge regional differences. While a majority of Scottish lakes have less than 10 µg P/l (which means they will probably meet good ecological status unless they are acidified), there are no lakes with such low phosphorus content in England. More than 60 % of English lakes are at least eutrophic, and many of them are in fact hypertrophic.

Figure 14 shows the change in nitrogen and phosphorus export to water from diffuse agricultural sources since 1931. In most areas, there has been a considerable increase. The areas that have experienced the greatest increase in nutrient delivery to waters are in the west of England and Wales – and these are the waters that our environmental agencies traditionally have ranked as being good or "high quality". The nutrient content may be low, but the increase in load could be as much as 400 or 500 %. This data shows that we need a mind shift in characterising our water bodies. The UK environmental agencies are struggling to move away from the perception that low nutrient concentrations mean clean water and high concentrations dirty water.

Characterisation of water bodies

The analysis aiming at defining reference conditions is done by water body type. We have defined 10 lake types, 18 river types, 6 transitional water types and 12 coastal water types. Techniques employed include:

- Analogy with sites presently at reference condition (very few, none for most freshwater type classes).
- Interrogation of natural history records, mostly from nineteenth century.

% CHANGE IN N AND P EXPORT TO WATER FROM DIFFUSE AGRICULTURAL SOURCES, 1931-1991

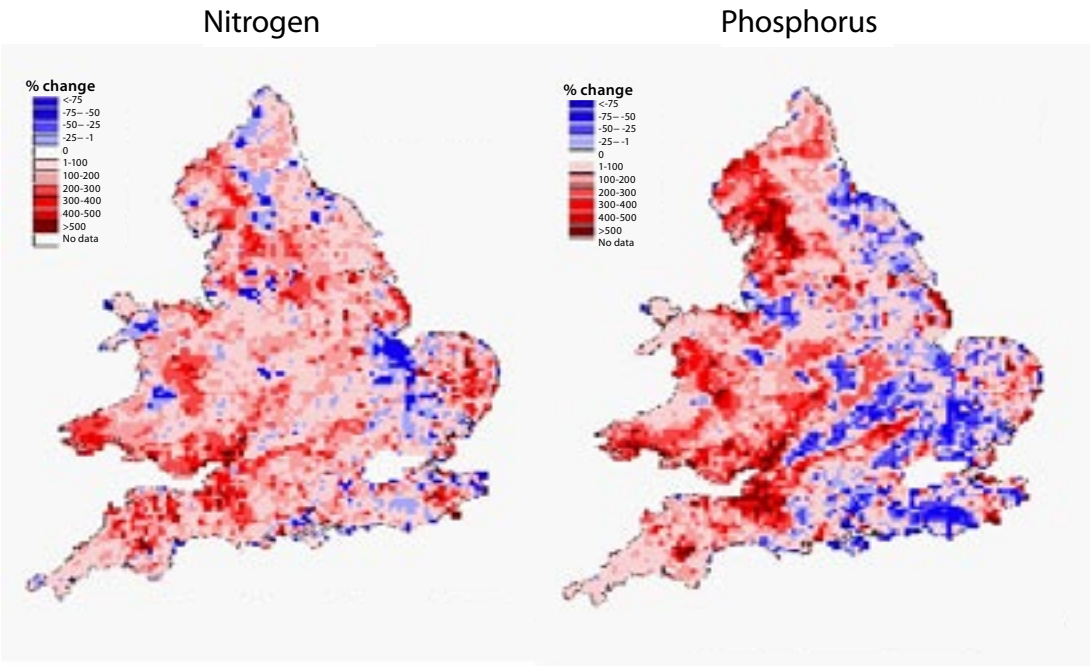


Figure 14. The change in nitrogen and phosphorus export to water from diffuse agricultural sources since 1931. In most areas, there has been a considerable increase. The areas that have experienced the greatest increase in nutrient delivery to waters are in the west of England and Wales.

