COMMON IMPLEMENTATION STRATEGY
FOR THE WATER FRAMEWORK DIRECTIVE
(2000/60/EC)

PILOT RIVER BASIN OUTCOME REPORT

Testing of the WFD Guidance Documents.

DG Environment

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

Institute for Environment and Sustainability

2005

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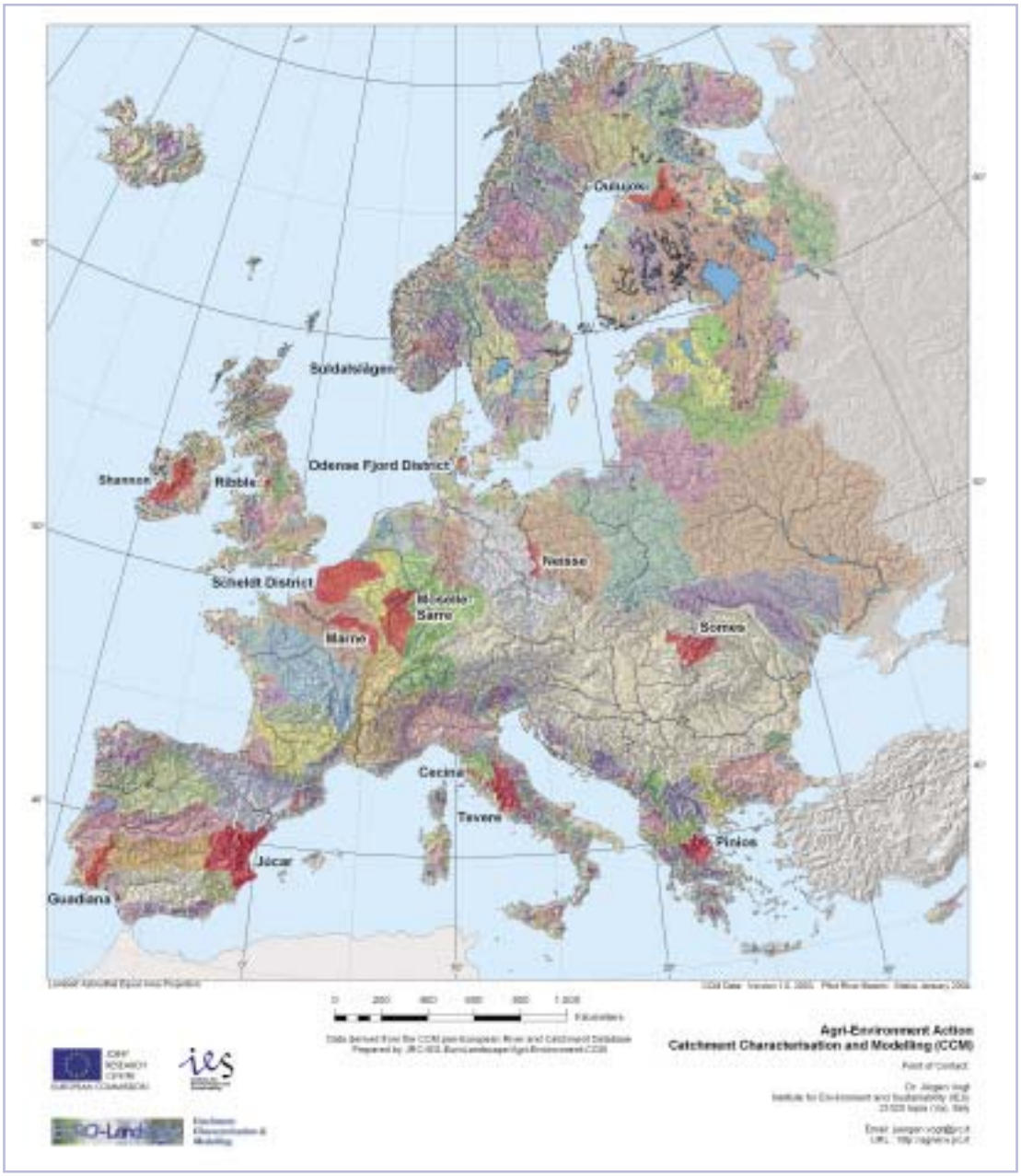

- CECINA (IT)
- GUADIANA - Portuguese part- (PT)
- JUCAR (ES)
- MARNE (FR)
- MOSEL-SAAR (BE, FR, DE and LU)
- NEISSE (CS, DE and PL)
- ODENSE (DA)
- OULUJOKI (FI)
- PINIOS (EL)
- RIBBLE (EN)
- SOMES/SZAMOS (HU and RO)
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STRUCTURE OF THE DOCUMENT

During the PRB exercise, two reports for Phase 1a and 1b were produced. These documents are available on CIRCA under: Pilot River Basin/PRB Outcome Report – Phase1a, and Pilot River Basin/PRB Outcome Report – Phase1b.
These documents presented the PRB exercise, its main aims and the structure chosen for its implementation. After completing Phase1b it was decided to merge the two reports in a unique document reporting the overall experiences, conclusions and recommendations coming from the PRB exercise.

The merged document maintains the subdivision of the exercise in two phases. After a general introduction, the results coming from Phase 1a are presented in three chapters:
1) INTRODUCING Phase 1a
2) OUTCOME OF TESTING: Phase 1a
3) CONCLUSIONS AND RECCOMMENDATIONS: Phase 1a

The same structure is used to present the results coming from Phase 1b of the testing:
1) INTRODUCING Phase 1b, Linking Phase 1a and Phase 1b
2) OUTCOME OF TESTING: Phase 1b
3) CONCLUSIONS AND RECCOMMENDATIONS: Phase 1b

At the end of these six chapters two ANNEXES are included:

ANNEX I, which is a collection of the case studies proposed by the PRBs to illustrate the procedure and the work carried out during the testing of the GDs. This annex is divided in two parts reporting case studies for Phase 1a and then case studies for Phase 1b, respectively.

ANNEX II, which is a summary of the answers to the ToR given by the PRBs for each GDs, in order to highlight the main outcome for each of them [1].

1 A third ANNEX collecting the complete answers given by each PRBs during the testing of each GDs is only available in electronic format. The document is available for downloading on CIRCA under: Pilot River Basin/ Answers to the ToR – Phase 1a and Phase 1b.

PILOT RIVER BASIN EXERCISE, GENERAL INTRODUCTION

During the 2001/2002 Common Implementation Strategy (CIS) of the Water Framework Directive (WFD) a series of Guidance Documents (GDs) concerning all major aspects of its implementation were developed by Working Groups (WGs) including representatives of Member States (MSs), Accession Countries, National experts and the European Commission.

In order to test and cross validate these GDs, a network of Pilot River Basins (PRBs) has been established. It was foreseen that such a network would contribute to the implementation of the WFD, leading in the long-term to the development of River Basin Management Plans.

Several countries have proposed river basins and associated coastal zones within their territory taking into account the following objectives:

- Cover the maximum number of Ecoregions
- Commitment and resources for testing the GDs in this voluntary exercise
- Participation of local, regional and national competent authorities, i.e. water management administrations
- Active involvement of NGOs and stakeholders
- Dealing with the maximum number of pressures and environmental problems
- Include transboundary river basins with all the involved partners

Figure 1. The Pilot River Basin Network.

- Represent data availability in MS.

Initial Pilot River testing of the GDs started in 2003 and was finished by the end of 2004. Similarly to the rest of the WFD-CIS process the PRB testing is a common exercise of the Commission and Member States. The Institute for Environment and Sustainability of the Joint Research Centre (IES-JRC) acts as the technical secretariat, and constitutes a part of the Working Group 2B for Integrated River Basin Management co-lead by France and Spain.

The Pilot River Basin network has been joined by 15 river basins all across Europe: Cecina (Italy), Guadiana - Portuguese part (Portugal), Jucar (Spain), Marne (France), Mosel-Saar (Belgium, France, Germany, Luxembourg), Neisse (Czech Republic, Germany, Poland), Odense (Denmark), Oulujoki (Finland), Pinios (Greece), Ribble (UK), Somes/Szamos (Hungary, Romania), Scheldt (Belgium, France, The Netherlands), Shannon (Ireland), Suldalsvassdraget (Norway) and Tevere (Italy). The geographical location of the Pilot River Basins is presented in Figure 1.

STRUCTURE OF THE PRB EXERCISE

The PRB exercise was structured into two phases:

- **Phase 1**, has as main objective the testing of GDs, and included two parts:
  - **Phase 1a** focused on the implementation of Article 5 of the Directive and tested the Guidance Documents affected by this Article (Water Bodies Identification, Pressures and Impacts, and some parts of Heavily Modified Water Bodies, Reference Conditions, Coast, Public Participation, and Economics). The decision to test in advance Art. 5 related GDs was taken because the implementation of the WFD was already taking place in many countries, which had to report to the Commission on specific issues of the Directive Annexes in a relatively short time. Furthermore, the horizontal GD on Identification of Water Bodies was a base for the testing of the other GDs. Phase 1a was finalised by end 2003, and the report compiling the outcome has been presented to the Water Directors in June 2004.
  - **Phase 1b**, focused on testing the Guidance Documents not addressed during the previous phase, and on finishing the testing on several issues not included in Art.5, i.e. some parts of Heavily Modified Water Bodies, Reference Conditions and Public Participation; Intercalibration, Monitoring, Geographic Information Systems (GIS), Planning Process, and Wetlands. Other specific issues emerged in Phase 1a, were considered in this phase.
- **Phase 2**, start at the beginning of 2005, will built up upon the experience gained in Phase 1 and it is expected to cover the period 2005-2006. The detailed Work Programme for this phase is being developed. Key issues for this period will emerge from the analysis of the reports from PRBs on Art.5 implementation [2].

GDs reflect the EU common understanding of the WFD implementation and, hence, they are addressed to the national-strategic level of MSs rather than to the regional or local-operational level. For this reason, some MSs have developed their own national guidelines, sometime based on specific WFD GDs in their national language and with references to regional/local data sources of information. Where possible this report makes appropriate references to these documents.
The GDs are available at the following address: http://europa.eu.int/comm/environment/water/water-framework/implementation.html

Main aims of the PRB testing exercise

For both Phase 1a and Phase 1b, a Terms of Reference (ToR) document was developed. These documents focus on Key Issues which WG leaders felt to be of particular relevance when developing the GDs. In the document three main objectives were set out for the PRB exercise:

1. to test whether the GDs responds to the needs of the PRBs;
2. to test whether the inter-linkages between the GDs are sufficiently developed; and
3. to disseminate valuable learning experiences from the PRB exercise but also to point out similar experiences from outside these experience.

[2] *The document is available for downloading on CIRCA under: Pilot River Basin/PRB Outcome Report – Phase 1a/PRB Outcome Report - Testing of Art.5 related GDs/PRB Outcome Report - Testing of Art.5 related GDs.pdf*

Context of the PRB testing: a rich diversity

The most striking feature found in the PRB exercise is the rich diversity encountered, which in turn reflects the enormous disparity that one will have to expect during actual implementation of the WFD. This diversity has several aspects that need comment:

- Geographical distribution: the PRBs cover twelve of the 25 ecoregions for rivers and lakes and four of the 6 ecoregions for transitional waters and coastal waters defined by the WFD: Annex XI, maps A and B, respectively. For example, Iberic-Macronesian region for rivers and lakes is represented by the Guadiana-Portuguese side-and the Jucar rivers, whereas Baltic Sea for transitional and coastal waters is represented by the Oulujoki river. Furthermore, the pilot river basins cover a wide range of sizes from 900 Km^2 of the Cecina (small, Mediterranean, few authorities and high degree of participation) to 37170 Km^2 and 22436 Km^2 of the Scheldt (international, highly industrialised, many authorities, complex river management, involvement of politic) and Jucar respectively.
- Transboundarity: one important characteristic to consider concerns the trans-national versus the national character of the testing. This is related mainly to the amount of additional work needed to co-ordinate the activity between several MSs and CC, language barriers, disparity on management approaches and data availability. In the PRB exercise there are four transboundary pilot river basins: Mosel-Saar (Belgium, France, Germany, Luxembourg), Neisse (Czech Republic, Germany, Poland), Scheldt (Belgium, France, The Netherlands) and Somes-Szamos (Hungary and Romania). For example, the Neisse has different water management systems, which makes data difficult to compare.
- Pressures: there is a rich variety from the Suldalsvassdraget with a scattered population within the basin area amounting to approx. 3000 persons but with a strong regulation of the basin for hydropower generation (the river accounts for a 5.4% of total Norwegian electricity production) to the Marne with 2.8 million inhabitants.
- Existing data: another important aspect when testing the GDs was to have several levels of data availability to assess the use of different approaches, from the application of validated models at the basin scale, to statistical analysis of existing data, to expert judgement where data is scarce or not available. For example, the Odense river – small, few authorities, agricultural- has relatively long historical data series due to the appearance in 1973 of the first Danish Environmental Protection Act, whereas the National Surface Quality Monitoring Network organized by the Greek Ministry of Environment, Physical Planning and Public works was designed in 1992 and consequently the Pinios river basin has much less historical information available.

However, after Phase 1a became clear that certain issues were common to practically all PRBs, therefore they were considered also in Phase 1b:

- Agriculture and hydromorphology as recurrent topics, despite geographical distribution; in practically all PRBs intensive agriculture constitutes one of the major pressures against the achievement of the environmental objectives in the WFD. It is becoming clear to all PRB participants that a strong link between WFD and CAP (Common Agricultural Policy) is urgently needed. For example, the Odense PRB has recognised diffuse pollution from agricultural origin as one of the major issues to tackle, hampering achievement of environmental objectives; in the Shannon PRB, with 73% of the watershed area devoted to this activity, agriculture constitutes a major pressure. Furthermore, the problem of strong regulation of the basin for hydropower generation is considered as a major problem not only in North (Suldalsvassdraget, Oulujoki) but also in Mediterranean (Tevere, Jucar).
- Certain pressures seem to have a strong geographical connotation: issues related to water over-exploitation and increased tourism pressure during the summer period is relevant in all Mediterranean PRBs (Guadiana, Jucar, Cecina, Pinios and Tevere). Furthermore, due to climate change impacts, it is expected that these pressures can only increase.
- The implementation of the WFD will have profound implications in the management of

water resources in EU. Such conclusion has already been reached in transboundary PRBs (Mosel-Saar, Neisse, Scheldt, Somes-Szamos) where new management structures have been developed to address common issues in the WFD implementation. Furthermore, the WFD calls for an integrated approach to water issues and, as a consequence, several activities that are administered independently by National, regional and local administrations in PRBs will have to be coordinated at watershed level. For example, in France ownership of hydrological data is administered by both the IGN (National Geographic Institute) and the Ministry of Ecology and Sustainable Development. Such joint management could generate some problems in French PRBs, e.g. in Marne, for the reporting of results produced for the WFD. Such fragmentation is also typical in the case of monitoring networks. For example, in Italy the Ministry of Environment is in charge of the implementation of the WFD, and of the management of Protected Areas; however, monitoring of drinking and bathing waters is under the domain of the Ministry of Health. In Norway, the responsibility for monitoring and management of waters are fragmented into several ministries and national authorities.

An overview of the GDs that have been tested by the PRBs during the overall Phase 1 is presented in Table1. Some of the GDs already tested in Phase 1a have been re-assessed in Phase 1b for some aspects not previously covered. Specifically, Public Participation has been included, but one generally, VFD implementation should be considered as an iterative process aiming at refining the results as data, analysis and new structures are developed.

	ART5	ART5		ART5	ART5		ART5		ART5	ART5			
River Basin	Water Bodies	IMPRESS	IDAWB	REFCOND	COAST	Inter-calibration	WATECO	Monitoring	Ground Water	Public Participation	Planning Process	GIS	Wetlands
Cornish/Fiord													
Odiel/Piedras													
Mosselle-Sarre													
Maione													
Meuse													
Somes/Szamos													
Scheldt													
Ebro													
Shannon													
Guadiana													
Tejo													
Tevere													
Ombla													
Neagh/Bann/Roe													
Rhone													
Legend		The FRB is testing the GD											
		The FRB is not testing the GD											

Table 1: Overview of GDs tested by the PRBs

CHAPTER 1: INTRODUCING PHASE 1A

Phase 1a of the PRB exercise is focusing on implementation of the first requirement of the Directive (Article 5) tested the Guidance Documents affected by this Article (Water Bodies Identification, Pressures and Impacts, and some parts of Heavily Modified Water Bodies, Reference Conditions, Coast, Public Participation, and Economics). The decision to test in advance Art.5 related GDs was taken because the implementation of the WFD is already taking place in many countries, which will have to report to the Commission on specific issues of the Directive Annexes in a relatively short time. Furthermore, the horizontal GD on Identification of Water Bodies was a base for the testing of the other GDs. Phase 1a was finalised by end 2003, and the report compiling the outcome has been presented to the Water Directors in June 2004.

CHAPTER 2: OUTCOME OF THE TESTING, PHASE 1A

2.1. HOW TO DEAL WITH GUIDANCE DOCUMENTS

The first question to answer in the PRB testing was: do the guidance documents respond to the needs of the river basins? This issue is briefly discussed in section 2.2, starting with the general usefulness of guidance documents. Although the expectation in advance was that this matter would be the main subject of this report, the PRBs did not experience much trouble with individual GDs. In section 2.3 the second issue, on the linkages between guidance documents is discussed. Because of the time constraints, the different WFD issues were dealt with in different working groups when drafting the GDs. How do these GDs work out when applied together? Finally, a lot of the lessons learned were not foreseen when starting with the PRB exercise. These issues are discussed in section 2.4.

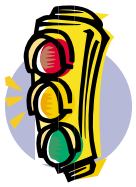
2.2. USEFULNESS OF GUIDANCE DOCUMENTS (IN GENERAL AND SPECIAL GDS)

In general the GDs were very well received, and their usefulness acknowledged. However, as these GDs aimed at providing some general direction, many PRBs highlighted a need for more specific documents. As a general comment, it seems that these sets of guidance documents are now part of a large body of available information concerning the implementation of the WFD. During the testing phase it has been seen that many sources of information and guidance are used to achieve a successful implementation of the WFD relative to Art.5. There were some efforts on transnational basins to use similar sets of information including national documents, however additional collaboration will be needed to reach consensus. There was no major issue raised concerning differences in interpretation. This testing phase is seen as a screening exercise, while a more refined approach will only be possible once impact threshold criteria are defined. Indeed these thresholds will be the key issues for identifying the water bodies at risk of not meeting good ecological status, and thereafter in the development of the River Basin Management Plans. It is expected that more questions will arise once the issue of thresholds is tackled.

During the testing there were no issues related to differences in interpretation. However, this might change when the issues of thresholds and references conditions are tackled.

Technical versus legislative quality standards

It is known that triggering of threshold values of internal or external variables in the ecological system may affect the evaluation of the ecological status of the system. For this reason, the definition of quality standards plays a vital role in the WFD. During the testing of the guidance documents PRBs have stressed the difficulties encountered caused by the lack of existence of thresholds for impact indicators. They felt also that there is a lack of legislative thresholds, and thus the preliminary testing of the GDs should also take into account the uncertainties linked with the absence of these threshold values. However, many of these thresholds, including those for priority substances, are still under discussion and will be only available in the coming years. A further difficulty is that there is not always a direct relationship between pressures and impacts even if threshold values exist.



All PRBs stressed the need for thresholds for impact indicators. There is thus the need to go more in detail respect to specific situation in the definition of the threshold. Therefore MSs in addition to the EU threshold used also national data as: monitoring data, both physico-chemical and biological, time series for conducting the impact assessment.

The uncertainty embedded in the preliminary analysis of the pressure and impact will have to be estimated, as they have major implication in the identification of water bodies at risk of not meeting the WFD requirements. As illustrated by some PRBs, these thresholds are likely to be defined at MS-level, based both on scientific and political considerations.

Related to this aspect, reference conditions have the same problem; their establishments in some cases are difficult since there are few pristine sites in Europe. Some countries, e.g. Italy, are discussing the legislative definition of such reference conditions or thresholds whereas other countries consider that a technical definition needs to be agreed.

Concerning reference conditions, some PRBs are favouring the adoption of legislative definition while other PRBs prefer a more technical definition.

National versus WFD/CIS GDs

The concern for the national implementation of the WFDs lead to the development of guidelines that were available prior to the elaboration of the GDs developed in the framework of the Common Implementation Strategy of the WFD. Two official documents, one German and the other French, are actually available. The German Document produced by LAWA was published in 2002 and deals with the implementation of the whole WFD. In substance this document is similar in intention as the GDs produced in the framework of the CIS, and "is intended to make the complex structure of the Directive easier to understand for enforcement purposes across Germany, to ensure a uniform approach to implementing the Directive and to avoid any duplication of effort" (LAWA, 2002). The French document was also produced in an effort to ensure a harmonised compliance with Art.5 of the WFD throughout France. Spain in addition has also produced a Manual for conducting an analysis of Pressures and Impact on Surface water pollution. This illustrates the need of the MSs to produce documents readily usable by local managers that take into account the specificity of the country, including the administrative environment. This is also reflected in the PRB testing where often a combination of national documents and CIS GDs were used.

CIS Guidance Documents were efficiently used in conjunction with national documents, as the latter are more specific to certain regions, do not present a language barrier, and have often been used for a long time.

The conceptual approaches proposed in the GDs seem to be very suitable for all PRBs. For instance, concerning the analysis of Pressures and Impacts,

in most cases, the concept of DPSIR seems appropriate. However, as the testing is still at an early stage, the response part of the analysis has not been performed. It is clear that the IMPRESS guidance document lists potential tools for carrying the Pressure and Impact analysis, however, PRBs are happier using tools for which they have already collected data, and where the whole system has been set up and running. The impact of local conditions is most evident in the definition of the reference conditions and is strongly controlled by the monitoring strategy in place. Local expertise is often used in conjunction with existing data or modelling results to define reference conditions.

The need to produce national guidance documents based on CIS documentation in the context of national legislation has been underlined by many PRBs. However, agreement is required for transboundary catchments. The experience gained during the testing and the elaboration of the CIS Guidance Documents is being used during the development of the national guidance.

CIS Guidance Documents are very useful tools, and local adaptation was often performed by the PRBs to take into account the national or regional specificity.