- Interrogation of angling club and fishery records.
- Palaeoenvironmental reconstruction, including:
  - Palaeolimnology
  - Diatom-inferred phosphorus- and pH-status
  - Palynology
  - Emerging techniques for macrophyte fossil remains
- Reconstruction of past ecology by examination of response curves between physico-chemical pressures and biological water quality elements.
- Modelling approaches to reconstruct past nutrient status, based on examination of:
  - Annual agricultural census returns at parish level (land use and livestock numbers, 1866 to date).
  - Decadal population census returns at parish level (1841 to date).
  - Science describing export rates by crop or livestock type, fertiliser application rates and management.
  - Science reporting STW and septic tank per capita export rates.

A national advisory group of scientists (UKTAG) has been set up to advise the regional authorities in order to ensure consistency

SPECIFIC REFERENCE CONDITIONS FOR MARL DEEP LAKES, UK

(As defined by the UK technical advisory group on the WFD)

This rare lake type is characterised by the formation of calcium carbonate deposits (marl). It is confined to areas of soluble limestone and chalk, occurring predominantly in northern England and southern Scotland. Calcium carbonate precipitation removes phosphate from the water column (by co-precipitation), low dissolved carbon dioxide levels can limit phytoplankton production and suspended organic matter binds to marl, leading to characteristically clear water. Marl lakes fall within a similar alkalinity range to the high-alkalinity lake type but are differentiated by catchments which are predominately limestone. Therefore, they form a subset of the high-alkalinity lake type, which is characterised by the production of marl. Consequently, marl lakes support species rich macrophyte, fish and invertebrate assemblages that cannot be easily separated from those occurring in high-alkalinity lakes. Water depth will restrict macrophyte growth and associated invertebrate assemblages to the shallow water areas.

- Macrophytes and phytobenthos: Species of stonewort (Chara spp.) are typically the most abundant component of the macrophyte flora and may be present as dense beds.
- The phytobenthos is likely to be similar to that of high-alkalinity lakes with typical diatom species including Fragilaria spp., Amphora pediculus and Achnanthes minutissima.
- Fish: Trout are to be expected if there are afferent streams with suitable spawning gravels. Additional fish species may include pike, perch, eel, minnow and/or stickleback. Roach, tench and ruffe may also occur in England.
- Macroinvertebrates: These are characterised by a rich and diverse fauna where submerged macrophytes occur although northern and upland faunas may be impoverished. Typical chironomid species are similar to those expected in high-alkalinity lakes and include Cricotopus (i) intersectus, Glyptotendipes paripes, Tanytarsus mendax and Tanytarsus usmaensis. Molluscs are abundant and the beetle Halipus confinis typically associates with Chara beds.
- Phytoplankton: Phytoplankton productivity in marl lakes is typically low but species composition is supposed to be similar to that of high-alkalinity deep lakes.
- Water quality: This water body type is characterised by very clear water with low nutrient status, and pH which can achieve very high values. Alkalinity is high while total phosphorus and total nitrogen are generally low.
- Hydrology: This type is largely aquifer fed. Characteristic discrete enhanced flow horizons in calcareous aquifers will mean any springs are also likely to be discrete. Calcareous catchments typically exhibit a higher proportion of base flow, sudden increases in flow after rain or rapid ceasing of flow in drought would not be expected.
- Morphology: The underlying calcareous rocks are free draining and water bodies rarely occur on their surface. Basin form may be stepped/shelving/angular due to the underlying geology's propensity to dissolve and fracture. Substrate dominated by marl.

between the regions. The group is now publishing type specific reference conditions for water bodies of the different classes. An example of this, for marl deep lakes, can be found in the box on page x. The definitions are made in similar ways for rivers and coastal waters. In some cases the definitions are very vague, because there is very little data on the reference state of some water types.