Real life versus virtual testing

The testing of the GDs by the PRBs is seen as a front-runner project that will serve for the real implementation of the WFD. Many PRBs have recognised this consideration expecially where the selected catchment is ahead of the national implementation process. Many PRBs have taken the approach that the GDs testing is to be considered as "real life testing" for various reasons including economical and practical considerations. Furthermore, time available between "virtual test" and "real commitment" would be too short to capitalise on the PRBs experience gained. For instance it was noted that stakeholders would not be involved in testing the GDs if such an exercise would be conducted as only virtual testing. Furthermore, it was recognised by the PRBs that testing will provide MSs with valuable insight on how to comply with the Art.5 requirements, and the other basins will greatly benefit if the testing is conducted as a real case study rather than a "virtual exercise", as the results should provide clear solutions to the problems encountered during the real implementation of the WFD. It should be noted that many PRBs are also involved at a broader level in the National Implementation of the WFD, and that some of the results of the testing are only sub-sets of results produced at a much larger scale. For instance, the tools and methodologies used for Marne PRB cost recovery analysis derive from the works already led at the scale of Seine Normandy basin. Strategies and results developed in the PRB projects can also be modelled on future national activities. In the Neisse PRB virtual approaches from the project were expanded to a larger scale of other river basins in the three countries involved.

Many PRBs approached the testing as a real life exercise from which other river basins already starting the implementation of the WFD will greatly benefit.

Level of involvement of stakeholders and public participation

The involvement of stakeholders and Public Participation (PP) in the testing exercise should be done at two different levels: testing the public participation GD – 9 PRBs committed to this testing - and fostering the involvement of stakeholders during the testing of all the GDs, as an horizontal activity applicable to all the PRBs. During the Art.5 phase there were two main positions regarding the involvement of stakeholders. On one hand, most of the PRBs judged that the PRB exercise (Phase 1a) was too early for stakeholders' involvement; on the other hand, some PRBs have started active stakeholder and public involvement at a very early stage, resulting in a satisfying response. The results of this was that there was a scarce involvement of stakeholders in most of the PRBs and that only 2 out the 9 PRBs testing the PP GD actually started active involvement of stakeholders.

The objective of public participation and stakeholder involvement is to bring together key partners, obtain input of new ideas, share the ownership of the WFD implementation process, improve and focus the delivery of results, align goals with stakeholders, manage expectations, raise awareness and identify conflicts at an early stage, "before" confirming the definition of water bodies status.

For example, the Ribble PRB considers this aspect essential to create a common vision of what one can expect from the implementation of the WFD between stakeholders and public in general. A soccer analogy for public participation from the Ribble PRB is illustrated in the ANNEX I.

To avoid confusion among stakeholders, Oulujoki PRB organised a workshop together with officials from the recently established River Basin that included both a presentation of River Basin and the first results of the testing within PRB Exercise.

The viewpoint of the PRBs that did not involve stakeholders in the process, was to first define the provisional objectives for the water bodies based on actual conditions and then, when the water managers have a better idea of the type of conflicts that are likely to appear, start the involvement of stakeholders. This is due mainly to the amount of work river basins managers have to spend for developing the public participation scheme required by the WFD. For example Odense PRB has stressed the need to reduce nutrient loading from agricultural origin to fulfil good ecological status for 2015 and, hence, after this analysis, they have identified the main problem to be addressed together with stakeholders.

Some problems emerge in the identification of stakeholders at the international level, and especially the level (regional, national, international) of involvement of the stakeholders. Furthermore, there is some disappointment as clear-cut answers are not always possible for very specific questions. However, this dialogue is crucial as it highlights potential future problems.

Workshops

To support the PRB exercise, a series of workshops were held during the second half of 2003. The issues covered by the workshops were Surface Water bodies Identification, Groundwater Characterisation and Economic Analysis.

- **Workshop on Economics**
  The workshop on Economics took place in Paris on 9 - 10 October 2003. The workshop was organised together with the Agence de l'Eau Seine Normandie under the umbrella of the CIS. The purpose of the workshop was to present experiences and examples from PRBs and other national case studies on the implementation of the economic elements of the WFD and to hold a brainstorm session on key economic issues related to the implementation of the WFD. Presentations were made by the Odense PRB on their experience of their economic assessment; the Marne PRB on baseline scenario and trends analysis; the Scheldt and Jucar PRBs on cost-recovery analysis (see extended Report on the Workshop on Economics available on CIRCA under: Pilot River Basin/PRB Outcome Report – Phase 1a/ANNEXES). The document concentrates on the input provided by the PRBs and the key issues raised during the workshop.
- **Workshop on Initial Characterisation of Groundwater Bodies**
  Under Art.5 of the WFD, MSs have to identify water bodies by 22 December 2004 as part of the first characterisation of the river basin. Member States have to carry out an initial characterisation of all groundwater bodies including their location and boundaries as well as identifying pressures and groundwater bodies at risk of failing to meet the objectives of the WFD. A workshop on Groundwater bodies' characterisation took place in Brussels on 13 October 2003. The workshop was organised together with the Ground Water group under the umbrella of the CIS. During the workshop the PRBs reported their first experiences when testing the ground water part of the Horizontal Guidance Document on the Identification of Water Bodies. The detailed information on the initial characterisation at the National and PRB levels is available on CIRCA under Pilot River Basin/PRB Outcome Report – Phase 1a/ANNEXES, with an extended Report on the initial characterisation of Groundwater Bodies.
- **Workshop on Water Body Delineation**

The workshop on Surface Water Bodies took place in Brussels on 25- 26 September 2003. The purpose of the workshop was to discuss and analyse the experience gained in specific river basins in Europe on the implementation of the WFD for the characterisation of surface water bodies. Under Art.5 of the WFD, MSs have to identify water bodies by 22 December 2004 as part of the first characterisation of the river basin. The water bodies are the units that will be used for reporting and assessing compliance with the WFD environmental objectives. Twelve out of the 15 PRBs have agreed to test the horizontal Guidance Document on the identification of water bodies during 2003. JRC based the discussion during the two-day meeting on the responses from 12 PRBs to a questionnaire drafted in early September 2003. The PRBs gave presentations on the different approaches used to delineate water bodies. A complete report on this workshop is available on CIRCA under Pilot River Basin/PRB Outcome Report – Phase 1a/ANNEXES.

2.3. TRANSVERSAL ISSUES – COHERENCE BETWEEN GUIDANCE DOCUMENTS

Economics and pressures

During the Phase 1a testing, stress was placed on the necessity to look at economic analysis of water uses in such a way as to provide a basis for the assessments needed for WFD implementation. At the same time, the approach needed to consist of a first step in which a large variety of water uses were considered before focussing on the most important ones. Through this work, PRBs learned that the content of the economic analysis should be driven by the information needed to answer the WFD GDs as well as by the availability of data. In this context, it is crucial to link the work done on "pressures and impacts" and economics, in order to improve decision-making in water management and for the practical implementation of the WFD. During this phase of the testing the PRBs used different approaches to consider jointly the economical evaluation of water uses and the pressures and impact analysis. This transverse relationship should be taken into account in order to guarantee a co-ordinated approach and to avoid duplication of work. The WATECO and IMPRESS GDs support this approach. However, during the PRBs testing the practical implementation of the economic analysis in many cases seems to be disconnected from the pressures and impacts analysis.

Even though an integrated testing of the various GDs, such as IMPRESS and WATECO, would have been greatly beneficial, it seems that in many PRBs the testing was conducted using each GD individually.

Among the PRBs, different approaches were applied to link the pressure factors identified, impact on water resources and evaluation of cost recovery and economic impact. Generally all the PRBs report problems in developing cost recovery evaluation at the same scale as that used for the identification of pressures and impact factors. For example, Marne highlight how cost recovery analysis and pressure and impact analysis are not easily comparable because:

- Cost recovery analysis is done at a basin or sub basin level and indicates the monetary transfers between user categories (agriculture, industries, domestic).
- Pressure and impact analysis tries to estimate different sources of pollution at the water body level.

Thus, cost recovery analysis does not need to be conducted at the same scale than pressure and impact analysis. The Jucar River and the Somes/Szamos Basins both reported lack of suitable economic data at river basin scale, this information being available only at the regional scale. In the Scheldt transnational river basin the information related to IMPRESS and WATECO is plentiful, but the difference in scale at which the data are available does not allow an economic evaluation and cost recovery analysis of the pressures and impacts. To deal with the scale problem the Tevere River Basin has used a "multi-step" approach. Using the pressure list of the IMPRESS guidance document the impact of pressures were identified. In a second step, conflict between these pressures and the basin-specific uses of the water are identified and, on this base,

evaluation of economical impact and cost of recovery actions were evaluated. The Moselle/Sarre River Basin used a similar approach; the linkage between the pressures and impacts analysis and the economics evaluation was based on a national management plan, which establishes economic evaluation of the water resources to be preserved.

When trying to link the testing of various GDs, technical problems appear, such as the scale issue between IMPRESS and WATECO.

Pressures and Water Bodies

The horizontal Water Bodies guidance gives a common understanding of the definition of water bodies and specific practical suggestions for the identification of water bodies under the WFD. Guidance on the analysis of pressures and impacts addresses the question related to the role of this analysis within the implementation process and how it contributes to the characterisation of water bodies, which has to be fulfilled as part of Art.5 of the Directive. It also shows how this analysis feeds into the development of monitoring programs, River Basin Management Plans and Programs of Measures. In this context the coherence between the horizontal Water Bodies (WBs) Guidance and the IMPRESS Guidance is a key point in the implementation of the WFD. The PRBs have taken different approaches towards the relation between WBs delineation and IMPRESS analysis. For example the Mosel-Saar and Marne have begun identifying WBs using as a first step only natural criteria.

Subsequently pressure and impact criteria will be considered to achieve the delineation (and to split as necessary the natural WBs) in order to obtain homogeneous WBs according to both natural and pressure criteria. The PRB used a similar approach to evaluate the coherence between the IMPRESS and the WATECO GDs. They first identified the water bodies, and then determined their typology and finally the pressure and impact analysis was used to identify water bodies which are size-significant but which can negatively affect the quality of water resources. Considering their significant impact on the water quality of the outflow from the whole basin, the Cecina PRB has also identified very small streams as WBs. In this case the IMPRESS Guidance was more useful in the Water Bodies identification than the designation according to typology.

In many cases the IMPRESS GD results to be a useful in tool in the identification of water bodies within the overall basin. IMPRESS GD was used both as the major factor in some PRBs to identify water bodies and as one discriminatory factor applied after having carried out the water bodies delineation, according to ecological and natural criteria.

Some PRBs (i.e. the Walloon part of the Scheldt PRB and the Romanian part of the Somos PRB) have applied a combination of the biological status criteria and pressure analysis to identify WBs. Aggregation seems to be applied in most PRBs for very small WBs if these are not under significant pressures. For example, the Suldal PRB has applied aggregation to a large extent within the basin. The Suldal considered that if pressures and impact factors within a water body do not significantly impact the ecological status, they are not taken into consideration for defining water body borders.

Bottlenecks in the planning process

All WGs and PRBs have been faced with the ambitious and legally binding timetable of the Directive. In principle, deviation from this timetable is not allowed and deadlines cannot be postponed. Several WGs and PRBs felt that the timetable, on the one hand, is tight and leaves little time to go through the issues in sufficient detail and on the other hand that the chronological order of the deadlines is not always logical when dealing with the practical implementation. This combination often results in bottlenecks.

Analysis of the actions needed for implementation has allowed the identification of some bottlenecks. For example, the incongruities in planning that

occur when comparing the official deadline requirements of the Directive with a pragmatic approach regarding the implementation. To ensure these bottlenecks do not cause problems for implementation, i.e. redundancy of work, the WG on Best Practices in Planning summarised the bottlenecks that have been identified by the different WGs of the CIS Strategy.

Bottlenecks appeared during the testing, as the chronological order of the work is not always logical. For instance, the lack of information on reference conditions made the pressure and impact analysis difficult.

Some of the bottlenecks are specific to a Member State or River Basins and are due to: lack of financial or technical means, institutional arrangements, priority setting, habits and/or traditions.

The following bottlenecks relevant to the first phase of the RPB testing have been identified.

- The lack of data for the first review and the need for: existing information and data on pressures and impacts, a definition for the significant pressures, relation between pressures and impacts, baseline scenarios before estimating the forecasted impacts, the 2015 objectives to assess the risk of failure.
- Data on reference conditions (RC) are a prerequisite for assigning ecologically relevant typology.
- Need to start monitoring potential RC sites before general monitoring programmes are operational.
- Need for monitoring data from intercalibration sites for calculating EQRs.
- Evaluation of the testing and review of guidance will be too late for the 2005 reporting of status.
- Typology, reference conditions and class boundaries are not available. Draft register based on expert judgement.
- Finishing intercalibration exercise before monitoring programmes are operational.
- The 2004 review of the GDs should be done with data and tools currently available, but these have to be used in a pragmatic manner in order to meet the requirements of the Directive. Making the 2004 review is an opportunity to assess the data lacking and shortcomings to be resolved.

Most bottlenecks can be summarised into a few basic issues or deadlines within the Directive:

- Objectives to be achieved are unclear. The Directive refers to the achievement of "good water status" in 2015, which can be defined by the help of Annex II and V. At present this information is general and needs to be elaborated and made operational. This work is planned to be finalised by 2004. As a consequence it is hard to tell if a water body is at risk of failing the environmental quality objectives before 2004 (gap analysis) and which measures would need to be taken.
- Data availability. The monitoring programme will unlikely be in place before 2006; hence recent and complete information (measured values) on parameters of importance to pressure and impact analysis, settings reference conditions, defining ecological class boundaries, intercalibration sites, and indirectly to the designation of heavily modified water bodies, will only be available from 2007. Also a low monitoring frequency is not optimal. As a consequence assumptions will be made about missing data, which increases the uncertainties in the analyses and affects the validity of the assessments.

The PRBs worked with three types of solutions for the bottlenecks, applied in an iterative process.

- Use of existing information. In all PRBs, data available resulting from the present water management system was used, as well as the present thresholds (fixed via national procedures).
- Expert judgement. A great part of the existing data does not fit into the formal WFD structures. With the use of expert judgement, estimations could be made on the implications of the present knowledge for the WFD requirements.
- Working from coarse to detailed. Most PRBs started a process in which first the main lines were drawn, and after that was zoomed in on the problems and gaps. This made an effective use of (human) resources possible.

These three types of solutions were applied in an iterative process, working from the broad perspective full of uncertainty, to a more detailed view on the aspects that need attention.
The combination of unclear objectives, missing data and the first major deadline in 2004 (Art.5) made it nearly impossible to give a very exact assessment of current water status and the real risk of failing to meet objectives. Therefore several WGs already considered the process as being an iterative one and are undertaking preliminary analyses and assessments, based on available data (if necessary on assumptions) by 2004, and plan to check these assessments at a later stage when monitoring data become available. It is important to estimate the uncertainty of these preliminary exercises.

Make the process iterativ
Although not foreseen in guidance documents, this turns out to be the main solution for many planning problems within the WFD, e.g. the delineation of water bodies will depend on the IMPRESS analysis. At this time, this analysis only can be preliminary. Therefore the delineation of water bodies in the Art.5 report must be open to refinement (if needed) in the subsequent River Basin Management Plan.

2.4. PRACTICAL PROBLEMS

Time issues
A considerable effort has been put into testing by PRBs, especially considering that the approved versions of the GDs did not become available until the end of 2002, beginning of 2003. Thus the time available for this first exercise has been limited to 6-9 months. Despite the rather demanding time constraints the large majority of PRBs have delivered a general overview of the issues that other river basins may expect to be confronted with when addressing with Art.5 requirements. A recurrent issue is the time needed to start the assessment process. It requires a preparatory period to put in place a management structure, which often is not involving only public authorities and water managers but also, stakeholders, NGOs. Public involvement to establish collaboration mechanisms and to gather the needed data that is often spread among several regional/national administrations. The time needed to implement these steps should not be underestimated. For example, in the case of Pinios River basin, this first step has been more time consuming than subsequent testing of the GDs or implementing Art.5, since obtaining data owned by several authorities was essential and raising the awareness of public in general and stakeholders in particular required considerable effort.

Technical versus Political Art.5 report
One point of discussion in the PRBs exercise concerning the first report on Art.5 have been the level of political involvement that should be included. Some PRBs considered that this report is a pure technical testing report developed by water managers and should not include any political consideration. Other PRBs considered that this testing report has to be discussed at a more political rather than just technical level, because it had a close relation with the real

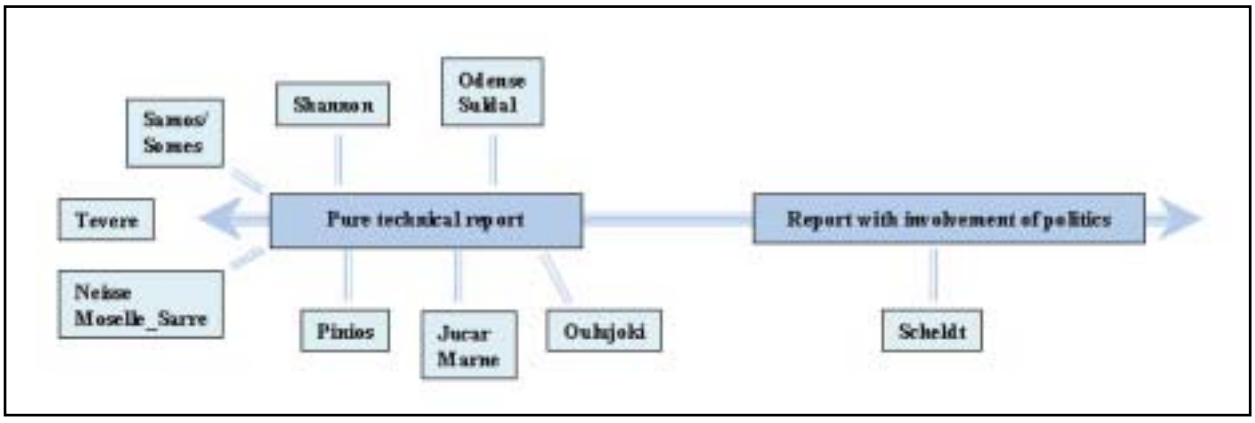


Figure 2. Technical vs. Political Art.5 report.

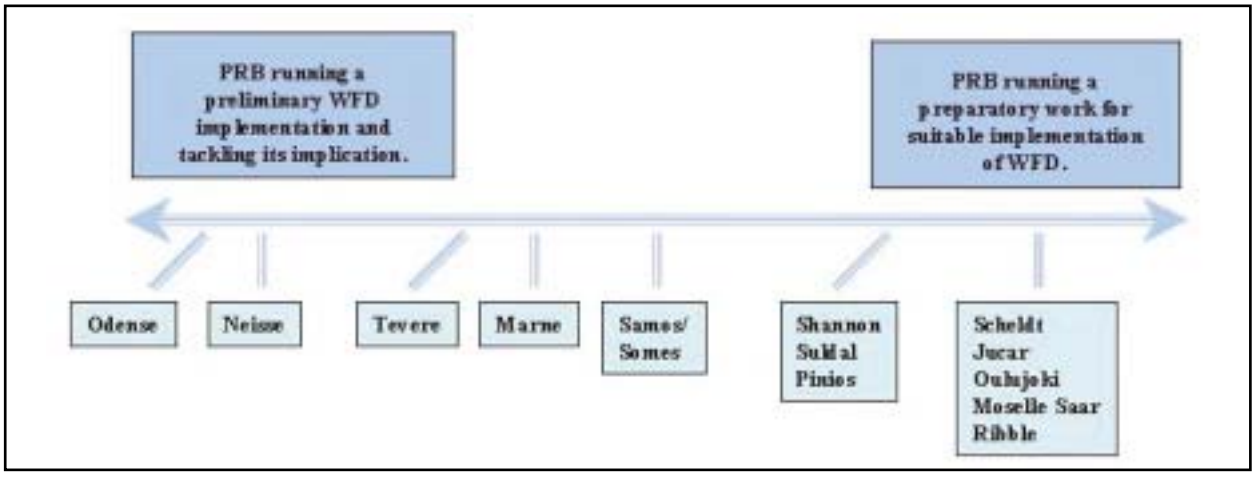


Figure 3. Independent or embedded implementation.

implementation process. Participants were asked at the PRB Workshop at Belgirate (27-28th November 2003) to identify themselves along the axis in the Figure 2.

Independent or embedded implementation

Another important issue concerning PRB results (also discussed at the Belgirate Workshop, 27-28th November 2003) is the relationship between PRBs and National implementation processes occurring in MS. Whereas some PRBs are far in advance in the implementation of the WFD (within their PRBs) with respect to the more general national implementation in their own country, others are embedded in the National implementation process (Figure 3). This is reflected in the time difference that certain PRBs have compared to the National implementation plans.

Transnational co-ordination

The PRBs Network comprises four transboundary rivers, i.e. Scheldt (Belgium, France, The Netherlands), Mosel-Saar (Belgium, France, Germany, Luxembourg), Neisse (Germany, Poland, Czech Republic) and Somes (Romania, Hungary). In these PRBs several issues due to their transboundary character have appeared, among them:

- Historical approaches: in transboundary rivers there exist differences between monitoring approaches, in terms of sampling frequency and parameters. There are differences in management approaches for example with each country applying their own national standards. These differences may, afterwards, condition the approach one country is following for the implementation of the WFD. For example, for the identification of water bodies in the Lausitzer Neisse, Germany has followed the water bodies GD whereas the Czech Republic has used the Strahler (based on stream order) approach. In spite of these principal differences of the approaches, both countries have now found an agreement for common transboundary water bodies, as a compromise between both systems aiming at defining homogeneous but not too small common management units. On the same lines, new approaches have emerged that are fully compatible between States, for example in the Somes managers have adopted a common Geographical Information System (GIS) for the entire basin to solve the problems of compatibility.
- Language barriers: communication between different water managers in transboundary rivers can be a problem that has to be solved before real work starts. For example, in the Scheldt and Mosel-Saar all meetings require simultaneous translation (also for documents, with the extra associated costs) whereas in Somes/Szamos River Basin it has been decided that all technical reports and meetings are carried out in English.
- Artificial divisions in terms of implementation of the WFD in some basins: as each country is responsible for their own part of the basin some problems may arise when the geopolitical division is in contrast with the geographic division. This occurs mainly when the river acts as a natural border between

countries. For example, the Neisse acts for some of its length as a frontier between Germany and Poland. After some initial problems the Czech, Polish and German colleges have been able to define common transboundary water bodies. The "pressure - impact analysis" and the "risk assessment analysis" will be the result of a real transnational co-operation between the PRB-partners. Concerning the international co-operation the Neisse may serve as a model for the implementation of the WFD for all transboundary surface waters of the three countries (see Neisse case study in Annex I).

- Decision time: in this case the time between when a decision is prepared and when it is adopted requires a lot of consultation at local and national levels. An advantage underlined by the Scheldt and Mosel-Saar PRBs is that when an agreement has been reached this is seen as providing a very solid basis for future work.
- Administrative burdens: even when there is already an administrative structure (i.e. a Convention) for river basin management as in the case of major European rivers, e.g. Rhine, Mosel-Saar, Danube and Scheldt, the accommodation of the WFD may still encounter difficulties. Administration can become even more complex. For example, the International Commissions for the Protection of the Mosel and Saar rivers restructured their organisation in order to implement the WFD. However, this basin is only one among the nine working sectors of the transnational Rhine River Basin, designated within the Rhine. Thus the co-ordination between these sectors, the countries and the achievement of the legal obligations of the WFD implementation becomes a rather complex process.
- In large river basin, there is the risk that sub-districts do not have the same speed in developing specific items in the WFD implementation. This can result in items worked out in different ways. Therefore, also in large river basins, one should concentrate on guaranteeing comparability in the implementation process.

In various international river basins the obligation of international co-ordination of the implementation of the WFD led to a pragmatic approach on how to develop this co-ordination in practice. An example of this approach is the river basin organisations for the Rhine, Danube, Meuse, Scheldt, and the Ems.

In principle all WFD obligations are split in 2 types of subjects:

1. The so-called “A-type subjects” that need international co-ordination. These subjects may e.g. be related to pressures which cause an impact on the entire international catchment of a river basin.
2. The “B -type subjects” can best be handled at local level having only a local impact.

In this way the international co-ordination of the implementation of the WFD is brought back to a manageable size. The “A-type subjects” give as result an internationally harmonised reporting document. Each individual Member State sharing the international river basin district will submit this (same) document to the European Commission. First of all as a proof of successful international co-ordination, but also to demonstrate each Member States’ responsibility for his own part of the international district.

Taking into account all these issues one can conclude that the implementation of the WFD in transboundary catchments constitutes a rather challenging process, and PRBs with these characteristics should consider that they will need more time investments than national PRBs, to reach the same level of detail in their implementation. However, co-ordinated action to protect and improve the water environment will be jeopardising without it. Special emphasis should be given to this issue at EU level to facilitate their work.

Level of detail

As mentioned before, a Terms of Reference (ToR) document focusing on Key Issues felt to be of particular relevance by WG leaders for the testing phase was developed and it has served as basis for the testing of GD by PRBs. The level of detail in the answers to this document has shown quite large variability over PRBs reflecting the different problems experienced by them in a complex process with such a tight schedule. However, in some cases the results exceeded expectations and lead to the preparation of preliminary Art.5 reports that will certainly serve as guides for the EU river basins.

Dissemination of results

An important aspect of the PRB Network should be the dissemination of the results at National and European level. There has already been considerable effort devoted to this activity at all levels through:

Web dissemination: in addition to CIRCA "Implementing the Water Framework Directive" where all relevant documents have been made available, including this report and annexes, JRC-IES has developed a Platform for Information Exchange (PIE) at: http://viso.ei.jrc.it/wfd_prb/index.html to facilitate the exchange between the groups responsible for testing in the PRBs and the experts from MSs, Accession Countries and the EC who have been involved in the development of GDs. This platform is implemented as a document/information space (complementary to the WFD / PRB site on CIRCA), and a set of mailing lists.

Furthermore, the vast majority of PRBs have set-up their own Web pages for example:

- Jucar: http://www.chj.es
- Odense: http://www.odenseprb.fyns-amt.dk
- Tevere: http://www.abtevere.it
- Shannon: http://www.shannonrbd.com
- Mosel/Saar: http://www.eau2015-rhin-meuse.fr
- Scheldt-Scheldt: http://www.Scheldt.org
- Pinios: http://www.minenv.gr/pinios_river.html
- Ribble: http://www.environment-agency.gov.uk/regions/northwest/501317/?lang=_e&region=northwest
- Cecina: http://www.comune.cecina.li.it/cecina_prb/
- Suldal: www.nve.no/prb_suldal

National/Regional dissemination: the vast majority of PRBs have been involved at local, regional, national and European scale in the dissemination of their results. PRB leaders and identified stakeholders, NGOs and public have organised a large number of meetings in general. Furthermore, several meetings to present the results of the PRBs have been organised at National level, e.g. Environment and Agriculture Ministries. An exhaustive list of all these meetings can be found in the progress reports that PRBs have been submitting every 6 months (available on CIRCA under PRB section).

Meetings, Seminars and Workshops organized by DG Environment and JRC: meetings between PRB leaders and the Commission have been held (every 6 months) to discuss work progress and future planning. In parallel, as already mentioned, three workshops dealing initially with general aspects and subsequently focusing on specific topics related to Art.5 have been held. As the process progressed, seminars with experts that developed the GDs have been held in water bodies delineation, groundwater, economics aspects of the WFD.

Participation at International Conferences and publications in peer review journals: the PRB Network project has been presented as the keynote lecture at several International scientific conferences by PRBs members and EC staff. A complete list is beyond the scope of this document, we only cite a general overview paper: Murray, C. N., Bidoglio, G., Zaldívar, J. M., Bouraoui, F., 2002, The Water Framework Directive: The challenges of implementation for river basin-coastal research. Fresenius Environmental Bulletin 11, 530-541; and a journal issue devoted to the subject: European Water Framework Directive and River Catchment Management, in Physics and Chemistry of the Earth 28 (12/13), 521-563. Guest Editors: E. Mostert, G. Bidoglio and W. Rolland.

Electronic brochure: information sheets, 2 pages long, on the Pilot River Basins of the Network have been developed and they can be downloaded from PIE: http://viso.ei.jrc.it/wfd_prb/sites.html.

Finally, an important product of this exercise is the Provisional Art.5 Report that some PRBs have already written or are in the process of finalizing (Odense, Cecina, Jucar, Oulujoki, Pinios, Shannon, Suldal, Somes/Szamos, Tevere). These reports will certainly help other river basins in the preparation of their Art.5 report and will constitute a complete collection of case studies where other River Basins will find inspiration and help when confronted with the real implementation process. These documents are available in CIRCA under: Pilot River Basin/PRB Outcome Report - Phase 1a/Art.5 Reports provided by PRB.

CHAPTER 3. CONCLUSIONS AND RECOMMENDATIONS, PHASE 1A

Conclusions

- The GDs developed in the first phase of the CIS process have been of great help in preparing preliminary Art.5 reports. The PRBs concluded in November 2003 that the present guidance documents on the Art.5 subjects are suitable to conduct Art.5 analyses. The focus of the guidance documents has shifted during their development from recipe books for the operational level to sketches of outlines for the national scale, but the current level of detail suits well. Less detail would give too little direction, while more detail would mean that not all situations would fit. Of course, this approach implies that specific elements do need development at a national scale.
- Although no revision of the GDs was felt necessary at a European level, PRB managers felt that subjects that still lack clarity, or subjects that turn out to be impractical during implementation, should be elaborated through specific workshops leading to fact sheets. People prefer short, focused reports rather than new guidance documents.
- The implementation of the WFD in transboundary river basins constitutes an even more challenging process that requires more effort and time than for national catchments.
- The majority of the PRBs considered the Art.5 reporting as a technical exercise – no political decision had to be taken – which might be an explanation for the minor stakeholder involvement in the testing (also within PRBs that were to test the Guidance on Public Participation). The big majority of the PRBs did not consult or actively involve stakeholders in the technical testing and the drafting of the Art.5 report. Hence the exercise did not count on their active contribution or on their external "validation" of the testing results. In some PRBs (i.e. Odense), the stakeholders were involved in public presentation and discussion of the report but not consulted during the drafting of the technical aspect of the document.
- Due to the lack of data and the importance of expert judgement, the results of the Art.5 analyses have to be considered as provisional. This is even more the case in international River Basin Districts (RBDs), as data are often not comparable and co-ordination of these data is very difficult. In particular, the risk analyses in the Art.5 reporting in 2004 are based on provisional objectives for the water bodies.
- Considering the short time available, the PRB exercise can be considered as a positive experience. The amount of effort put in by the PRB network and the results already obtained in terms of increased information, identification of gaps, problems/solutions, pragmatic management approaches, and that the dissemination of the results of this exercise, will, it is believed, provide great help to other river basin managers in the first steps of the WFD implementation.

Recommendations

- Effective management requires good scientific information for understanding the main hydrological and ecological processes and relevant socio-economic analysis for identifying the drivers behind water uses. The results of the PRB exercise have shown that this capacity needs to be developed by allocating adequate human and financial resources in each RBD, and also by including stakeholders and NGOs in the process of implementation and by sharing of information and experience between RBDs, regions, and countries.
- Considering the big challenge of the implementation of the WFD and the importance to learn from as many pilot experiences as possible, the PRBs concluded that the involvement of other river basins in the future testing activities deserves consideration (e.g. the larger international river basins as Danube, Rhine, Meuse, Oder/Neisse, etc.).
- The PRBs have tested some of the GDs. They have tried to deal as well as possible with the requirements of the WFD implementation.

Their status of "front-runner" does not imply that the practices they have implemented can be used as "best practices" to be directly extrapolated to the rest of the country.

- Considering the importance of the involvement of stakeholders for the success of the WFD implementation and considering that the testing exercise should help to gain expertise in relatively 'new' subjects like public participation, it is recommended that the involvement of stakeholders is tackled in the 'real' implementation of Art.5 and in the remaining part of the PRB exercise.
- The Art.5 analyses and objectives should be revised and improved after 2005 as an iterative process, to optimise the design of both the monitoring programmes and the programme of measures.
- No new GDs seems to be needed. Also, there seems to be little enthusiasm for radical revision of existing GDs. Instead river basin managers would like to have fact-sheets with experiences as a reference base, describing the characteristics of the basin together with the outcomes of the implementation of certain parts of the WFD. Moreover, the progress reports and provisional documents available on some dedicated web sites (see above) could provide some useful examples. For these reasons, this report summarising the main findings obtained from the PRB Network, together with their detailed reports on their provisional Art.5 assessments, may be of practical use to the other EU river basins that will have to initiate their analysis and characterisation at the beginning of 2004.

CHAPTER 4. INTRODUCTION, PHASE 1B. LINKING PHASE 1A AND PHASE 1B

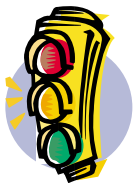
Phase 1b focuses on the testing of those GDs not tested during the previous phase; on finishing the testing on several issues not included in Art.5, i.e. some parts of Heavily Modified Water Bodies, Reference Conditions and Public Participation; Intercalibration, Monitoring, Geographic Information Systems (GIS), Planning Process, and Wetlands; and on specific issues emerged in "Phase 1a-Conclusions and Recommendations". During the discussion on Phase 1b it became clear that some of the issues addressed during Phase 1a were also of high relevance to Phase 1b. Moreover, as the testing exercise progressed further, some PRBs improved their approach to implementation of the Directive based on the experience gained during Phase 1a. In some cases, as discussed in the following paragraphs, the vision on some transversal issues changed dramatically between Phase 1a and 1b. PRBs were thus invited to report in Phase 1b on the improvements (if any) of their activities regarding GDs testing and WFD implementation since Phase 1a.

4.1 CRITICAL IMPROVEMENTS/DEVELOPMENTS SINCE PHASE 1A BY GDS

It should be emphasized that the implementation of the WFD should be considered as an iterative process in which, as more information becomes available, a better assessment is achieved. In this sense, Phase 1a was just the beginning phase of the GDs testing. Therefore some of the PRBs have produced more detailed and thoroughly investigated outcome results than in Phase 1a. These results have been incorporated in Phase 1b and described in this section of the report.

As a general statement, it was highlighted how the publication and dissemination of the individual Pilot River Basin Provisional Art.5 Reports (for each PRBs) and the Pilot River basin Outcome Report from Phase 1a has represented a major outcome for the WFD. These documents show at local level how the Directive will work and explain what actions WFD will seek to reverse/deliver. As such, they provide not only an overview of the current status of a river basin but also a powerful aid for communication, thus facilitating Public Participation. During several meetings it was reported that sometimes it has been difficult for stakeholders, local authorities and public to understand the practical implications of the WFD implementation.

Outcome of Phase 1a of the PRB exercise has shown at river basin level the practical implications related with the WFD implementation. The outcome of this phase (Pilot River Basin Provisional Art.5 Reports) has proven to be a powerful aid for communication. Therefore during Phase 1b many communication problems were tackled and solved.



Another important aspect to emphasize is the transferring of the experiences gained in Phase 1a of the PRB exercise to other national River Basins, to help in the development of National methodologies related to some aspects of the GDs (Art.5 in Phase 1a). For example, the Shannon PRB contributed to the development of national methodologies for Art.5 risk assessment, whereas results from the Ribble on Public Participation have been adopted by the Environment Agencies in England and Wales.

Furthermore, in some of the PRBs a warm-up period was necessary, as the implementation of the WFD requires a multidisciplinary team and, hence, the level of experience between the partners for each PRB was different. After Phase 1a the PRBs have reached a better cohesion within the partnership and have gained considerable experience and knowledge by means of "learning by doing" and information exchange between the colleagues in the PRB Network. In this sense, GDs are considered more as one element among others in the process of carrying

out the WFD (Art.5 analysis in Phase 1a).

4.2 NEW PERSPECTIVES/LESSONS LEARNT SINCE PHASE 1A

As a general approach, River Basins have used the PRB experience as a way to focus and increase their efforts towards the WFD implementation. Some PRBs have applied the results from Phase 1a to investigate particular issues found of relevance at local level. In particular, the Oulujoki RB, together with partners in Germany, Denmark, Poland and Lithuania have recently started an Interreg IIIB Baltic Sea Region project "Principles, tools and systems to extend and harmonise spatial planning on water courses in the Baltic Sea Region – WATERSKETCH". The project focuses especially on merging together the forms of water use and demands of society into a network of directives, conventions and legislation in river basin planning. It is a three-year project, started in July 2004 and ending in June 2007.

Another lesson learnt by the PRBs is related to the use of GDs themselves. The GDs remain theoretical products and, therefore, do not guarantee that the final results of different member states are comparable. This can raise problems in transnational river basins. An example can be found in designation of water bodies in the Scheldt – a transnational River Basin in the Network. All partners in the involved countries (Belgium, France, The Netherlands) used the GDs, and each one developed a different method for the designation of water bodies, with very different final results. Therefore, consultation, tuning of methods and compromises between the different countries/regions of an international river basin district are needed. Despite this, PRBs agreed on the fact that Water body determination has become a part of general implementation of WFD, especially concerning classification processes. However, in transnational river basins, the water body level doesn't seem to be the appropriate level for data collection and representation.

PRBs felt that GDs have a very theoretical cut and do not guarantee that the final results of different member states are comparable, which can raise problems in transnational river basins.

Regarding the HMWB delineation, PRBs highlighted that during the first phase of the testing the delineation was not always carried out for all the WBs in the basin. For example, the Oulujoki reports that during Phase 1a the main efforts were placed on lakes, where a large quantity of data was available and field campaigns where planned to fill data gaps on benthic invertebrates and macrophytes data in the river, necessary later for Phase 1b. In the Shannon PRB, lack of available datasets was a key obstacle for application and testing of GDs in Phase 1a. Since Phase 1a, many new datasets and GIS layers have been developed which has facilitated better delineation of water bodies and assessment of pressures and impacts. The Odense PRB Phase 1a testing of GDs was performed as a 'real life' study through preparing a provisional Art.5 report. Hereby, the reporting process also addressed topics related to testing of Phase 1b GDs, and the lessons learnt through the process are relevant in the Phase 1b context as well. The answering of the questions in the ToR for Phase 1a and 1b reflects these experiences (See ANNEX II). In Odense PRB, the GDs test process is conducted in close cooperation with other international projects with EU-funding, of which the most important and closely related is the BERNET-Catch-project, where 7 regions (in Germany, Sweden, Poland, Finland, Estonia, Kaliningrad with Fyn County as lead partner) around the Baltic Sea share information and experience on developing Art.5 analysis and Programmes of Measures according to the WFD. The project is financed by the EU-Interreg IIIB and by the European Commission's TACIS Cross Border Cooperation Program. Another project was recently launched; "The Marine Environment of the Western Baltic Sea" is financed by Interreg IIIA. This marine modelling project is conducted together with two other Danish Counties and Schleswig-Holstein in Germany. Fyn County participates in the EU-funded projects

EUROHARP, REBECCA, HARMONIRIB, BERAS, and DANLIM, which all use data from Odense River basin and provide important information and data analyses for the WFD-process. This year Fyn County received the 2004 Swedish Baltic Sea Water Award. The award was justified by the county's efforts to improve the water quality and the environmental management in the marine waters by initiating the BERNET project and in the context of the European Commision's testing of the GDs for the WFD at the Odense PRB.

CHAPTER 5. OUTCOME OF THE TESTING, PHASE 1B.

Some of the issues raised during the discussion among the PRBs in the Phase 1a of the testing were considered and proposed to PRBs also during this second part of the exercise. In fact, a lot of the effort made for Phase 1a went into putting together the necessary expertise, collecting the key information/data in each individual PRB, and devising a proper methodology. In other words, for many aspects PRBs developed the necessary knowledge by means of "learning by doing". In the following paragraphs some results are reported on the outcome of testing, with emphasis on the inter-linkages among the GDs, coherence between GDs and other important issues emerging during the Phase 1b of the testing, such as the management of the information within the PRB exercise, time constraint, organizational or political issues, the problem of coordination in the case of transnational river basins, dissemination of results.

5.1 INTERLINKAGES BETWEEN GDS

It has been generally agreed that the PRB exercise, along with all the CIS activities, is producing a large body of information. PRBs found few interlinkages among the different GDs (of course with some exceptions) and the authors did not use a common glossary throughout the guidance documents, e.g. there are differences in terms used between the Impress and HMWB GDs: HMWB uses "physical alterations" whereas Impress uses "morphological pressures", HMWB uses "specified uses" whereas Impress uses "driving forces". It would have been useful if the same glossary would have been used throughout all GDs. Some of these information are shared between various groups, as in the case of the Oulujoki PRB, which reported the RefCond and Monitoring groups as working in close co-operation, sharing methodologies and data; or the Suldal, reporting that results from the Monitoring exercise are closely linked to activities stemming from the HMWB, the RefCond, the Impress and the Wetland GDs. The Suldal also reports on the need of a better linkage between the Impress and HMVB GDs. Odense PRB found very important to focus on close cooperation between the IMPRESS-work and the REFCOND and MONITORING-work to obtain a sound and well-documented risk assessment for the water bodies. The foundation and principles of risk assessment is a matter of intense discussion in Denmark at present.

In other cases, some sets of information are pertinent to activities of just one group, as in the case of hydromorphological changes (*HMWB* group) or eutrophication (*Pressure* group). The *Planning* group has gathered results from all WGs presenting them at stakeholder meetings. Ribble PRB reports that no new issues emerged since submission of the report on Art.5 testing. In this phase, they are linking Planning Process and Public Participation, as these two issues are already being managed jointly by the Environment Agency in England and Wales.

5.2 TRANSVERSAL ISSUES – COHERENCE BETWEEN GDS

Planning Process and Best Practices

Definition of River Basin District (RBD) boundaries is perceived by PRBs as an important issue of the Planning GD, spanning also the Groundwater GD for the connected issue of groundwater body definition in the case of shared aquifers. It is also felt that watershed boundaries for integrated management should be fixed as much as possible so as to follow the actual watershed delineation rather than the administrative boundaries as sometimes done for greater convenience. The same criterion should be adopted were possible also in the case of international water bodies. However, some countries, such as Denmark, where there are a lot of small river basins, have chosen to some extent to delineate river basins following existing administrative borders, with some adjustments where required to avoid catchment splitting.

For groundwater body definition the criteria where chosen in most of the countries at national level, and then adopted with the necessary

adaptation by all basin districts. Criteria were also set for assignment of each shared ground water body to all the pertaining river basins, based on available information about hydrogeology (bedrock geology, tracing study results, groundwater flow regime and direction) and the presence of dependent ecosystems (groundwater-fed lakes, rising from underground streams, groundwater-dependent terrestrial ecosystems).
In the case of shared river basins or groundwater bodies, the issue of cooperation becomes essential, particularly in the development of the program of measures and river basin management plans, to ensure that such interconnected water bodies and associated ecosystems are adequately protected.
In case of transboundary river basins (e.g. Scheldt) or transboundary groundwater bodies, administrative discussions have to take place to manage issues related to upstream/downstream user relationships (withdrawals, discharges, etc.).
Another transversal issue in the case of surface and groundwater bodies is related to the ecosystems supported by such water bodies (e. g. wetlands).

Monitoring

Because of the large relevance of monitoring in the implementation of related procedures (such as those deriving from the HMWB, Wetlands or RefCond GDs), there is a strong need for integrating existing monitoring networks (drinking, bathing water standards, surface and ground water bodies, protected areas) to achieve a cost-effective use of resources in all PRBs.
During the testing exercise, all PRBs have identified monitoring needs and actual monitoring network capability, including possible deficiencies in the existing networks and potential bottlenecks in future improvements. It is generally acknowledged that most of the existing monitoring programs in PRBs do not meet WFD requirements. Most PRBs have also determined which additional parameters and criteria, pertaining to local situations and not foreseen in the WFD, are needed for effective and comprehensive monitoring, and in some cases have drafted national guidelines accordingly. In the case of old standing networks, historical data can also contribute to the identification of reference conditions.
Concerning the relationships between monitoring and reference conditions, a complete set for all the water bodies defined in the PRBs is not available yet. For example, a main concern is still the lack of adequate and comprehensive biological information. However, a considerable improvement has occurred since Phase 1a.
Another issue is posed by those types of water bodies with unique characteristics (i.e. the volcanic lakes in the Tevere PRB) for which no comparison is possible with similar water bodies located elsewhere.
In the specific case of the HMWB the Monitoring Guidelines do not offer any specification. Therefore, an effort has been made to produce a proposal. It has also been proposed (Tevere) that ephemeral streams (less than 120 days of flow per year) should not be monitored. Such proposal is of particular relevance in the Mediterranean arc, where there is a high presence of such streams.
However, no general consensus has been reached between PRBs on the issue of how to decide whether existing monitoring networks and datasets are sufficient and under what circumstances. No agreement exists also on the proper stage for initiation of the monitoring program, being monitoring related to other issues of the implementations but being subject also to strong financial constraints.