Defining reference conditions

The definitions of the different classes of ecological status under the WFD used in the UK are:

- **High** Biological, hydro-morphological and physico-chemical quality elements match reference conditions.
- **Good** Biological and physico-chemical quality elements only slightly changed from reference conditions.
- **Moderate** Biological quality elements are moderately changed as a result of human activities.
- **Poor** Substantial changes to the reference biological communities through human activities.
- **Bad** Large portions of the reference biological communities are absent through human activities.

As concerns *Good ecological status* we are presently in the process of defining what "slightly changed" actually means. The pressure categories considered in the initial characterisation are:

- Point source pollution
- Diffuse source pollution
- Abstraction and flow regulation
- Morphological alteration
- Alien (invasive) species

Point source pressure

Assessing point source pressure is one of the more contentious areas. Final guidance is still to emerge from the UKTAG and is building on existing biological classification schemes developed by SEPA and the Environment Agency, as well as EQS (Environmental Quality Standards) for toxic and persistent chemicals. The initial assessment of risk submitted in June 2004 was based on:

- Compliance with existing discharge consents for industrial, domestic and sewage treatment plants.
- In the absence of European environmental quality standards (EQS), failure to meet UK standards for the 33 toxic and persistent substances identified in the WFD was taken to indicate a risk of not achieving good chemical status.
- Using these thresholds, permitted concentrations in rivers, transitional and coastal waters were calculated and compared with the target EQS for each substance.
- A separate assessment of risk from radioactive substances was also carried out.

Limitations to the initial risk assessment for point source pressures arise because:

- Existing discharge consents are too high to support Good Ecological Status (GES) in most water bodies, having been set to ensure high oxygen status rather than low pollution loads in UK waters.
- EU thresholds for toxic and persistent substances are likely to be lower than those in UK domestic legislation.
- Only phosphorus and not nitrogen was assessed as a risk, which might compromise GES in lakes and other standing waters. Current science thinking would not support this view.

There are many water bodies under pressure from point sources in the UK. Maybe more surprising is that there are a few, especially in Wales, not being under pressure according to this assessment.

Diffuse source pressure

Assessing diffuse source pressures is the most contentious area. It is widely acknowledged by government departments and agencies as the greatest risk to UK waters not achieving good ecological status by 2015. Final guidance is still to emerge from the UKTAG. For the 2004 assessment, risk of failing to achieve good ecological status by 2015 was assessed separately for nutrients, sediment, sheep dip, urban land use, acidification, mines, and minewaters. These categories were then combined to provide an overall risk assessment for diffuse source pressures.

Limitations to the initial risk assessment for diffuse source pressures arise because:

- Risks resulting from N enrichment were assessed against a 50 mg/l nitrate threshold, which is scientifically indefensible, particularly for naturally oligo-mesotrophic waters.
- Data do not exist from current monitoring programmes for all pressure types, notably only nitrate and SRP are regularly recorded in UK rivers, rarely in transitional and coastal waters, and there is no national monitoring programme for lakes in England and Wales. Total nutrient concentrations are not recorded and the full scale of the problem is not apparent from the routine water quality-monitoring programme.

According to the Environment Agency, many rivers in the western parts of the country are not at risk, which certainly is something that most scientists would not support.

Abstraction pressures

When it comes to assessing abstraction pressures, each water body is characterised by one of the following, still according to UKTAG guidelines:

- **Not at significant risk on the basis of available information**
  - Water bodies with no or very minor abstraction or flow regulation pressures acting on them
  - Confidence in the available information may be high or low.
- **Probably at significant risk**
  - Water bodies thought to be At Significant Risk from abstraction or flow regulation pressures but for which further information will be needed to make sure this view is correct.
  - Available pressure data indicates that hydrological risk thresholds are exceeded but confidence in the pressure information is not considered sufficiently reliable.
  - Ecological impact data if available appears to confirm that a significant risk probably exists (i e it is assessed as likely that there are one or more abstractions or flow regulation structures that may be acting as pressures on the water body but the location or magnitude of these is undetermined).
- **At significant risk**
  - Water bodies where the magnitude of abstraction and/or flow regulation pressures are much greater than the relevant hydrological risk threshold or there is otherwise high confidence that the hydrological risk threshold has been exceeded.
  - Ecological impact data if available clearly confirms that a significant risk exists.

Morphological pressures

In the UKTAG guidelines on assessing morphological pressures, significant pressure is defined as pressure that on its own or in combination with other pressures and in the absence of suitable measures, including existing controls, is liable to cause a failure to achieve one or more

of the directive's environmental objectives.

In particular, significant pressures on surface water morphology include:

- Any activity that causes deterioration from high status [hydro] morphology to a lower status.
- Any activity that leads to [hydro] morphological conditions that prevent the achievement of good ecological status, or cause a decline in ecological status from one class to a lower one.

Examples of specific pressures on morphology for lakes include for example bank construction and reinforcement, channelisation of inflows and outlets, lowering/draining and intensive use. For rivers some examples are river substrate manipulation, resectioning, straightening or realignment, channelisation or culverting and removal of natural barriers.

Results of the characterisation

If the assessment of all factors are combined, the result will be as shown in the map in figure 15. The map and the table (table 3) show that the situation in England and Wales is rather bad. 84 % of the lakes and an even higher proportion of the other types of water bodies are at risk of not achieving the WFD objectives of good ecological status by 2015.

In the next phase of the risk characterisation process the water bodies will be grouped in four categories based on the assessed risk and the information available:

1a. Water bodies at significant risk: start to plan measures. Operational monitoring.

1 b. Water bodies probably at significant risk. Further characterisation by 2007. Operational monitoring.

2. Water bodies not at significant risk based on available information.

2a. Available information could be improved. Characterisation to improve data and review result.

2 b. Available information is comprehensive. Watch for changes in pressures.

Public participation

In England and Wales, a national stakeholder group was established in June 2001 following criticism of lack of public and stakeholder engagement in a public inquiry into implementation of the WFD in England and Wales by the House of Commons Environment, Food and Rural Affairs Select Committee. The group includes senior representatives from key stakeholders, but is not open to the general public or minor stakeholders. In addition, the Environment Agency meets the minimum requirements of WFD by inviting comments (via a website and select circulation list) on draft strategies.

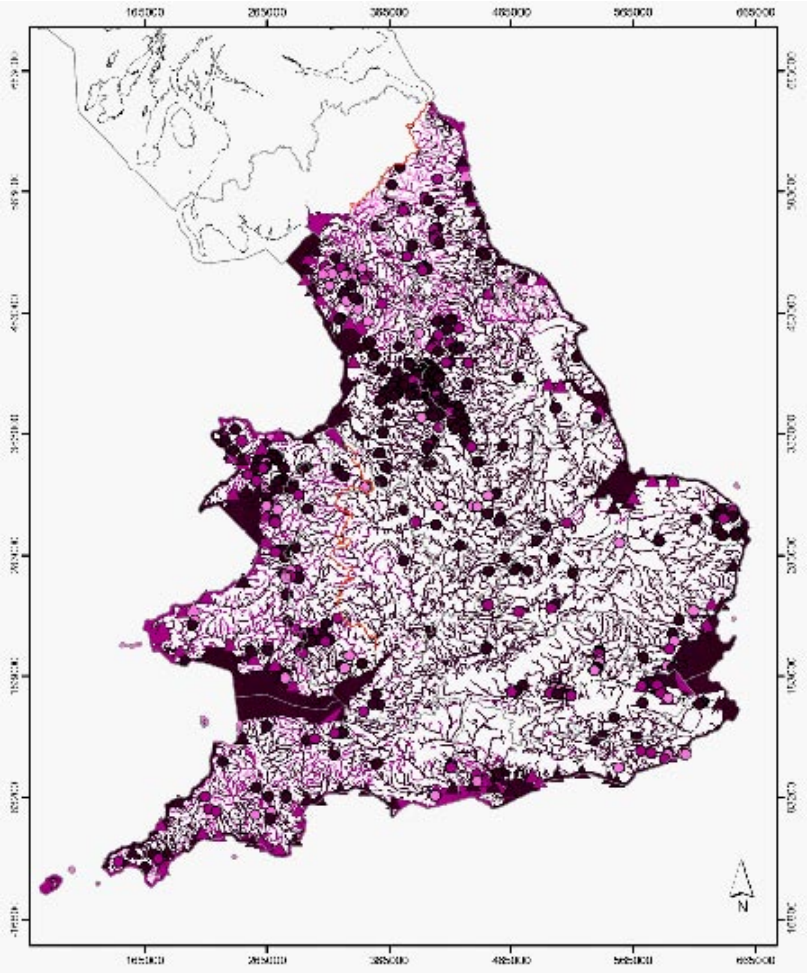
General public and community groups appear unaware of WFD across England and Wales, except through their engagement with key stakeholder groups such as the National Farmers Union, Country Landowners Association and Royal Society for the Protection of Birds.