Wetlands

Some tendencies have been evidenced by the testing exercise, although no general conclusion can be reached for all PRBs as only a few have participated in the testing of this guidance document at this early stage: most MSs already have regulations for management and protection of wetland areas; not enough is yet known about such environments, both in terms of general knowledge of the water body and the related ecosystem, and in terms of specific knowledge (evaluated in terms of presence of monitoring networks, quality indicators etc.). Also, management issues are of relevance as health status of the wetland affecting the feeding catchment.
The PRBs feel that the information provided in the Guidance Document is a good starting point for identification of wetlands and obligations to

them under the WFD. However, more examples or the definition of some specific wetland parameters is deemed necessary, to avoid the danger of Member States disregarding small wetlands that cannot be annexed to larger water bodies or those of small-medium size wetlands that cannot be classified as part of rivers, lakes, transitional or coastal waters.

The lack of knowledge on the water needs and the consequent need for hydrological and ecological studies to fill this gap has been pointed out, as well as a knowledge gap regarding particularly the delineation of the zone of contribution of wetlands.

As far as protected areas are concerned, those most often include already some wetlands according to international, national or local legislation. Significant pressures are due to water abstraction, regulation works, drainage, earth-filling, urban development, point and diffuse sources of pollution, air pollution, peat extraction from mines, harbor construction. Impacts are the lowering of water levels and pollution. However, PRBs have not specified how they will assess the significance of pressures and impacts on wetlands.

The PRBs recognize the positive functions of wetlands (biodiversity enhancement nutrient attenuation and storm flow abatement), and consider that the original wetlands need to be restored and the existing ones maintained to contribute to the good status of the whole catchment. However, the need for integrated management at river basin scale is also emphasized.

Public Participation

During Phase 1a most of the PRBs have regarded Art.5 characterizations as a purely technical exercise, therefore public participation was not fully developed by the PRBs. During the discussion among the PRB Leaders, it was agreed

PUBLIC PARTICIPATION IN THE WFD

The requirements on Public Participation (PP) in the WFD seem to lead to repetitive discussions, indicating that the terms are not commonly understood. Therefore a short recapitulation of the WFD and PP guidance is presented. Although the phrase "public participation" does not appear in the Directive, three forms of public participation with an increasing level of involvement are mentioned:

- *Information supply;*
- *Consultation; and*
- *Active involvement.*

According to the Directive the first two are to be ensured, the latter should be encouraged. The different levels of participation are not mutually exclusive. They build on each other: consultation implies information supply and active involvement implies consultation. Moreover, different levels can be useful at different stages. The choice of level depends on aspects like: the timing of public participation and the stage of the planning process, the (political and historical) context for public participation, available resources, objectives or benefits of public participation and the stakeholders identified to be involved.

Who should we involve? The Directive is prescriptive in the sense that at least stakeholders (i.e. interested parties) should be involved (when dealing with active involvement) and also the public when dealing with consultation. Background information should be available at any time for anyone. One of the key messages of the PP guidance is that for the competent authority, it is very important to start with a stakeholder analysis. By knowing the positions of stakeholders – by this is meant public and private stakeholders – a competent authority can optimally fit the PP process to the given specific situation.

(as reported in the PRB Outcome Report, testing Art.5 related GDs) that benefits from public participation should be considered also during Phases 1b and 2 of the exercise.

Consultation of the general public

Shannon reports that NGOs are not currently directly involved with the Shannon PRB. A strategy for public participation in the RBD projects is being developed nationally. A consultation paper on public participation in river basin management in Ireland, including in the Shannon PRB, has been prepared and is available at www.wfdireland.ie. However, the Shannon RBD project (parent project of Shannon PRB) has completed a series of eleven public meetings throughout the River Basin between January and February 2004, which were attended by over 300 people. The objective of these meetings was to inform interested individuals and organizations of the WFD river basin management process and help identify key water management issues for the Shannon River Basin. Key water management issues raised by attendees at these meetings were: environmental enforcement; boat cruising; forestry; septic tanks; wastewater treatment plants; agriculture; fisheries; cost recovery; and education/awareness. In the Mosel/Saar PRB the WG for the Integrated Testing (CIPMS/TI) has not agreed yet on the participation of NGOs and/or stakeholders other than official representatives to its formal meetings. Each contracting Party remains free to consult at the local/national level. Some current practices were recalled in the letter the CIPMS addressed to JRC, 30th July 2003. In the Odense PRB, the stakeholders were involved in public presentation and discussion of the report, but not consulted during the drafting of the technical aspects of the document. After issuing the provisional Art.5 report from Odense PRB, a technical working group was formed in 2004, where the main stakeholders were represented. The experiences from this technical working group show that strong involvement of stakeholders is a very time consuming process, and it would not have been possible to conduct the Art.5 reporting within the time frame, if this had been the case from the beginning of the process. During the process the agriculture asked for 'analysis of consequences', i.e. analyses of the expected economic costs for the agricultural sector in order to obtain 'good ecological status'. This has led to discussions on a very fundamental level on how to define reference conditions and how to distinguish between 'good' and 'moderate' ecological status. These discussions and definitions should be kept on a solely technical and scientific level, and should not be influenced by stakeholder pressure. According to the Odense PRB, massive stakeholder involvement thus should be postponed until a technical sound foundation in the form of an Art.5 report is obtained. In the Scheldt PRB, stakeholders are invited to participate in the coming about of the international Art.5 report. This might be very useful for the implementation of the Programme of Measures and to involve stakeholders in the Art.5 analysis (as equally stated in the Public Participation guidance). Stakeholder involvement is primarily relevant when discussing how to obtain the environmental objectives and designing the management plans, i.e. discussions and negotiations on which measures are the most cost-effective. River basin enhanced public participation by upgrading the homepage, setting up a mail service for orientation, and establishing a new discussion forum for the WFD implementation in addition to the regional and national advisory boards: a technical working group with 12 members, covering the main stakeholders, with 2-4 meetings per year. In Odense PRB, it was also use the regular Region Planning process running through the summer 2004 to present the WFD-activities to the municipalities and to the public in general presentation of the OPRB-results in meetings with Danish NGO's, regional and municipal authorities, at EU-seminars, official meetings with representatives from other countries etc.

Participation of specific stakeholders

Within the Jucar PRB, the main goal was to study and develop different pilot experiences regarding the Public Participation (PP) within the planning process. Concerning the results of Art.5 analysis, the provisional report (which was released in the PRB Meeting on February, 2004) was also disseminated to the NGOs, which were invited to participate in the follow up to the Guidance

Testing Process for implementation of WFD within the Jucar PRB. All these NGOs were asked for comments, suggestions and improvements on the technical aspects on the analysis. Only one feedback response was received on account of this consultation. On the other side, two meetings were held with Representatives of the Industrial sector in the Júcar River Basin Headquarters. In the first meeting, on May 27, 2004 there was a broad explanation on the implications of the WFD by the Júcar PRB staff; participants were given a questionnaire to fill up on the features of their own industrial field and significance of water as a resource in their industrial process. In the second meeting, on April 27, Public Participants (PPs) had the chance of making a presentation of their response to the questionnaire and there were laid the basis for future collaboration. The information gathered in all this process is deemed to be very valuable to the economic characterization of the river basins. Finally a Public Participation Plan is being conceived to organize all the process defining phases and issues to be tackled; rest of stakeholders and sectors of the broad public; schedule of activities; periodic assessments of the process; and summarize and diffusion of the results.

Ribble PRB delivered an extensive Outcome Report on Public Participation and River Basin Planning - Early Experiences -. This report is available on CIRCA under: "Pilot River Basins/PRB Outcome Report – Phase 1a/Art.5 Reports provided by PRBs/Ribble Pilot River Basin Provisional Art.5 Report". As main point, it was noted that time was a considerable constrain in the development of public participation, with the testing being completed with very restrictive deadlines. Increased planning time, coupled with the "piggy-backing" of other events to raise awareness of workshops would have enabled:

- a more diverse range of stakeholders to be contacted and involved in each event;
- attendees to schedule work around events to ensure continuity in participation from key organizations;
- participation of schools, as they need to fit events with tight school schedules. The Ribble Pilot Project intended to include a vision-building event at a secondary school with children at General Certificate of Secondary Education level (age 14 - 16) in the Blackburn area. Despite showing interest in principle, schools were unable to schedule in such an event at short notice.

Many other water managers will recognize the problem of timing and it therefore can be recommended to start the planning of public participation as early as possible.

Within Oulujoki PRB, involvement of stakeholders took mainly place at WG level or at level of specific symposium. Local nature-protection associations organized a WFD related seminar for all northern nature protection associations during March 2004 with more than 50 participants. Activities in the framework of the PRB experience, played a key role in meeting, and two members of Oulujoki PRB gave presentation of its status. PRB results were presented in several training seminars, workshops and lectures for university students. Several newspaper articles spread information of the basics of WFD and experiences of testing activities for large public. Stakeholders ranging from specialist of hydropower companies and environmentalists were attending especially in workgroup HMWB. However, there was a general tendency that Oulujoki PRB work was merged to normal implementation of WFD with its first Public participation themes.

The Scheldt PRB organized a workshop on public participation on November 21st 2003. The objective of this workshop was to present a number of case studies on public participation on three different levels (local, national/regional and international) and to exchange ideas on the action plan "Information and active involvement" for the Scheldt International RBD. In December 2003 it was decided by the plenary meeting of the International Scheldt Commission (ISC) that from then on, experts from NGOs would be admitted to project group meetings. In February, the Heads of delegations of the ISC approved all applications from NGOs. At this moment there is at least one NGO-expert per project group, except for the project group "Pressure and impact" (this was the only one for which no NGO applied). However, attendance from NGO-experts on project group meetings

remained very low up to now. The different countries/regions that are part of the Scheldt International RBD are of the opinion that consultation of the general public is the responsibility of the member states. At the level of the International RBD, up to now, participation of the general public is limited to dissemination of information (website, newsletters, brochure, information events). Thanks to the Scaldit project, it was possible to disseminate information at the level of the RBD (database with 1500 persons) from the beginning and on a regular basis. Actually, this tackles the so-called 'scale-issue', (mentioned in the GD), in a quite practical way.

5.3 OTHER ISSUES/OTHER APPROACHES (IMPLEMENTATION)

Information management

The gathering of information and their management is seen by PRBs as one fundamental part in the implementation of the WFD. This information traditionally has been collected and stored by different public bodies at different organisations. The WFD calls for a management of information at the watershed level and, therefore, a collective effort has to be carried out to recover, prepare and organize all this information, which in most of the cases is geo-referenced. Therefore a coupled database-GIS system has to be implemented.

Some approaches have been developed in the PRBs Network: from collecting and moving all the data to the river basin authority; to development of meta-databases that access to the relevant information. For example an important task in the Júcar PRB has been the adaptation of their Hydrologic Information System to the WFD requirements. This, amongst other tasks has included designing the structure of the database and GIS data according to the terms and concepts of the WFD, the integration of several databases and GIS into an unique information system, the establishment of links between Jucar River Basin Authority Departments and other organisations, the collection and incorporation of new data into the Hydrological Information System and the development of modules able to generate information accordingly to criteria of GIS Guidance. Similarly, concerning biological parameters in the Oulujoki PRB metadata base containing all relevant information data from the 1970s onward, has been compiled and published on maps.

The experiences from the Odense PRB show that conduction of the analyses and reporting needed for the Art.5 report for a water district within a limited time frame of one year is a challenging task, which demands adequate human and financial resources in the water district. In Denmark, the resources needed for performing the Art.5 analyses have been a matter of intense discussion between the state and the regional authorities. Lack of resources in terms of money as well as staff has lead to a decrease in level of ambition on solving the task instead of allocation of the necessary resources. The central issue of risk assessment thus has not yet (September 2004) been addressed by the national level. With regard to cartographic data in the Scheldt PRB, it was agreed to use a common reference and projection system for the production of maps (ETRS89). This means that the cartographic data of the different regions – which all use different reference and projection systems – have to be converted into the common reference system.

Transnational coordination

Several risk factors that have to be considered during the implementation of the WFD by transboundary catchments were already highlighted in Phase 1a report. Those include different historical approaches, language barriers, artificial divisions, decision time and administrative burdens. During Phase 1b other "more practical" problems have also arised. Among them, differences between the partners with regard to data availability: the problem of data availability becomes more important in an international river basin, as the same data have to be available to all of the involved regions/countries (five regions in the case of the Scheldt PRB) at the same scale, at the same level of detail and in the same format. If one of these conditions is not fulfilled, the data cannot be analysed on the transnational level. A different situation but that produces effects in the same way is the implementation process that occurs in the Mosel-Saar PRB, were data availability is not the primary problem but rather how to select (technically and politically speaking) the relevant data.

Dissemination of results

The river basins that constitute the PRB Network have been actively involved in disseminating their experience at EU level through the publication of the Provisional Art.5 reports and the presentation of their findings in the WD meeting at Dublin (June, 2004). Furthermore, updated information have been put in the web pages of the PRBs:

- Jucar: http://www.chj.es/index2.HTM,
- Mosel-Saar: http://www.eau2015-rhin-meuse.fr/,
- Odense: http://www.odenseprb.fyns-amt.dk/,
- Oulujoki: http://www.environment.fi/default.asp?node=14750&lan=EN,
- Pinios: http://www.minenv.gr/pinios_river.html,
- Scheldt: http://www.scaldit.org/,
- Shannon: http://www.shannonrbd.com/,
- Tevere: http://www.abtevere.it/.

As previously said, the experience of PRBs has helped in the development of National guidelines (e.g. Odense and Suldal). For example, the Suldal PRB has participated in the development of the Norwegian guidance for the characterisation period (under the leadership of the Norwegian State Pollution Authority), whereas the Ribble PRB has participated in the experimental report on public participation and planning presented to the Commission by the UK Government. In the same spirit, the Shannon PRB was also involved in testing the development of national methodologies for the Art.5 risk assessment.

CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS, PHASE 1B

Conclusions

- The outcome of Phase 1a of the PRBs exercise has shown at river basin level the practical implications related with the WFD implementation. The exercise has proven to be a powerful aid for communication and raised awareness on topics related with the implementation of the directive. For example, based on this experience, during Phase 1b many communication problems raised at the beginning of the process were tackled and solved.
- The GDs developed in the first phase of the CIS process have been of great help in planning and implementing the WFD. However, PRBs reading the GDs with different perspectives. This gives room for regional diversification, which could lead to the need for regional case-studies, information exchange, etc.
- The definition of River Basin District boundaries, spanning also groundwater is perceived by PRBs a fundamental issue to be fixed earlier in the process. Furthermore, these boundaries should be defined as much as possible so as to follow the actual watershed delineation rather than the administrative boundaries as sometimes done for greater convenience. The same criterion should be adopted were possible also in the case of international water bodies.
- There is a strong need for integrating existing monitoring networks and for complementing the actual deficiencies, from the point of view of meeting the WFD requirements.
- The structure of many administrations with tasks in water management does not fit the WFD requirements. This could often raise to problem during the implementation of the directive.

Recommendations

- MSs should try to harmonise monitoring competences in such a way that the information needed for the implementation of the WFD reach the competent authorities at each river basin that have the task of its implementation.
- PRBs agreed on the fact that there is no need of introducing changes in the GDs or produce new GDs. On the other hand PRBs highlight the needs for documents related to the national level of the implementation and local scale problematic related to this problem.
- PRBs generally highlight the necessity to improve linkage and communication with other groups and initiatives involved in the CIS. For example PRBs stress on the importance of the intercalibration process in relation with the design of the Programme of Measures. In this context an information exchange with the ECOSTAT group would be useful.

During the conference on Active Involvement in River Basin Planning, including presentations on lessons learned in public participation from the Ribble, Jucar, Scheldt and Danube, 10 key points for active public participation were highlighted:

1. Good involvement takes time, start early!
2. Develop and share a sense of ownership for the river basin.
3. Work to build and maintain trust with your partners.
4. Undertake “mapping” of stakeholders to find out more about them and their interests.
5. Learning from mistakes is as important as sharing successes.
6. Listening is as important as talking.
7. Be passionate for your cause, passion persuades.
8. Work with each other and build a common vision for your basin, to put the management plan into context.
9. Nobody can do it alone. True partnership leads to shared responsibility and decision making for shared actions.
10. Where cultures and traditions vary, agree key messages and adapt to their needs.

ANNEX I: CASE STUDIES

ANNEX I is a collection of the case studies proposed by the PRBs to illustrate the procedure and the work carried out during the testing of the Guidance Documents.

CASE STUDIES PHASE 1A

SCHELDT

A) pressures and impact analysis

Within the Scheldt IRBD, the pressures and impact analysis, as well as the economic analysis is based on following driving forces:

- Households
- Industry
- Agriculture, horticulture and forestry
- Fishery and aquaculture
- Tourism and recreation
- Transport
- Natural land use

These driving forces are linked to NACE-codes for both the pressures and impact analysis and the economic analysis. In this way, data on pressures can be more easily linked to economic data. Following table gives an overview of the NACE-codes considered per driving force.

B) Pressures and waterbodies

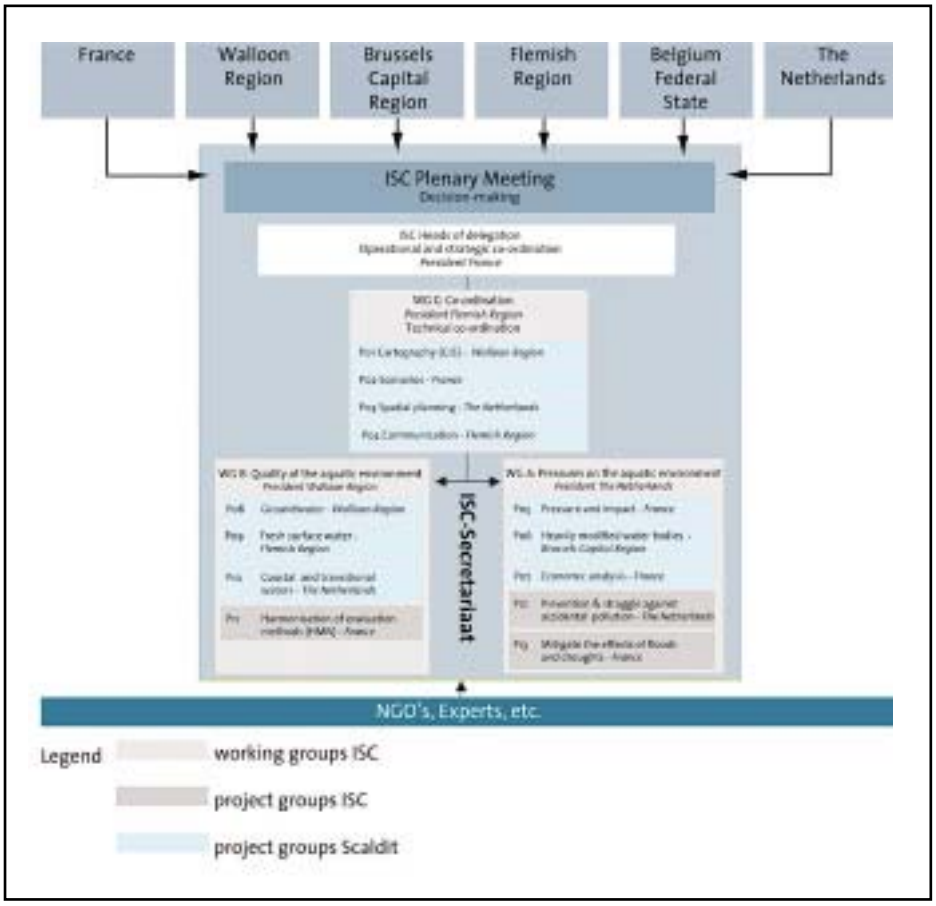
When carrying out the pressures and impact analysis on the scale of an entire river basin district, the waterbody level turned out to be not the appropriate level for the presentation of driving forces and pressures, due to differences between the partners with regard to data availability and to the level of detail of the data. Therefore, the partners decided to present the data on driving forces and pressures on the sub-basin scale.

However, the information is gathered on a waterbody scale (or, if this is not possible, on the most appropriate scale) by each partner. Then this information is aggregated on a sub-basin scale for the purpose of the transnational characterization and analysis.

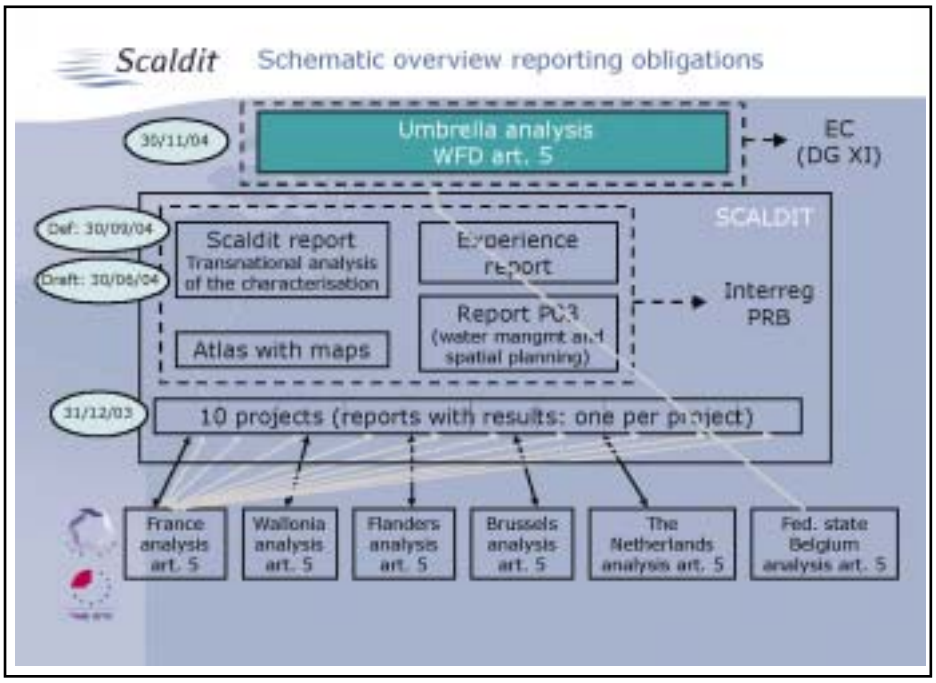
C) Transnational Co-ordination

Scaldit - name made up of Scaldis, latin name for

	Sectors considered within Scheldt	NACE-codes
Agriculture	Agriculture, horticulture, forestry and fishery	01+02+05
Industry	Agro-food industry	15+16
	Textile	17+18+19
	Paper & cardboard, wood & furniture	20+21+22+36
	Chemistry	23,2+24+25
	Materials	10+11+12+13+14+23,1+23,3+26+37,2+45
	Metallurgy	27+28+29+30+31+32+33+34+35+37,1+50
	Energy	40
Households	Commerce & services	51+52+55+60+61+62+63+64+65+66+67 +70+71+72+73+74+75+80+85+91 +92+93+95+96+97+99
	Public utilities	41+90



The organisation chart of the International Scheldt Commission.