In Scotland, a comparable National Stakeholder Forum was established in October 2003, including senior representatives from the industry, environmental groups, farming and community interests, but not the public. The Forum gives advice to the Scottish Parliament and key stakeholders on the implementation of WFD in Scotland. SEPA also supports a Regulatory Stakeholder Forum and Economic Stakeholder Forum.

In Northern Ireland, the Environment and Heritage Service announced the establishment of a National Stakeholder Forum in April 2005, including the industry, and environment, agriculture and conservation groups.

These initiatives mainly involve a limited number of key stakeholders. When it comes to true public participation – i e involving the

SURFACE WATER BODIES AT RISK OF NOT ACHIEVING WFD OBJECTIVES (COMBINED PRESSURES)



Pressures assessed include the impacts of:

- Point source discharges
- Diffuse source pollution
- Abstraction
- Physical changes
- Alien species

RBD boundary
Coastline
National borders

Rivers	Lakes	Coastal	Transitional Area <30 km²	Transitional Area >30 km²	Risk category
					At risk
					Probably at risk
					Probably not at risk
					Not at risk
					Not assessed

Figure 15. If the assessment of all factors are combined, the result will be as shown above. The map and the table to the right show that the situation in England and Wales is rather bad. 84 % of the lakes and an even higher proportion of the other types of water bodies are at risk of not achieving the WFD objectives of good ecological status by 2015.

SURFACE WATER BODIES IN ENGLAND AND WALES AT RISK OF NOT ACHIEVING WFD OBJECTIVES

PRESSURES	RIVERS	LAKES	ESTUARIES	COASTAL WATERS
Point discharges	23.1	20.1	48.5	18.2
Diffuse pollution	82.4	53.0	25.0	24.2
Abstraction	10.7	2.10	14.0	n/a
Physical changes	48.2	59.3	89.7	77.8
Alien species	21.1	9.30	36.8	45.5
Overall % of water bodies at risk	**92.7**	**84.0**	**98.5**	**84.8**

Table 3. Percentage of surface water bodies at risk of not achieving WFD objectives. Note that water bodies can be at risk from more than one pressure.

public – two projects have been established to build on the CIS Guidance document (8) on Public Participation in relation to the WFD. One is the Mersey Campaign, which seeks to bring water into the planning process as part of the Interreg 3c ENMaR-project (European Network of Municipalities and Rivers) with project partners from Latvia, Sweden, Spain and Germany. (For further information: http://www.merseybasin.org.uk).The second is the Ribble Pilot River Basin-project, part of the network of Pilot River Basins across Europe, which is testing European guidance on public participation and river basin planning (report submitted June 2004), and currently focusing on links between the WFD and agricultural production (For further information http://www.environment-agency.gov.uk/ribblewfd).

Expertise in public participation is also being drawn from the Countryside Agency's project on public participation *(Drawing the boundaries)* based on experience gained in long-term mapping and consultation to draw up nationally designated Open Access areas within the countryside.

The UK agencies have also been participating in the Harmoni COP-project designed to improve public participation in river basin management planning, together with partners from Belgium, France, Germany, Hungary, Italy, the Netherlands, Spain and Switzerland.

France

Hervé Piegay, University of Lyon

Legislation and administration

It has been comparatively easy for France to implement the WFD. For example, there are no administrative boundaries causing problems. Since 1964 the administration of the water resources of France has been based on six great river basins. There has been one agency in charge for each basin. Water managements plans (SDAGEs) have existed for these regions since 1997 (by the Water law of January 1992). In the initial phase of implementing the WFD this existing administration was used, and the six river basins became River Basin Districts (RBDs). There is a state authority *(Préfet de bassin)* in charge of each district, and an advisory committee with elected representatives and representatives of basin users. In addition, France is part of three international river basin

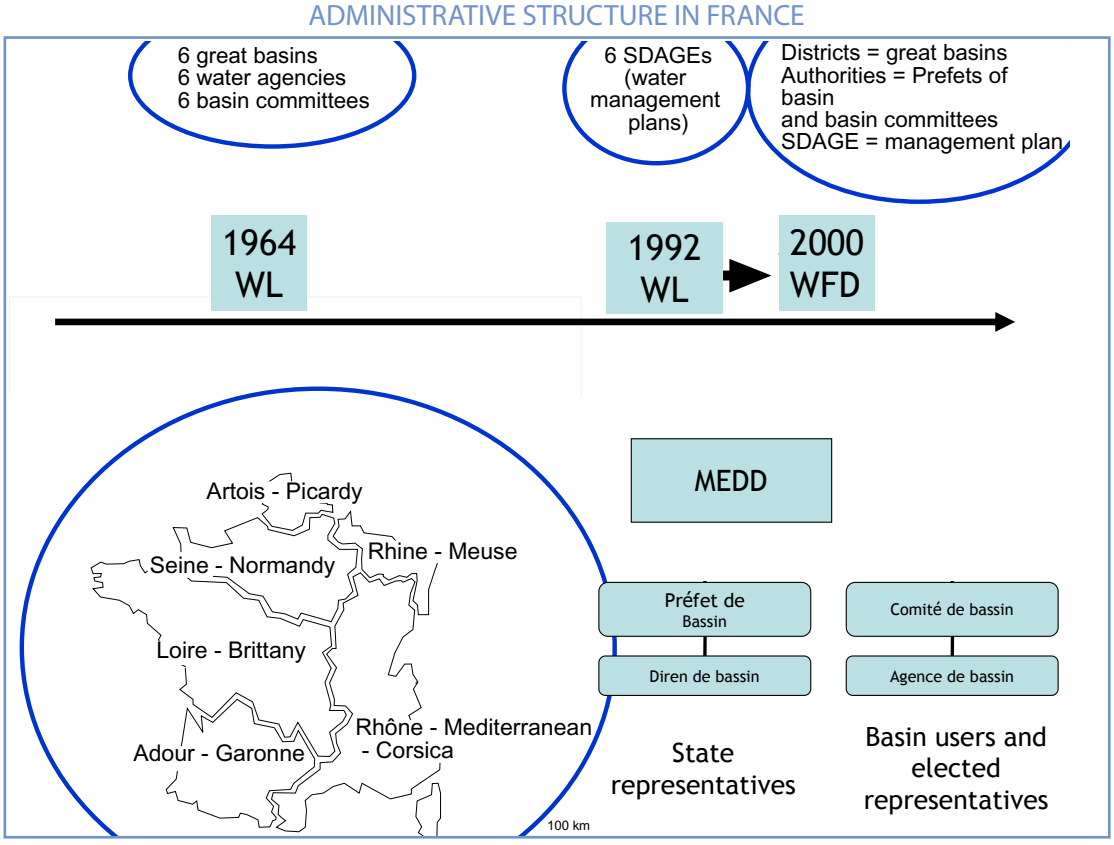


Figure 16. The overall administrative structure in France.

districts. There are also eight districts in overseas territories.