The different reports that will be produced within the context of the Scheldt project and how they are related to each other.

Scheldt and Integrated Testing- is an Interreg III B North- West Europe project that is contributing in the PRBs Network by testing the feasibility of the GDs developed in the CIS. Due to its transboundary nature it poses quite a task as the political and administrative cultures of the riparian states differ greatly and operate on different levels (central, regional, provincial,

local). Furthermore, different monitoring and evaluation systems for determining the status of water exists in the area as a whole and hence, the need for a harmonisation strategy is essential. For these reasons, the project has been embedded in the International Scheldt Commission. However, this embedding complicates considerably the taking of decisions within the framework of the Scheldt project and slows down the progress of the project, but the advantage of the political basis that is created in this way for all decisions taken and results achieved within the context of the project may not be underestimated.

ODENSE

The Odense Fjord PRB-study includes (a.o)

- Estimates of reference water quality in streams, reference nutrient loading to - and nutrient concentrations in - the Odense Fjord
- Agricultural Pressure and Impact on diffuse nitrogen loading to streams
- Assessment of the risk of failing to achieve good ecological quality in the Odense Fjord by 2015 [*the case studies were provided by:* **Jørgen Windolf, Mikael Hjorth Jensen and Harley Bundgaard Madsen** - Fyn County –Denmark]

A) Reference condition

The quantitative definition of reference environmental quality is a key issue in the WFD implementation process. However, no quantification tools are provided in the WFD-guidance's. In the preliminary Art. 5 report for the Odense River Basin (ORB) several approaches have been used including

- sparsely historical information
- distribution of eelgrass, palaeolimnological data from lakes, abundance of wetlands 100 years ago…
- simple as well as complex models
- linking pressure/impact variables with ecological indicators
- information of water quality and ecological status in areas with no major antropogenic impact

Reference nutrient concentrations in streams are very important to estimate in order subsequently to evaluate the reference nutrient load to – and hence the reference nutrient status of – lakes, fjords and coastal marine waters.

Monitoring results from Danish streams draining catchments with no agricultural activity and no outlets of sewage can be used to assess the Reference nutrient load from Odense River Basin (ORB) to the Odense Fjord, (Tabel 1). However monitoring results from these Danish streams has to be corrected to represent reference values on nutrient concentration and loadings in streams, because the ecological/chemical status of these streams is still anthropogenic affected by airborne pollutants ex. ammonia from agricultural activities. Figures in Table 1 on reference nutrient loadings and concentrations in streams are tentatively corrected taking into account the impact of airborne pollutants, where the upper range values represent the uncorrected values.

Tabel 1. Estimated reference nutrient loading and concentrations in streams draining the Odense River Basin

The range in Table 1 representing the estimate of the reference concentrations and nutrient loadings indicates uncertainty. In example phosphorus concentrations (Table 1) might in some cases even be higher than stated in the Table by receiving waters rich in phosphorus from old marine deposits in the catchments. In such cases reference

	Transport per ha ORB	Concentrations In watercourses	Riverine load To Odense Fjord
	Kg/ha y	Mg/l	Tones/y
Total N	2.5-5	0.7-1.5	250-500
Total P	0.08-0.17	0.022-0.050	8-17

Tabel 1. Estimated reference nutrient loading and concentrations in streams draining the Odense River Basin

concentrations might be as high as 0.15-0.20 mg P/l. However, such high concentrations is rare and does not reflect the general reference concentrations in most streams.

Major experience gained

More scientifically sound information of reference nutrient concentrations and loading in streams including the natural spatial variation due to difference in hydrological cycle and geomorphology is needed based on cross border investigations/collection of data from undisturbed areas within ecoregions ie the Baltic sea area.

B) Agricultural Pressure and Impact

The major source of nitrogen in streams and hence the major source for the nitrogen loading of Odense Fjord is nitrogen leaching from agricultural areas. There is a strong correlation between the quantity of nitrogen flowing in streams and the amount of fertilizer used in the catchments. This can be demonstrated by relating the measured nitrogen concentrations in different streams in the region to the total amount of nitrogen applied in the specific catchments (manure + artificial fertilizer), Figure 1.

This pressure/impact analyse has also included the use of a simple, empirical nitrogen leaching model, (GIS). These modelled results are shown in the figure as well.

Major experience gained

The models used so far demonstrate the overall impact of the pressure from agriculture (Nitrogen). However, in the management plans, which have to be developed in the coming implementation steps of the WFD, it will be necessary to develop more complex models

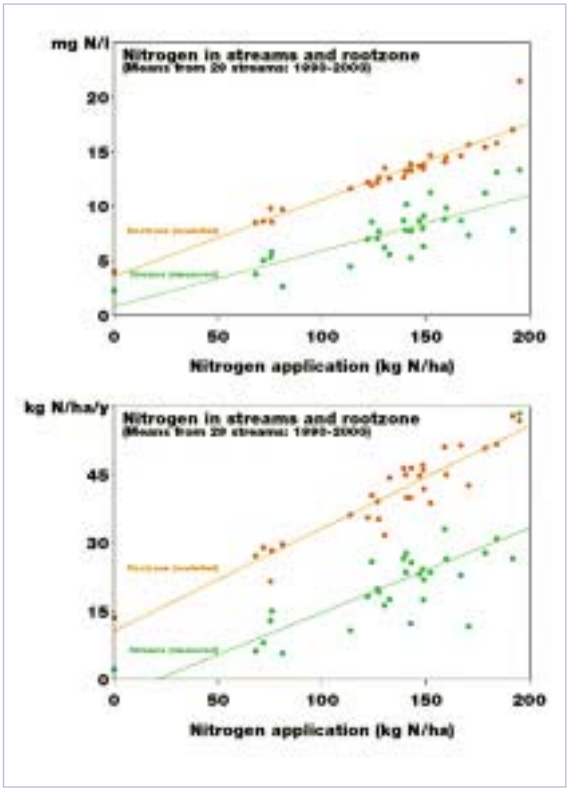


Figure 1. Relations between Nitrogen application (manure + art. fertilizer) in different catchments and measured nitrogen concentrations in these streams. Modelled mean catchment specific nitrogen concentrations in root zone (1 m) are shown as well.

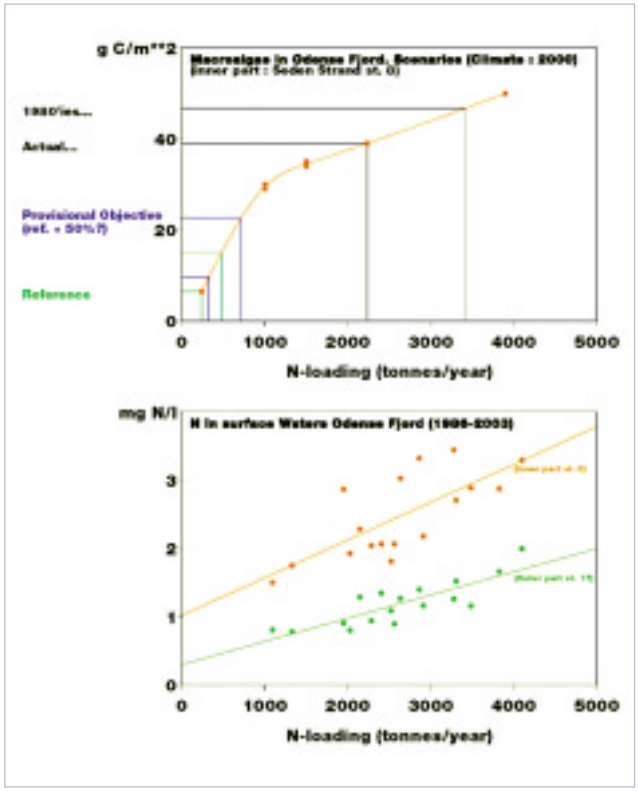


Figure 2. Relations between different external nutrient loading (scenarios) and modelled abundance of macro-algae (upper) and relations between annual measured nitrogen loading and measured nitrogen concentration (Total N) in surface waters at two monitoring stations in Odense fjord (lower).

enabling proper scenario analyses of different agricultural farming practices to combat diffuse nitrogen pollution.

C) Risk Assessment

The WFD Art. 5 report shall include an assessment of the risk of not achieving good ecological quality in the different water bodies by the year 2015.

In the Odense PRB report such risks have been preliminary evaluated. For the Odense Fjord it has been demonstrated that an improvement in the ecological quality of the fjord will imply a reduction in the nutrient loading of the fjord. This evaluation is based on the results of the comprehensive eutrophication model for the fjord using different external nutrient loadings as driving variables (scenarios). Examples of the relation between nitrogen loading and model derived quality in the fjord are shown in Figure 2 (upper), using amount of macro-algae as an indicator for ecological quality. However, neither in the WFD nor in the Guidance documents specific quantitative definition of good ecological quality is included. In Figure 2 good ecological quality has been indicated using reference state + 50% as a preliminary definition. Furthermore it is shown in Figure 2 (lower) that the annual measured concentrations of total Nitrogen in surface waters in the fjord are correlated to the measured annual Nitrogen loading to the fjord. The measured concentrations are lesser in the outer part of the fjord than in the inner part due to exchange of more nutrient poor sea-water.

Major experience gained (a.o):

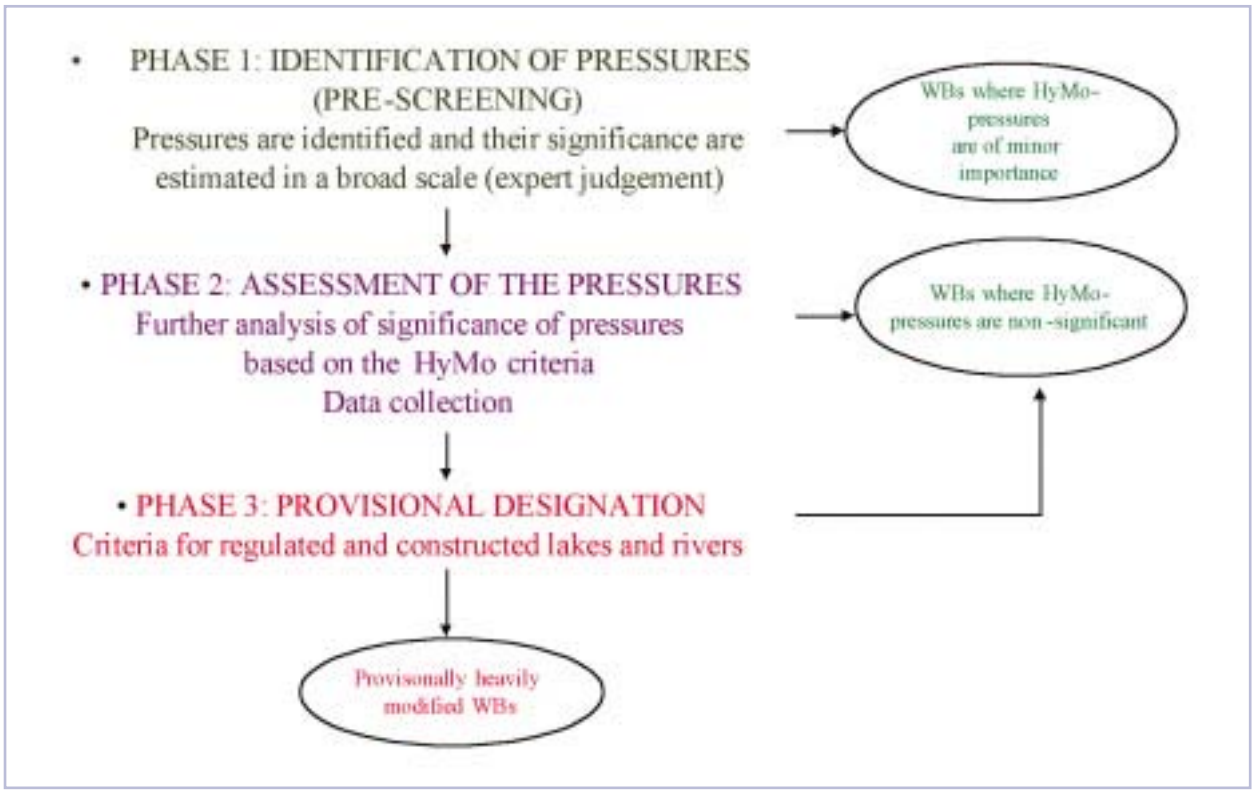
The WFD Basic Analyse (form and content) is a very good platform for the following making of Water Management Plan's including the public involvement and experience of potential areas of conflicts.

- Quantitative definition of the 'Good Ecological Quality' is lacking both at European and national scale as well.
- The WFD Basic Analyse (form and content) is a very good platform for the following making of Water Management Plan's including the public involvement and experience of potential areas of conflicts.
- More simple models linking ecological quality in near coastal waters and fjords and the pressure variables have to be developed.

OULUJOKI

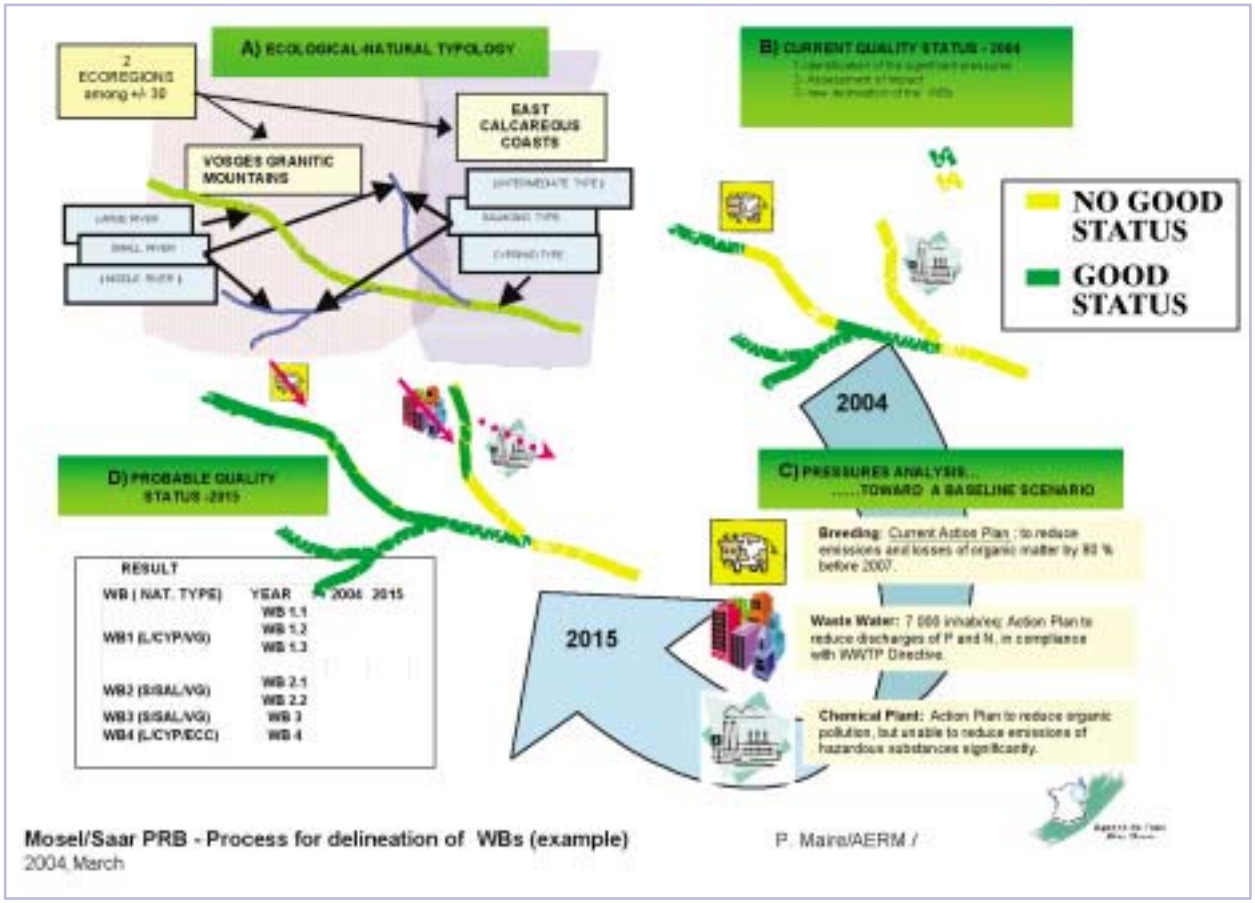
Provisional designation of heavily modified water bodies at Oulujoki Pilot River Basin.

Hydro power production plays an important role in Fennoscandinavian water systems. Following three-phase approach was developed at Oulujoki PRB. It follows the principles of HMWB guidance and takes into account a scarcity of relevant biological data. Based on this scheme main river branches were provisionally designated as heavily modified, whereas in most of regulated lakes and in smaller rivers hydromorphological pressures were non-significant.



MOSEL-SAAR

Process for delineation of WBs
The icon drawn from different views of a presentation shows, on the basis of a theoretical situation, the different steps to delineate the river Water bodies according to the natural criteria and the risk to reach or not the good status by 2015.



Mosel/Saar PRB - Process for delineation of WBs (example)
2004 March
P. Maire/AERM /

MARNE

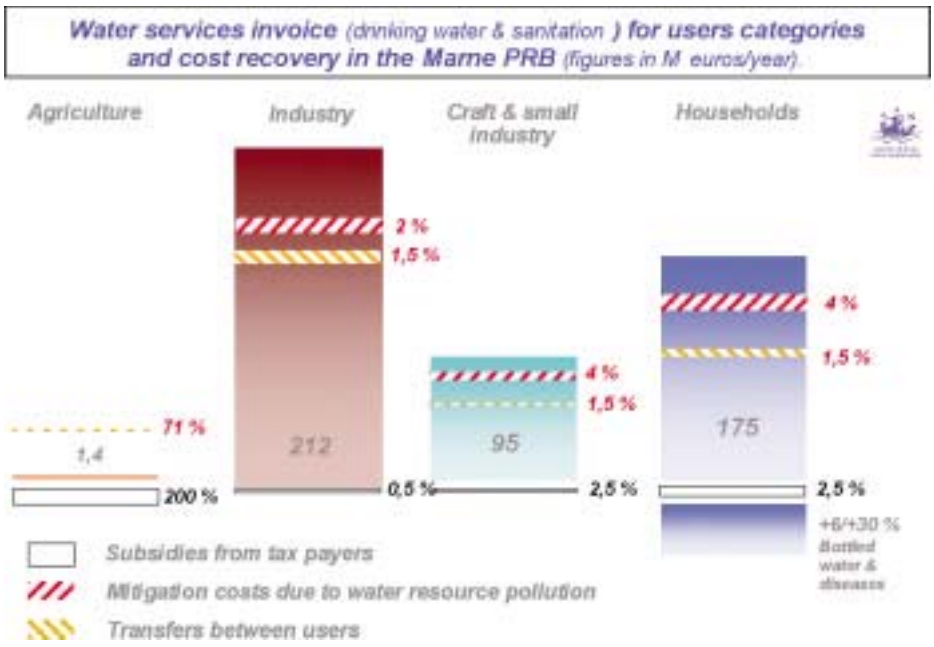
A) Public Participation
Following the publication of the CIS guidance on public participation, the French mirror group wrote a national guidance to adjust the methodology to the French water management context.

	Action	Means	Reached people	Results	Main difficulties
Elaboration	Elaboration of RBD characterization	Web Site Lots of meetings	Experts	Second draft in 11/2003	No NGO involved.
Participation and active consultation	Consultation of local state offices	Web Site Meetings	All state offices (20)	Shared vision of the basin characterization	Very difficult to share the WFD vocabulary (technical documents to support consultation)
	Consultation of interested parties	parliament of water (2/year) Questionaires	250 people	Very good attendance Good sharing of information	Necessity of short documents. Too many people for debate.
Information	Focus group	Meeting	12 people	Sample of broad public consultation	Not representative of the whole population
	WFD on the Internet	Web Site	Broad public	On going	Need synthesis
	Consultation of local authorities	Mail Web Site	Local authorities Broad public	Implement progressively the WFD at local level To be done	Manage numerous answers
	Public consultation	To be defined			

Source of non cost recovery	IMPLEMENTATION
Direct transfers	*Subsidies from the tax payer* Taxpayers subsidise the water invoice from 0,5 to 2,5% for households, "craft & small industry" and industry, and for 200% for agriculture. Nevertheless the amount is quite low for agriculture (Cf diagram). Transfers between users These transfers are mainly due to the attribution of subsidies by the Water Agency (balance between contributions and aid received). Net transfers originate from households and "craft & small industry" (1,5% of their water invoice) towards industry and agriculture for 1,5% and 71% of the cost of their water use.
Mitigation costs	These additional treatment costs include nitrogen & pesticides specific treatment costs, new uptakes because of pollution. According to our calculation, these costs represent 2 to 4% of the water services costs. We can add the cost of bottled water and the cost of diseases deriving from water (estimation through the cost of sick leave…) which represent from 6 to 30% of the water invoice.
Environmental costs	Current expenditure in favour of the environment (do not include sanitation) : 4 M€ per year Willingness to pay : 80 M€ Cost to avoid nearly all pollution : on going

The Marne river basin is about 12 000 km2. The population of the basin amounts to 2.8 Millions of inhabitants. At Marne basin level, works of WFD implementation integrate 3 levels of public participation as shown below and many different tools. The main organisation involved in public participation is the water parliament of about 40 permanent members and 160-200 invited members from different sectors (1/3 local authorities, 1/3 users, consumers, NGOs and 1/3 of representatives of State).