There is a tax system that can be used for funding the implementation. The system is based on the principle that water polluters pay a fee or a tax. In practice all water users pay, including the public.

The overall administrative structure is shown in figure 16. The ministry of ecology and sustainable development has the overall responsibility for implementing the WFD in France.

Characterisation of water bodies

The characterisation of water bodies such as required by the WFD is a new experience also to France.

The overall process for characterisation of water bodies in France is outlined in figure 17. The identification of water bodies in streams and rivers was done using four parameters:

- Hydro-ecoregion
- Stream order
- Fish communities
- Human pressure (water quality)

Using this method, 688 water bodies were identified in the Rhone-Mediterranean RBD, just to give an example. The average length of each water body was in this case about 30 km.

The characterisation of water bodies has been based on:

PROCESS FOR CHARACTERISATION OF WATER BODIES IN FRANCE

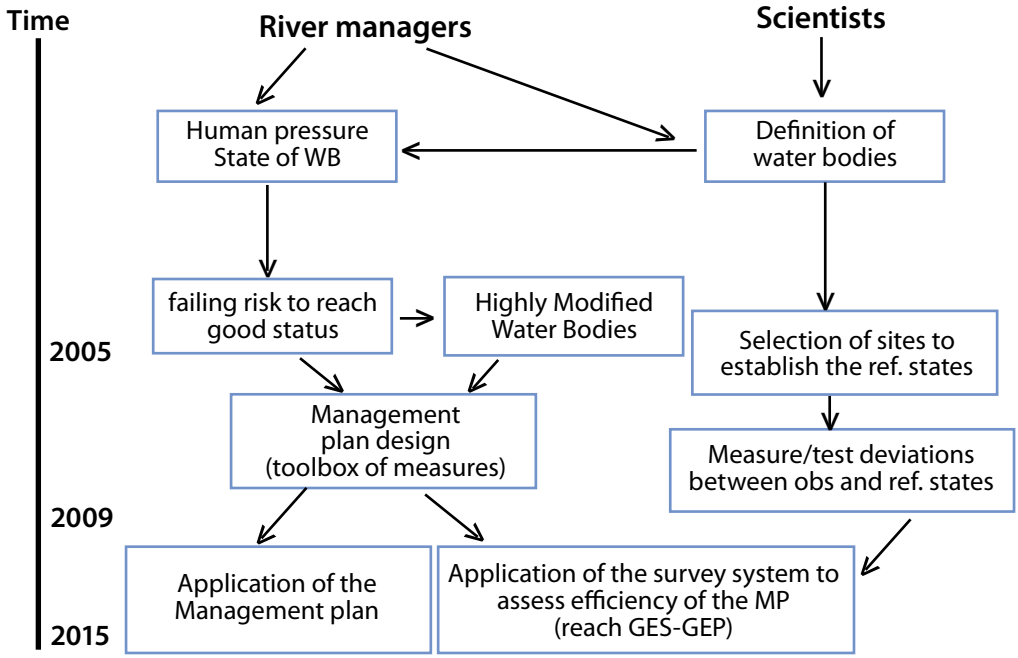


Figure 17. The overall process for characterisation of water bodies in France.

• Existing data on physical, biological and chemical status as well as human pressures. There is quite a lot of data from the monitoring of water bodies carried out by the basin management authorities. France has also developed a system to consider some expert judgements. To some extent, modelling approaches have been used to produce these maps.