The three steps of public participation are



gradually implemented from the elaboration (as soon as 2001) to public information (2004) and consultation (2005). The different actions are presented below, as well as the time table.

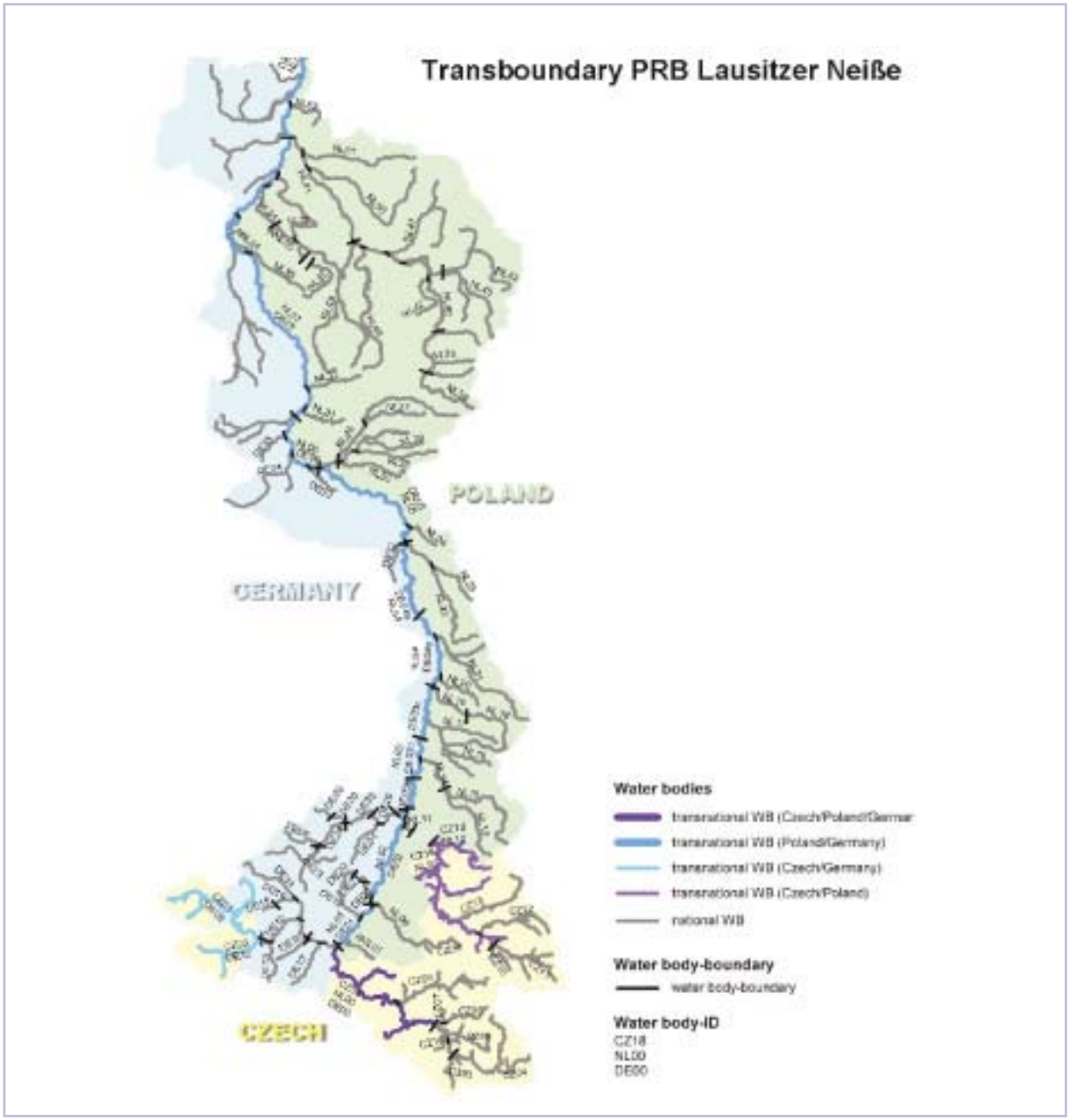
B) Cost Recovery: Overview of the users
The invoice: water & sanitation invoice paid yearly amounts to 175 M € for households, 95 M € for Craft and small industries connected to domestic water supply and sanitation systems, 212 M € for industries (including their own water supply & sanitation system) and 1.4 M € for agriculture (considering irrigation systems and breeding effluent management systems).
The Wateco guidance underlines that three kinds of economic transfers may lower the cost recovery rate. Moreover these macro-economic costs have to be calculated at the basin level (or sub basin). We implemented these recommendations at Marne basin level as follow:

Conclusions
On this basis, the comprehensive cost recovery rate arises to 90% on average in the Marne basin putting aside environmental costs. The weight of environmental costs may reduce the cost recovery rate.

NEISSE

Transboundary water bodies

The implementation of the WFD in transboundary catchments has to be coordinated between the countries involved. In the Neisse basin three different national approaches on water body delineation already existed and, therefore, starting with a common approach was not feasible. The implemented strategy was to merge the three national sub-basins with delineating transboundary water bodies by expert judgement (i.e. no common method, but common, comparable results). In general when a river stretch was delineated to water bodies in different national ways, the larger scale was accepted as water body with national subdivision into "sub-water bodies". For the risk assessment also the national results basing on different methods were merged. In transboundary water bodies with different national risk assessment results, the final judgement was done by expert judgement in a trilateral discussion. No general strategy to deal with these different results was developed.



SHANNON

MANAGING GROUNDWATER BODIES IN THE SHANNON PILOT RIVER BASIN FOR THE WATER FRAMEWORK DIRECTIVE

Introduction

The Shannon Pilot River Basin (PRB) is the largest river basin in Ireland draining a land area of some 18,000 km2 in central Ireland. It includes part of 18 local authorities in the Republic of Ireland and has a small transboundary component of approximately 6 km2 in County Fermanagh, Northern Ireland.

Carboniferous rocks dominate the bedrock geology of the Shannon PRB. Of these, highly karstified pure bedded limestones predominate in the upper reaches of the basin. Groundwater flow in these rocks is dominated by conduit flow. In contrast, in most of the rest of the basin, groundwater flows through fissures and faults in relatively low transmissivity aquifers. In the west, on either side of the Shannon estuary, bedded shales and sandstones of Namurian age dominate. Between the upper & lower reaches of the basin, unbedded pure limestones and impure limestones are folded around cores of older rocks.

Agriculture is the principal activity in the River Basin (73% of total area); the dominant land use being pasture. There are some significant areas of wetland (12%), mainly peatland. The catchment is not notably industrialised and agri-industries, such as milk and meat processing are the most prominent.

Groundwater Body Delineation

The Geological Survey of Ireland (GSI) has carried out the delineation of groundwater bodies in Ireland, including the Shannon PRB. The delineation process involved several stages.

Groundwater Management for the Water Framework Directive

The first requirement of WFD is to identify groundwater bodies at risk of failing to meet the environmental objectives set out in Article 4. To achieve these objectives requires making operational the programme of measures specified in the River Basin Management Plan. A proposed risk assessment methodology to identify GWBs at risk is presented overleaf. This process will allow for the prioritisation of resources in the River Basin Management Plan. The focus of the programme of measures should be on the high

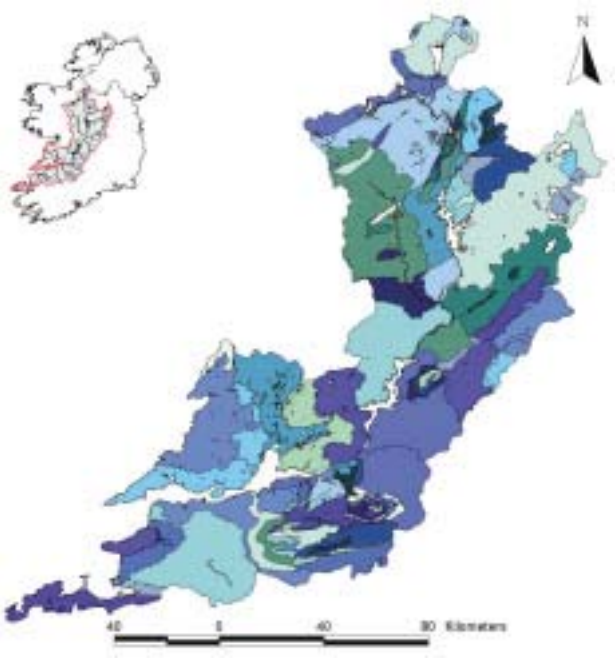


Figure 1. Groundwater Bodies in Shannon PRB (Geological Survey of Ireland).a

Mapped rock units were assigned an aquifer class based on the existing GSI aquifer classification system. These aquifer classes were then grouped into four aquifer types based on groundwater flow regime, i.e. Karst aquifers, Gravel aquifers, Productive fissured bedrock aquifers and Poorly productive bedrock aquifers. Preliminary groundwater bodies were then delineated using no-flow geological boundaries, as well as boundaries based on groundwater highs, differing flows and flow lines. Final delineation incorporated major surface water catchment boundaries except in areas where the influence of topography is diminished (e.g. karstic or confined aquifers).

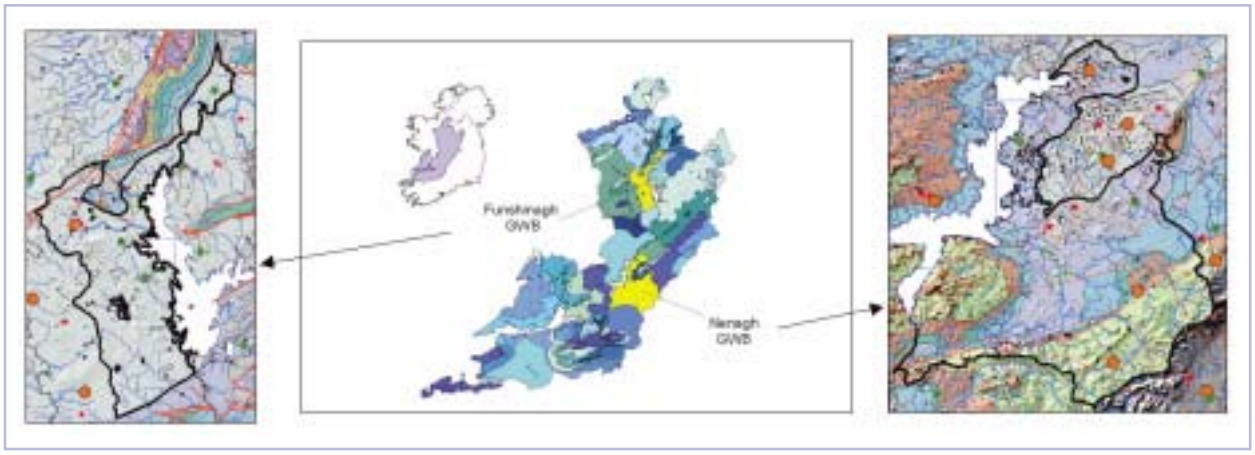
This process resulted in the delineation of 97 bedrock groundwater bodies with a median size of 53 km2 (Figure 1).

impact potential areas of "at risk" GWBs. Different aquifer types will require different management responses appropriate to their spatial extent, flow regime, degree of groundwater-surface water interaction, and connectivity with groundwater-dependent terrestrial ecosystems. This approach will require a detailed conceptual understanding of each GWB to ensure the most suitable programme of measures are applied and the use of limited resources is optimised.

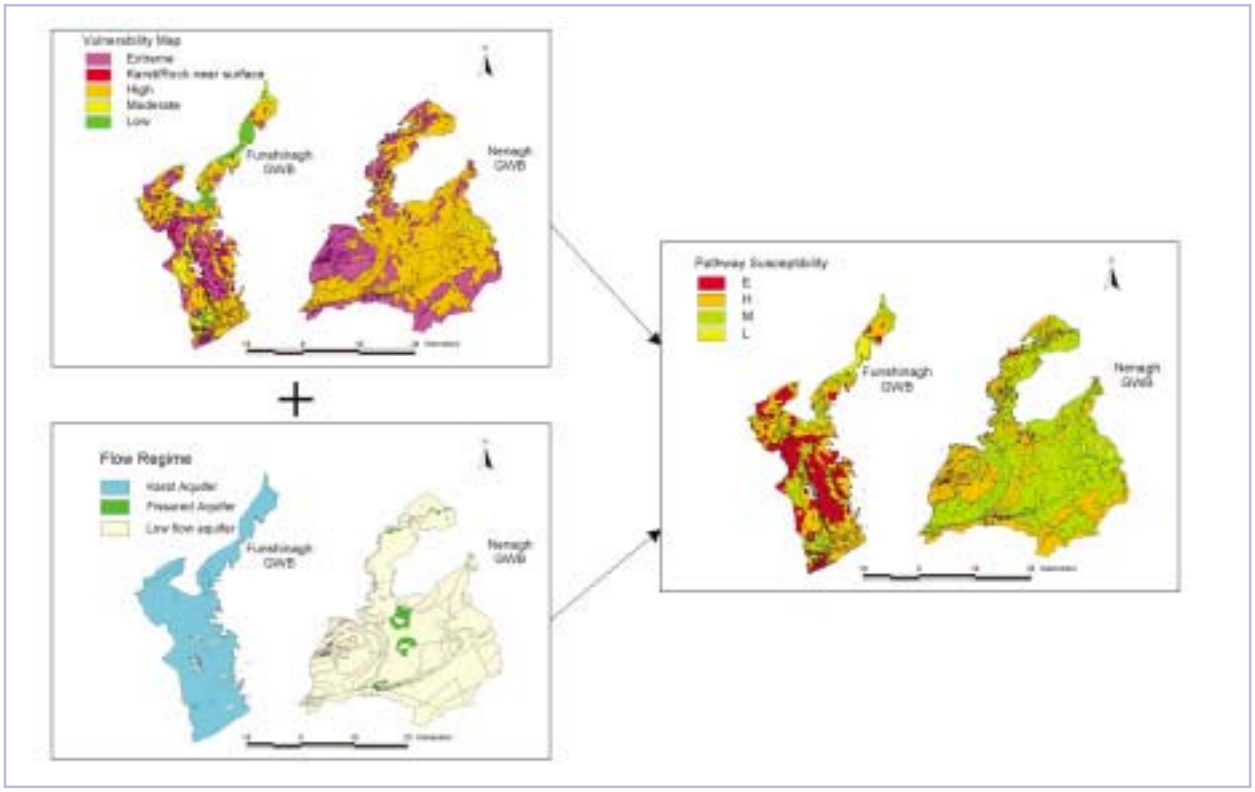
Example of risk assessment methodology for diffuse groundwater pollution in the Shannon PRB

The following approach is a screening exercise using available GIS layers and follows the 'source-pathway-receptor' model. The objective is to identify groundwater bodies at risk and allow for prioritisation in the programme of measures and river basin management plan.

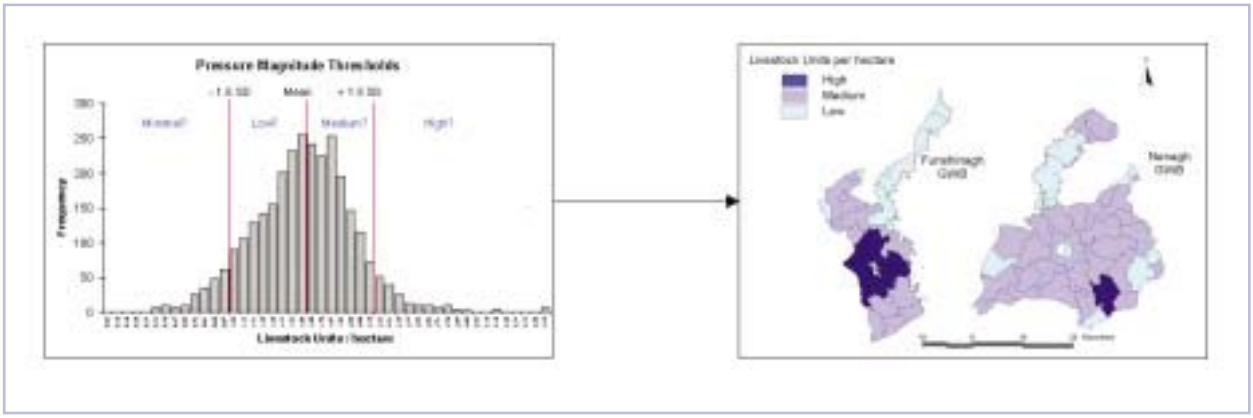
Step 1 Develop a good conceptual understanding of each groundwater body.



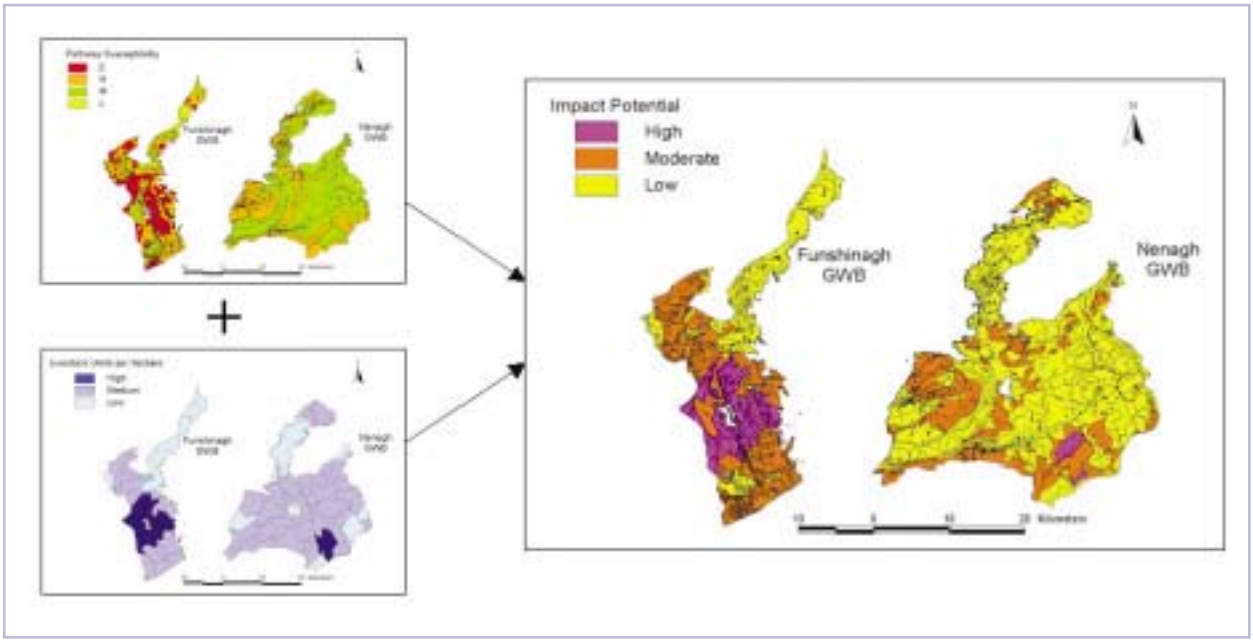
Step 2 Combine information on groundwater vulnerability with aquifer flow regime characteristics using risk matrices to identify the degree of pathway susceptibility to diffuse pollution.



Step 3 Set pressure magnitude thresholds e.g. for stocking density. Thresholds will need to be developed for all pollutant types.



Step 4 Combine Pathway Susceptibility and Pressure Magnitude using risk matrices to produce an Impact Potential Map.



Step 5 Final risk designation

Identification of whether a groundwater body is "at risk" will be determined by percentage area thresholds for all pollutant types combined with verification using monitoring data. Lack of monitoring data and pressure layer information will affect the confidence in the risk designation. Further assessment may be required to determine whether associated surface waters or groundwater-dependent terrestrial ecosystems are adversely impacted.

JUCAR

RESOURCE AND ENVIRONMENTAL COST ASSESSMENT FOR ECONOMIC ANALYSIS

The provision of Article 5 and Article 9 of WFD, requires carrying out an economic analysis (Annex III of WFD) which allows assessment of the accomplishment of the principle of cost recovery for water services, including environmental and resource costs, taking account of the long term forecast of supply and demand for water.

The Jucar PRB apportions the total cost into three separated components: financial, resource and environmental. The financial cost is evaluated by means of the expense assessment for all water services. The marginal opportunity cost of the resource (MOCR) in a certain location and time can be defined as the cost for the system of having available one unit less of resource. The assessment of the MOCR, is made by means of hydro-economic models at the river basin, able to represent dynamically the marginal economic value in different locations in the basin, taking into account resource availability, storage capacity, losses, return flows, surface and ground water interactions, and willingness-to-pay (or marginal economic value) of the various demand units. Monthly economic value functions that express the relation between the supplied water and the marginal value for each month of the year are defined for the water uses. The integration of the demand economic function up to a certain level of supply (area under the demand curve) provides the economic benefit

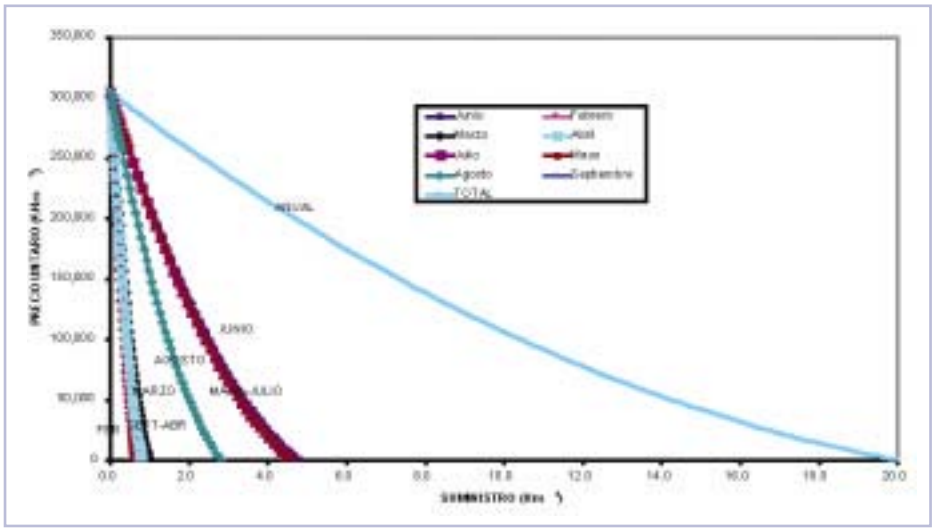


Figure 1 - Schematic of the hydro-economic models for Júcar RB.