• NABE criteria – guidelines for assessing the risk of not reaching good ecological status. 50 different variables have been used and assessed by expert groups at the local level. They include hydromorphological and chemical as well as biological parameters.

The result of this characterisation process has been compiled and presented in detailed maps.

Still using the Rhone-Mediterranean basin as an example, the data for the 50 parameters for each of the 688 water bodies has been compiled and analysed statistically to give an overall picture of the pressure on each water body and to identify the highly modified water bodies. In the Rhône-Mediterranean basin, 35 % of the water bodies have been identified as highly modified.

Defining reference conditions

The first step in defining reference conditions has been to make a preliminary selection of sites with low human pressure, using selected field data. 450 reaches all over France have been selected, and for these sites the local and regional

authorities have carried out field studies to collect additional data on:

- Invertebrates
- Fish
- Macrophytes
- Diatomées
- Physio-chemistry (nutrients, micro-pollutants, 12 pesticides)

The outcome of this will be a map of reference sites.

In the next step, the network of reference sites will be used to define good ecological status. The objective is to calculate a deviation between an observed state and a reference state. This process is guided by a "Circulaire" from the Ministry of Environment for the so-called transitory phase 2005–2007. The border between good and moderate ecological status is defined at this stage in a rather pragmatic way. For example, a water body is considered to be in good status if 75 % of the species of reference conditions are present. There are also simple threshold values for 33 chemical parameters.

Later on, we expect that the outcome of the EU intercalibration process will make it necessary to change the definitions and methods used.

Public participation

Local stakeholders or other groups have been involved in the process of water body characterisation using the same methods and systems that have been applied by the regional river basin managers for the application of the 1992 water law. There has been no similar experience to draw upon when it comes to involving the public in the implementation of WFD.

The involvement of the public will be made in three steps, each with a duration of six months. The steps and the deadlines are:

Dec 2006: Concerning the timeline of the management plans and the stakes.

Dec 2007: Concerning the main problems.

Dec 2008: Concerning the management plan project.

A first campaign to encourage the public in the Rhone-Mediterranean district to give their opinions was carried out from May to November 2005. Questionnaires were handed out, a website was set up and advertisements were published in local and regional newspapers. The campaign resulted in 70 000 answers or comments submitted by mail or e-mail.

Final remarks

Stefan Löfgren, Swedish University of Agricultural Sciences

Stefan Löfgren concluded that the EU members seem to have chosen very different ways to distribute the responsibility for implementing the FWD. Some countries have chosen to use existing, older administrative structure, while others are still in the process of forming new systems for their water management.

There are also big differences between the countries when it comes to public participation. It seems that most if not all other states have a lot to learn from France, which has a long tradition in this field.

Most speakers today have stressed that the implementing the WFD largely is a political process. Still, authorities and scientists are working together in all countries.

Obviously, defining the reference conditions is a very important step, from scientific as well as a political point of view. From a scientific point of view the reference conditions seems to be like the Holy Grail: you can search for it forever but you will never find it. Politically, on the other hand, it seems like the reference conditions and good ecological status are more like rubber bands that can be extended as much or as little as you like. A conclusion from this is that the intercalibration process that we now have ahead of us is crucial for the effect of the WFD and for the future water quality of Europe.

Utgivna nummer av Kungl. Skogs- och Lantbruksakademiens TIDSKRIFT (KSLAT)

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Nr 7 Det ekologiska valet - påverkar det nästa generations hälsa?
Nr 8 Water Framework Directive - WFD Implementation in a European Perspective *

The EU member states are presently performing the characterisation of their water bodies according to the EU Water Framework Directive (WFD).

Due to different national conditions concerning the natural status and the anthropogenic pressures on water bodies, the member states are allowed to perform the characterisations differently. The ecological status of the water bodies should be reported to the EU in December 2006.

In this report focus is put on how some European countries implement the WFD and how EU will treat the differences. Special emphasis is put on the characterisation process and to what extent this includes public participation.

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