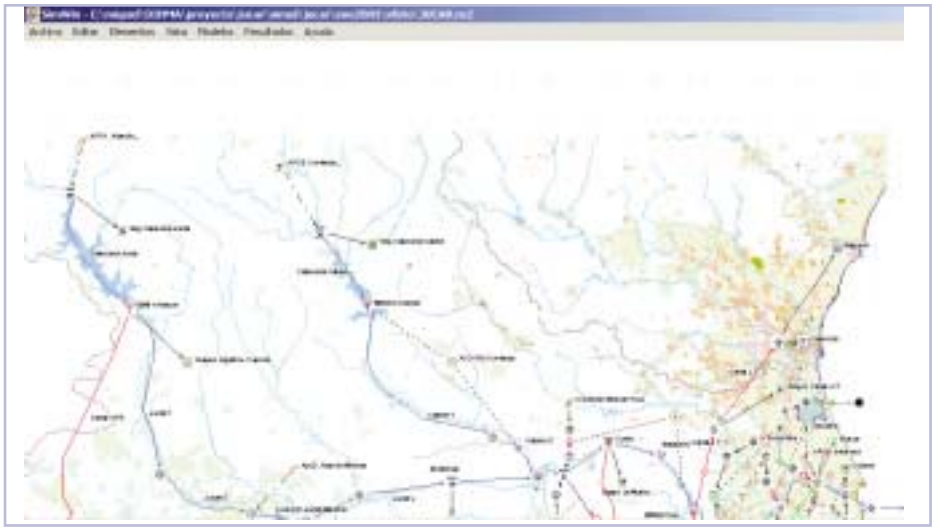


Figure 2.- Annual and monthly disaggregated demand economic functions.

imputed to this supply level. Operating cost to be considered include variable cost of intake, distribution and treatment of the resource for both surface and groundwater supply.

Two complementary approaches are followed. The optimisation approach assumes that perfect market conditions exist, which allow for economically optimal water use, and the analysis of shadow prices or dual values yields an upper bound of the MOCR at different locations and times. The simulation approach assumes that the system is operated with allocation rules established a priori. These rules can correspond to the priorities and historical rights, hence reproducing the current modus operandis of the system. The MOCR is obtained by comparing the aggregated benefits of the system with the benefits that would occur if a unit less of water were available at a given location and given time. The gap between the results corresponding to the economically optimal water use and to the current water allocation system allows assessing the "distance" between the optimum and any management analysed.

The proposed approaches can be applied to the Júcar PRB since hydrological models for water management have been previously developed and successfully applied on Júcar Hydrological Plan, and the computation modules for incorporating the economic analysis have been recently developed and tested. Finally, it has to be noticed that, once the hydro-economic models are in service, they can provide additional interesting economic outputs. For instance, a similar approach could be applied in order to assess the opportunity costs incurred by the society as a consequence of the use of the resources to achieve and implement the environmental regulations and the resulting reduction in production. Given the difficulty in assessing environmental cost as the costs of damages to the ecosystem, an indirect partial assessment of the environmental costs could be the marginal opportunity cost of the environmental measures that allow maintaining the good ecological status. For example, the maintenance of ecological flows in a reach of the river represents a cost for the system, which corresponds to the economic losses for supply reduction in the affected demands.

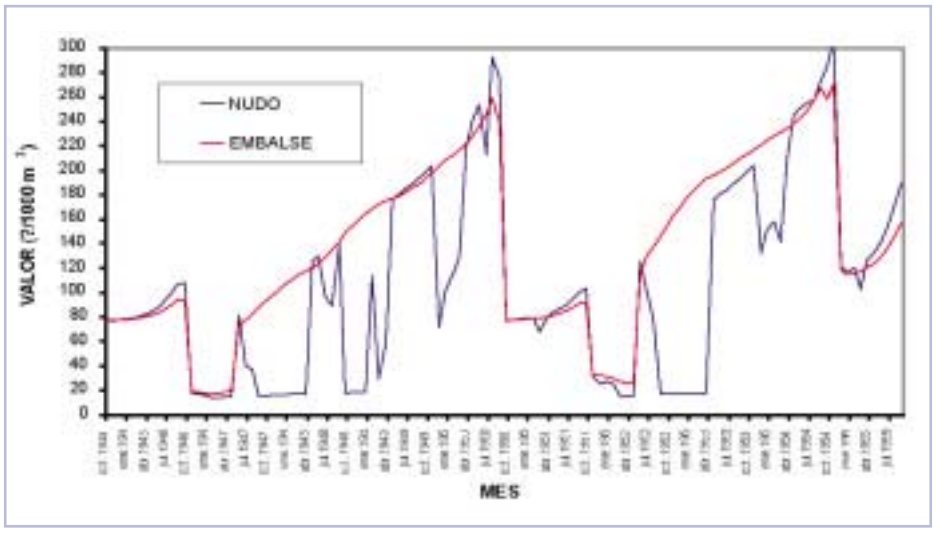
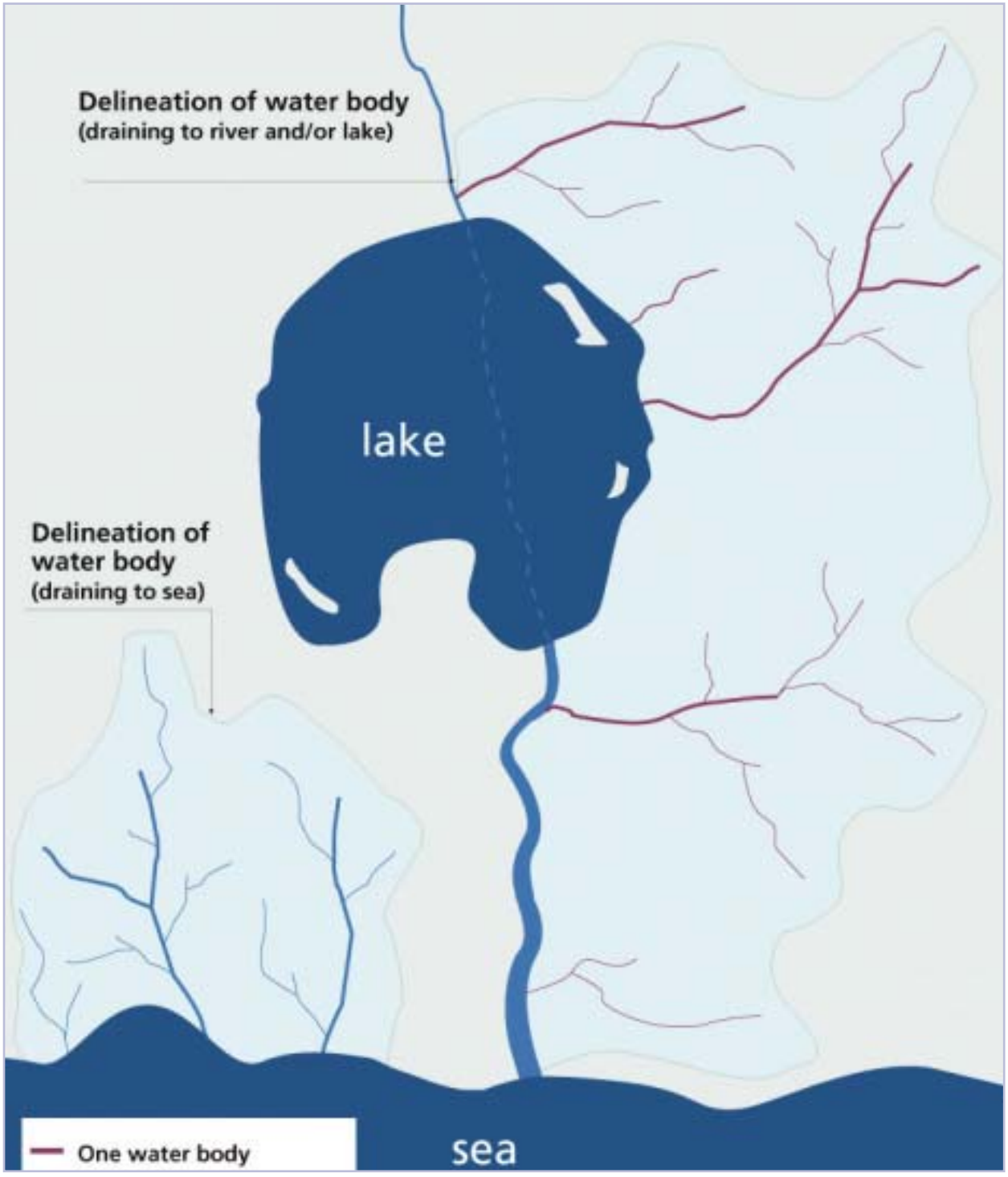


Figure 3.- Time evolution of MOCR at a reservoir (red) and at a diversion point (blue).

SULDAL

DELINEATION OF SURFACE WATER BODIES (WBS) - AN APPROACH APPLIED TO NORWEGIAN FRESHWATERS

The Norwegian climate and topography has created a large number of small and large lakes, as well as a complex network of streams and rivers. The anthropogenic influence and present-day pressure to many of these waters are low or insignificant, with a consequently low risk of deteriorated status according to the WFD. It is subsequently a challenge to divide these waters into reasonable WBs for management purposes, appropriately meeting the WFD requirements, as well as designing appropriate hydrographical units, avoiding a huge number of small WBs



with no significance for practical purpose. Norway has applied the following main adaptations during the first phase of characterization (8 pilot studies) according to Article 5.

- Lakes < 0.5 km2 are generally included in the river network and are merged into the adjacent river WB. Single, small lakes may still be selected as separate WBs if there are significant management issues.
- Lakes > 0.5 km2 (which number approx. 4500 in Norway) are always identified as a separate WB. However, the associated river may still be a continuous WB through the lake, joining the upstream and downstream part of the river into one single WB.
- Catchments with homogeneous ecological typology, as well as facing comparable pressures and impacts throughout, should not be divided into subunits even if the size is >> 10 km2. Consequently, the river network within a large catchment may consist of one single river WB.
- Small rivers which drain separately into the sea, a large river or a lake, are merged with neighbouring catchments into one single WB if typology, pressure and impact are alike throughout. The resulting WB might be >> 10 km2, but is separated from the WB it is draining into, which has a different type and/or category
- When an insignificant part of a catchment crosses type-borders (e.g. timber line, post Ice Age marine boundary), it should be assessed whether a new WB should be defined or not. This assessment needs to be based on whether there are significant changes in ecology and also the size and importance of the potential new WB. As an example where a new WB should not be identified is when a tributary runs a few hundred meters in the valley below the marine boundary before it reaches the main river. A change from above to below the marine boundary would normally lead to another type of WB and consequently a new WB. However, in this example, the tributary would still be dominated by the upstream ecology.
- The WBs will be identified as far as possible based on management units. WBs will be grouped into larger units for management practices, such as monitoring, reporting and classification.
- The size of a WB will depend on identified pressures. However, there needs to be a minimum limit on how small a WB can be. This has to be decided based on qualified judgement like how serious the environmental problem is and how suitable the unit is for management purposes. An example of a minimum limit is that it needs more than a 100 meters reach of reduced river water quality caused by pollution or encroachments before a new WB needs to be identified.

TEVERE

Case Study: Tevere

The Tevere River Basin developed a methodology based on hydromorphological reference conditions in order to identify the base flow that must be maintained in the river in carbonate areas that are strongly impacted from abstraction for hydropower use (Fig. 1).

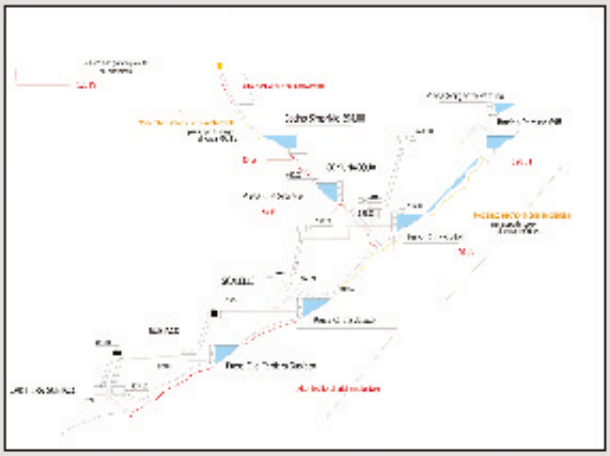


Figure 1 – Hydropower diversions along the river

This method allows us to identify the characteristic curve representing the natural flow fed by point and linear springs. Then, in some significant sections, the optimal base flow for fish life (considering trout as target species) is identified and the characteristic curve representing the minimum flow supplying water to depending ecosystems is produced and adjusted according to the characteristic curve, which represents the hydrological reference conditions (Fig. 2).
A comparison with the flow left in the river consequently to hydropower diversions, allows us to identify the quantity of water resource that must be restored (Fig. 3).

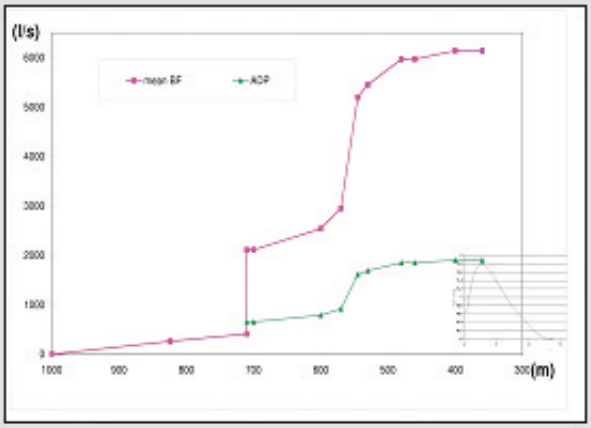


Figure 2

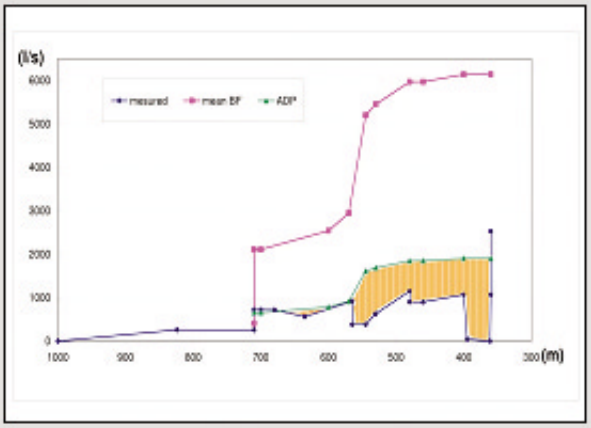


Figure 3

Case Study: Tevere

In the context of the first phase of groundwater body characterization, the Tevere PRB proposed a method for the identification of groundwater bodies, with particular reference to volcanic hydrogeological structures. The method is based on an accurate reconstruction of the hydrogeological balance and it takes into account the interaction of groundwater bodies with surface water bodies (Fig. 1).
The aquifer's hydrogeological balance and the abstraction/recharge ratio are identified and considered in relation to the base flow of surface water bodies (Fig. 2).
Taking account of the interaction between GWB/SWB, the Tevere PRB underlines the necessity of considering together the objectives for surface and groundwater bodies in the planning phase.

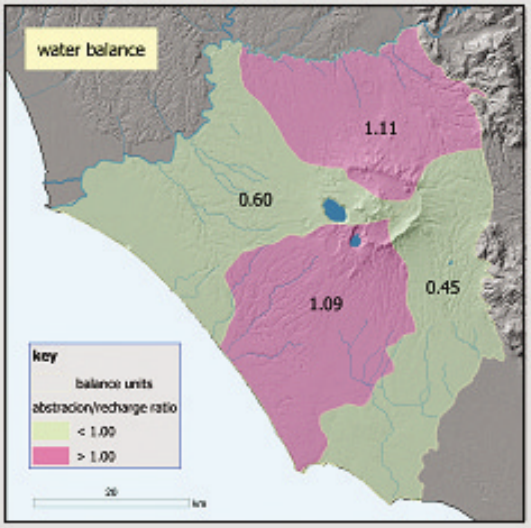


Figure 1 – Water balance

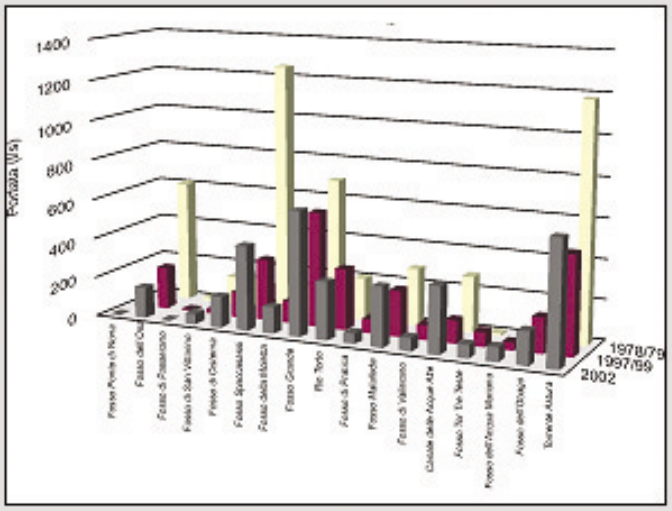
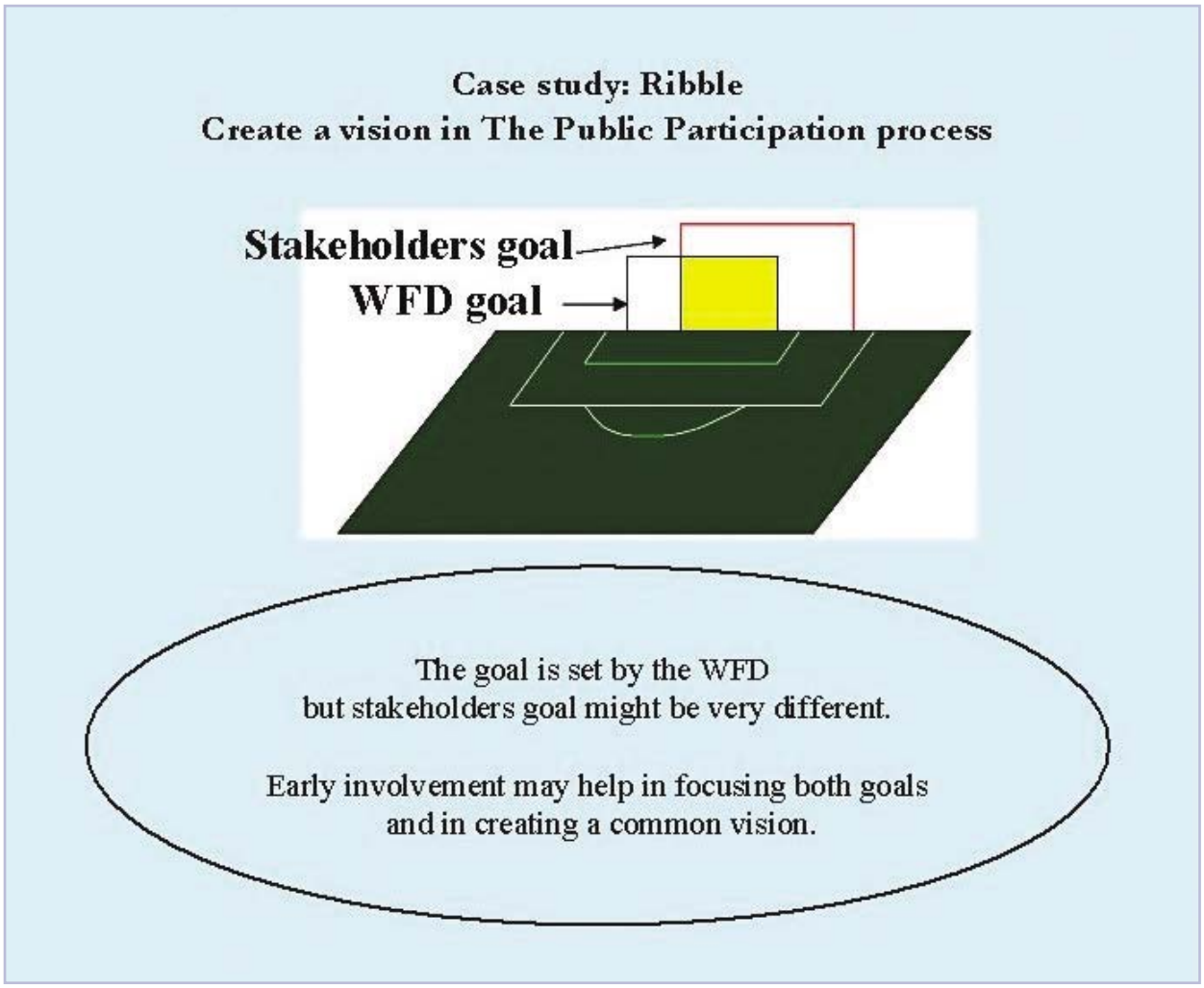


Figure 2 – The river's flow from 1979 to 2002

RIBBLE
Public participation



CASE STUDIES PHASE 1B

TEVERE

CASE STUDIES (MONITORING)

During Phase 1b, the Tevere River Basin Authority, in collaboration with the Regional Environmental Agencies, carried out monitoring activities in order to verify and examine types and reference conditions further in depth.
The following are 2 case studies containing preliminary considerations on the results of these analyses.

TESTING OF THE WFD 2000/60/EC, PRB TESTING PHASE 1B: WATER BODY ECOLOGICAL STATUS IN RELATION TO TYPE CLASSIFICATION.

AUTHORS: Fedra Charavgis, Tatiana Notargiacomo, Elisabetta Ceccarelli, Linda Cingolani, Angiolo Martinelli (ARPA Umbria = Umbria Regional Environmental Agency)

ASSESSMENT OF WATER BODY ECOLOGICAL STATUS IN RELATION TO TYPE CLASSIFICATION BASED ON HYDROMORPHOLOGICAL PARAMETERS

The Nestore river and the Assino torrent have been selected as water bodies in order to evaluate whether the type classification based on hydromorphological parameters proposed in the WFD 200/60/EC and used by the Tevere PRB in the context the WFD testing activity, also represents a homogeneous ecological water body characterization.

CASE STUDY 1: THE NESTORE RIVER

(main stem of the river only type 1)
The entire course of the Nestore river, a tributary on the Tevere river's hydraulic right, has been classified as Type 1. Due to the scarcity of a natural base flow and to the presence of different types of anthropogenic pressures (farming, industry, agriculture, civil waste water discharge), the watercourse is considerably polluted. It's hydrological regime, subject to marked flow fluctuations during the year, is clearly torrential. Among the tributaries of the hydrographic right, the Caina and Genna torrents are very polluted, due to wastewater discharge from urban centres, pig-farming activities, and industries.
Data from the monitoring activity carried out along the watercourse within the project " Indicatori Biologici per I Corsi d'Acqua e Canali Artificiali = Biological Indicators for Watercourses and Artificial Canals (APAT CTN_AIM,ARPAT CTN_AIM leader, year 2003)" is available for the ecological characterisation of the Nestore river. During 2003, three monitoring stations for the identification of the chemico-physical parameters listed in Annex 1 (Tab. 4) of D.Lgs 152/99 and of the benthic macroinvertebrate community (EBI) were sampled on a seasonal basis.
Monitoring station n. 1, situated in the initial stretch of the river, upstream of the Piegara urban center, was chosen as reference for the natural characteristics of the watercourse. The surrounding area, covered by woods and cultivated land, generates a weaker anthropogenic impact in respect to the downstream part of the river. The benthic macroinvertebrate community that was identified is taxa-rich and characterised by sensitive organisms (Plecoptera and wide-headed Ephemeroptera), which are indicators of good water quality. The Extended Biotic Index values for water quality range from class I to class II.
Monitoring station n. 2 is located in Compignano, in the municipality of Marsciano, downstream of the immission of the Genna torrent, that strongly contributes to the deterioration of the Nestore river's water quality. The torrent is characterised by a modest flow. It receives the effluent of the Pian della Genna treatment plant (that treats part of the urban and industrial discharge of the city of Perugia). It is subject to the pollution loading from intense farming activities. Withdrawals carried out in the monitoring station showed that taxa was drastically reduced, sensitive groups completely disappeared, and a very tollerant community, tipical of an environment with strong organic loading and low oxygen levels, developed. The EBI values that were recorded correspond to class V quality (completely deteriorated environment). The analysis of chemical data confirm the presence of a considerable anthropogenic impact.

Monitoring station n. 3, called Fornaci Briziarelli, is located downstream of the Marsciano urban center, before the confluence of the Nestore river with the Tevere river. This station is included in the regional monitoring network for surface waters in accordance with D.Lgs 152/99.
Also in this monitoring station, the considerable alterations to the benthic community (6-8 taxa, quality class IV or III) confirm the negative effects of pollutants. In this part of the river the environmental status is classified as "poor" according to the legislation in force.
Also biological data from the period October 2003-April 2004, from two monitoring stations situated upstream and downstream of the Pietralata ENEL hydropower plant (in a stretch of

Tab. 1 – Benthic macroinvertebrate community in the Nestore river (CTN project).

	Staz. 1 mag-03	Staz.1 lug-03	Staz.1 Ottobre	Staz. 2 mag-03	Staz. 2 lug-03	Staz.2 Ottobre-03	Staz. 3 Maggio-03	Staz. 3 Luglio-03	Staz. 3 Ottobre-03
I.B.E	10-9		8	3	2	3	5	5/4	6
CLASSE	I/II		II	V	V	V	IV	IV	III

Tab.2 –Nestore river surface water chemico-physical data

Parametri chimico-fisici	Staz.1 28-05-03 3	Staz.1 9-09-03 3	Staz.1 10-11-03 3	Staz.2 28-05-03 3	Staz.2 9-09-03	Staz.2 10-11-03	Staz.3 28-05-03	Staz.3 9-09-03	Staz.3 10-11-03
pH (unità di pH)	8,15		8,18	8,12	7,77	7,78	8,33	8,06	7,88
Temperatura acqua °C	15,5	IN SECCA	10	20,6	20,5	11	21,6	21,2	13
Ossigeno disciolto (DO) mg/l	9,3		10	2,4	1,2	2	8,8	6,5	8,8
Conducibilità(20°C) µS/cm	530		611	859	958	750	774	962	736
BOD5(O2) mg/l	0,7		0,8	22	7,2	6,2	12	4,4	9
COD(O2) mg/l	7,9		6	53	28	26	36	22	26
Fosforo totale(P) mg/l	0,05		<0,02	2	1,3	1,2	1	0,67	0,82
Ortofosfati (P) mg/l	0,03		<0,02	1,3	1	1,1	0,67	0,61	0,7
Azoto totale(N) mg/l	1,4		<1	14	8,7	9,9	6,1	6,8	8,4
Azoto nitrico (N) mg/l	0,58		0,35	1,2	4,7	2,8	1,7	5,2	3,6
Azoto nitroso (N) mg/l	0,01		<0,01	0,37	0,78	0,52	0,34	0,17	0,23
Azoto ammoniacale(N) mg/l	< 0,04		<0,04	5,6	2	4,9	0,16	0,13	2,9
Solfati(SO4) mg/l	20		26	52	107	53	48	99	54
Cloruri (Cl)mg/l	36		50	87	99	69	69	100	76
Solidi sospesi mg/l	26		15	120	43	24	26	38	14
Durezza(CaCO)	275		298	339	376	271	319	358	253

Nota: per le condizioni idrologiche (fiume in secca), nel mese di luglio non è stato possibile effettuare il prelievo macrobentonico per la stazione n.1.

Tab. 3 – Relevant parameters in monitoring station upstream of the Pietralata hydropower plant

Localizzazione	Nome Punto Prelievo	Comune	Data prelievo	Indice Biotico Esteso (I_B_E_)	Classe di Qualità	Temperatura acqua - °C
Fiume Nestore	A monte Centrale Pietrafitta	Panicale	08-ott-03	6	III	
Fiume Nestore	A monte Centrale Pietrafitta	Panicale	03-feb-04	6-5		7,0

Tab. 4 – Relevant parameters of the monitoring station downstream of the Pietralata hydropower plant

Localizzazione	Nome Punto Prelievo	Comune	Data prelievo	Indice Biotico Esteso (I_B_E_)	Classe di Qualità	Temperatura acqua - °C
Fiume Nestore	A valle Centrale Pietrafitta	Montepetriolo	08-ott-03	6	III	
Fiume Nestore	A valle Centrale Pietrafitta	Montepetriolo	03-feb-04	6-5	III/IV	7,5
Fiume Nestore	A valle Centrale Pietrafitta	Montepetriolo	12-mar-04	6	III	
Fiume Nestore	A valle Centrale Pietrafitta	Montepetriolo	12-apr-04	6	III	

the river comprised between monitoring stations n. 1 and n. 2 of the CTN project), are available.
The results of the EBI analysis in this stretch of the river identified an altered macrobenthic community, characterised by third class quality organisms.
This data allows us to classify the Nestore river, from an ecological point of view, into three main stretches:

- From the mouth to the Piegaro built-up area: the environment shows moderate signs pf pollution and alteration. The water quality from a chemical and a biological point of view is good;
- Between Piegaro (downstream) and the confluence with the Caina river: the overall water quality is sufficient;
- From the confluence with the Caina river to the confluence with the Tevere river: the environment suffers from the discharge of heavy pollutant loadings from the two affluents. The final stretch is characterised by poor water quality and it is very altered.

Conclusions
In this case of a torrent classified as one type (type 1), 3 water bodies have been identified. However, on the basis of current available data, it is not clear whether the different ecological status is only due to pollution loading or if it reflects further typology sub-division.

CASE STUDY 2: THE ASSINO TORRENT

The Assino torrent is a tributary on the hydrographic left of the Tevere river. It is about 22 km long and its total catchment area amounts to 174.29 km2. Assino torrent's main tributaries are the Cesa torrent on the hydrographic right and the Lanna torrent and S. Donato ditch on the left.
On the basis of the WFD's classification criteria, the torrent was sub-divided into two types: Type 1 from the upstream stretch to the final stretch; Type 2 for the intermediate stretch.
Regarding the torrent's ecological characterisation, there is available data from three monitoring stations (year 2003), identified and sampled to draft the regional fish map, and from single data

Tab 5 – Biological and chimico-physical parameters for the Assino torrent (Regional Fish Map, year 2003).

Ambiente	Codice punto prelievo	Località	comune	Data prelievo	I. B. E.	Classe di Qualità	BOD5 (O2) mg/L	COD (O2) mg/L	Azoto ammoniacale (N) mg/L
T. Assino	06assi01	Mocaiana	Gubbio PG	26/06/03	8	II			
T. Assino	06assi01	Mocaiana	Gubbio PG	07/10/03			2,7	11	0,17
T. Assino	06assi02	Campo Reggiano	Gubbio PG	25/06/03			0,8	9,1	<0,04
T. Assino	06assi02	Campo Reggiano	Gubbio PG	26/06/03	9/10	II/I			
T. Assino	06assi02	Campo Reggiano	Gubbio PG	14/10/03			1,2	8	<0,04
T. Assino	06assi03	Ponte SS 3 BIS	Umbertide PG	06/06/03	7	III			
T. Assino	06assi03	Ponte SS 3 BIS	Umbertide PG	25/06/03			0,9	8,3	<0,04
T. Assino	06assi03	Ponte SS 3 BIS	Umbertide PG	14/10/03			2,1	10	0,1

Tab. 6 - Biological parameters and macrodescriptors, monitoring station upstream of confluence with Tevere river

Ambiente	Codice punto prelievo	Località	comune	Data prelievo	I. B. E.	Classe di Qualità	BOD5 (O2) mg/L	COD (O2) mg/L	Azoto (N) mg/L ammoniacale (N) mg/L
T. Assino	06assi03	Ponte SS 3 BIS	Umbertide PG	27/05/04	7	III	1,8	7,1	<0,04

on sampling carried out in the most downstream monitoring station, in the context of testing of the WFD on minor water bodies (year 2004).
Monitoring station 1 is situated in the upstream stretch of the river, in the area of Mocaiano (Gubbio plain), before the confluence with S. Donato ditch. The surrounding environment is characterised by cultivated fields and the Mocaiano built-up area.
Monitoring station 2 is located in Campo Reggiano, in the municipality of Gubbio, upstream of the confluence with the Lanna torrent and after the confluence with the Cesa torrent, that conveys good quality water. The environment is mainly characterised by woods on the left side and by fields and scattered houses on the right side. In this stretch the watercourse is more natural and diverse.
On the basis of the results from the analysis of the macrobenthic community, the Assino torrent's upstream stretch and the intermediate stretch are characterised by good water quality, moderately polluted in monitoring station 1 (quality class II) and with slight alterations in monitoring station 2 (quality class II/I); there are no industrial activities and urban settlements that exert a strong anthropogenic impact. Chemical analyses confirm the results obtained from the biological parameters.
Monitoring station 3 is situated in Piandassino, before the confluence of the Assino torrent with the Tevere river. The surrounding environment is characterised by the presence of seed crops, urban settlements, and a quarry in the stretch upstream of the monitoring station, on the right side.
Data from this monitoring station (final stretch of the Assino torrent), show signs of deterioration of the water quality, from a biological point of view (quality class III, sufficient). The disappearing of more sensitive taxa and the reduction of diversity indicate that there is a polluted and altered environment. The chemical parameters, although insufficient for a complete characterisation of the torrent from a chemical point of view, on the

Azoto nitrico (N) mg/L	Azoto nitroso (N) mg/L	Fosforo Totale (P) mg/L	Ossigeno disciolto (DO) mg/L	Temperatura acqua
1,7	0,07	0,15	8,8	13,2
1,6	0,01	0,06	8,9	21,4
1,8	<0,01	0,05	11,6	12,7
1,2	0,01	0,03	8,2	23,2
0,88	0,02	0,06	9,8	14,2

(WFD testing activity, year 2004).

Azoto nitrico (N) mg/L	Azoto nitroso (N) mg/L	Fosforo Totale (P) mg/L	% sat. Ossigeno disciolto	Escherichia coli
2		<0,02	107,8	430

contrary, show that the water quality is good. The results of the analysis carried out in 2004 for monitoring station n. 3 confirm what was demonstrated by precedent sampling.

From an ecological point of view, the Assino torrent can be sub-divided into two stretches:

- From the source to Camporeggiano: the environment shows signs of pollution and slight alterations. The water quality from a chemical and biological point of view is good;
- From Camporeggiano up to the confluence with the Tevere river: Although the impact from anthropogenic activities is not very strong, the water quality from a biological point of view is one class lower, also due to the minor turbulence and slower velocity of the watercourse's flow.

Conclusions

The results from the monitoring activity showed that the first stretch of the Assino torrent (type 1) and the second stretch (type 2) have similar ecological characteristics and can therefore be considered as an only water body. The fact that type differences are "masked" may be due to the impossibility of describing ecological differences in detail using only one indicator (EBI).

SULDAL

Proposed procedure to determine future monitoring in the Suldal PRB

A 5-step approach has been developed as procedure to design the monitoring of the Suldal catchment to be able to fulfil the requirements of the Water Framework Directive (WFD). This approach is based on testing the CIS-guidance on monitoring (MONITOR) and on other preliminary experiences of the PRB project.

1. Provisional characterisation as basis

Suldal PRB – only surface water included in this case

Area 1561 km2

Water Bodies	113 identified			
Category	River	Lake	Bekkefelt *	HMWB
	43 stk	27 stk	43 stk	54 stk
Type	5 river	4 lake	3 types "bekkefelt"	

** Due to a large number of rivers and lakes, a new category has been identified as "sub-catchment river network" (Bekkefelt).*

Status: 54 HMWB (automatically at risk in the provisional characterisation) and 59 water bodies not expected to be at risk.

2. Requirements of the WFD

The MONITOR GD gives few quantitative criteria for monitoring and opens for national adaptation.

'Surveillance monitoring'

- Surveillance monitoring is needed, but not necessary within the catchment if other representative locations exist outside the

catchment.
- Reference stations to monitor natural condition for each type (12 types within the catchment).
- Today's condition needs to be monitored: for 12 water types and 5 types of pressures (maximum 60 locations).
- Parameters: biology, physio-chemistry and hydromorphology.
- Natural trends and long term changes caused by anthropogenic activity.

'Operational monitoring': only in water bodies "at risk".
- In Suldal PRB that will be on HMWB that will not reach maximum potential.
- Risk assessments for HMWB are not executed in the provisional characterisation.

'Investigative monitoring': not identified needs in the catchment.

3. Existing monitoring in the Suldal PRB

A. Biological paremeters;	
• Macrophytes and periphyton :	: 9 locations
• Fish - young	: 16 locations
• Benthic fauna	: 13 locations
• Spawning fish	: 21 locations
• Hazardous substances in fish	: 1 location
B. Physiochemical parameters	
• Water chemistry	: 11 locations
• Water temperature	: 12 locations
• Long-range transported air/rain	: 13 locations
• Metals in lakes	: 1 location
C. Hydro-morphological parameters	
• Water flow	: 11 locations
• Sediments	: 3 locations

4. Classification of existing monitoring
Surveillance monitoring: chemistry, heavy metals, water flow and temperature.
Operational monitoring: monitoring in the River Suldal related to the adjustment of a new regulation regime (biology, chemistry, sediments and temperature) and related to the liming activities (biology, chemistry).

5. Proposal for future monitoring in the Suldal PRB
The monitoring is aimed to be as cost-effective as possible. It should as far as possible be based on existing monitoring with good co-ordination between different authorities and organisations.

Monitoring in the Suldal PRB will to a large extent be classified as surveillance monitoring (reference locations and trends). A national network needs to be established to finally decide how many locations that are needed within the Suldal catchment.

The monitoring will be based on the knowledge of the pressures in the area and on established dose-response relationships between indirect parameters, e.g. water flow and ecological status or pH values and fish stock. Large parts of the catchment are remote areas with low pressure and will automatically be characterised as "low risk" and monitoring in these areas will only be necessary as part of monitoring reference conditions and natural trends.

ODENSE

A) CASE STUDIES ON WETLANDS

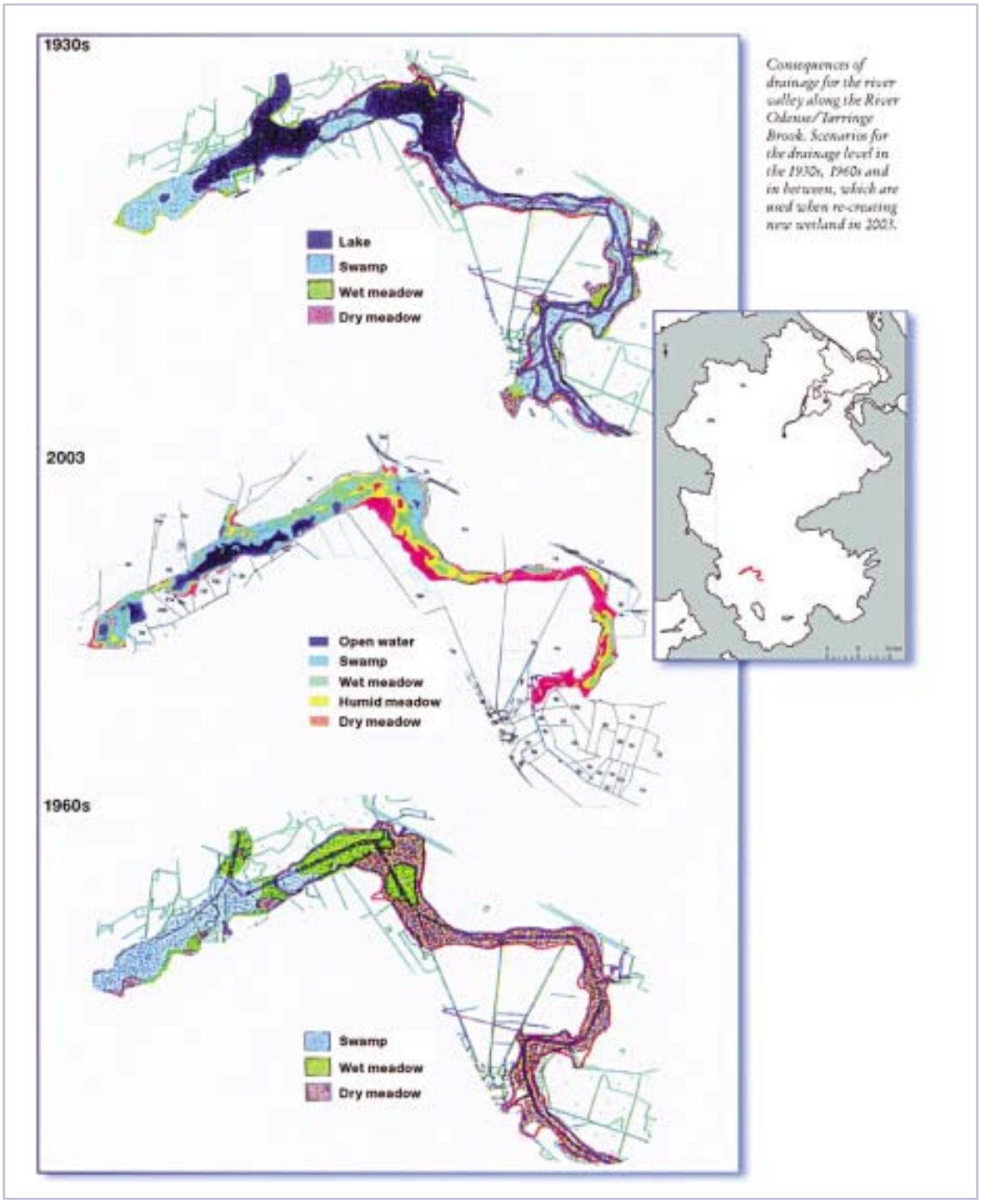
The purpose of the Water Framework Directive includes the protection, restoration and enhancement of the water needs of wetlands.
Deterioration of the status of wetlands can be caused by other parameters than the water level. Par example overload of nutrients, not only from ground water as mentioned in the Directive, but also from drainage and air pollution, can cause damage to wetlands. Removing peat from mires can also cause deterioration.
As wetlands in many cases already in the text are defined as part of the water bodies, if belonging to riparian, lakeshore or inter-tidal zone, it is also relevant to protect these parts of the water bodies from other factors changing their conditions than water level. Wetlands can

of course need water of different reasons, but wetlands can also be overloaded with nutrients, so that the retention capacity will minimize and leaching of phosphorus and other substances can occur. Recommendations on wetland management from the international project BERNET (Baltic Eutrophication Regional Network) are attached.
In Denmark wetlands can be categorized in four types:

- existing natural wetlands
- restored wetlands with water level adapted to existing nature values
- restored wetlands with natural hydrology
- restored wetlands with natural hydrology used as nutrient sinks

It is important to ensure that all types of existing wetlands are protected and prevented from deterioration in relation to the Water Framework Directive, because all wetlands whether natural or restored, are transforming nutrients leaving the catchments and thereby the surface water bodies are protected. In some countries, now also in Denmark, you find political decisions describing that the highest priority is international designated areas. That makes a more general protection of wetlands on an international basis absolute relevant. Another aspect is that the "obligations to prevent more than very minor anthropogenic disturbance to the hydromorphological condition of surface water bodies at High Ecological Status" including the "structure and conditions of riparian, lakeshore or inter-tidal zone" also have to cover wetlands adapted to water bodies with lower status than High Ecological Status. Reason is that wetlands can be of great importance in relation to downstream water bodies, which can have a higher status than the water body closest to the wetland. So actually it is necessary to look at wetlands in the whole catchment of a water body at High Ecological Status. In addition to that it can be recommended that above-mentioned obligations also must apply for water bodies at Good Ecological Status.
It is also important that the whole river valleys are defined as relevant to the achievement of the Directive's objectives and not only smaller parts of the valley, as shown in figure 2. Often the hydrological regime changes through a river valley, but most of the valley will always be affected of either ground water, water level in river or drainage conditions. If about 50 % of a catchment area as per example on Fyn in Denmark is drained with tiles, it is very important to look at the hydrology for surface water runoff, drain water and root zone runoff more than ground water levels. Even ground water from the root zone will be collected in the drain tiles. Historically all this water has been seeping through the soil to the river valley. Hydrology and topography must be decisive for which areas are associated with a water body. Formerly wetlands should also be included as potential, because a restoration of such areas can be very important in relation to fulfil the objective of par example good ecological status for a water body. Fyns County in Denmark has maps showing wetlands from 1890's, which we expect to use as guidelines for finding wetlands adapted to water bodies, also the potential ones.
It can be recommended to have equal obligations to wetlands that are not individual water bodies, and to "open water" wetlands, which are identified as water bodies.

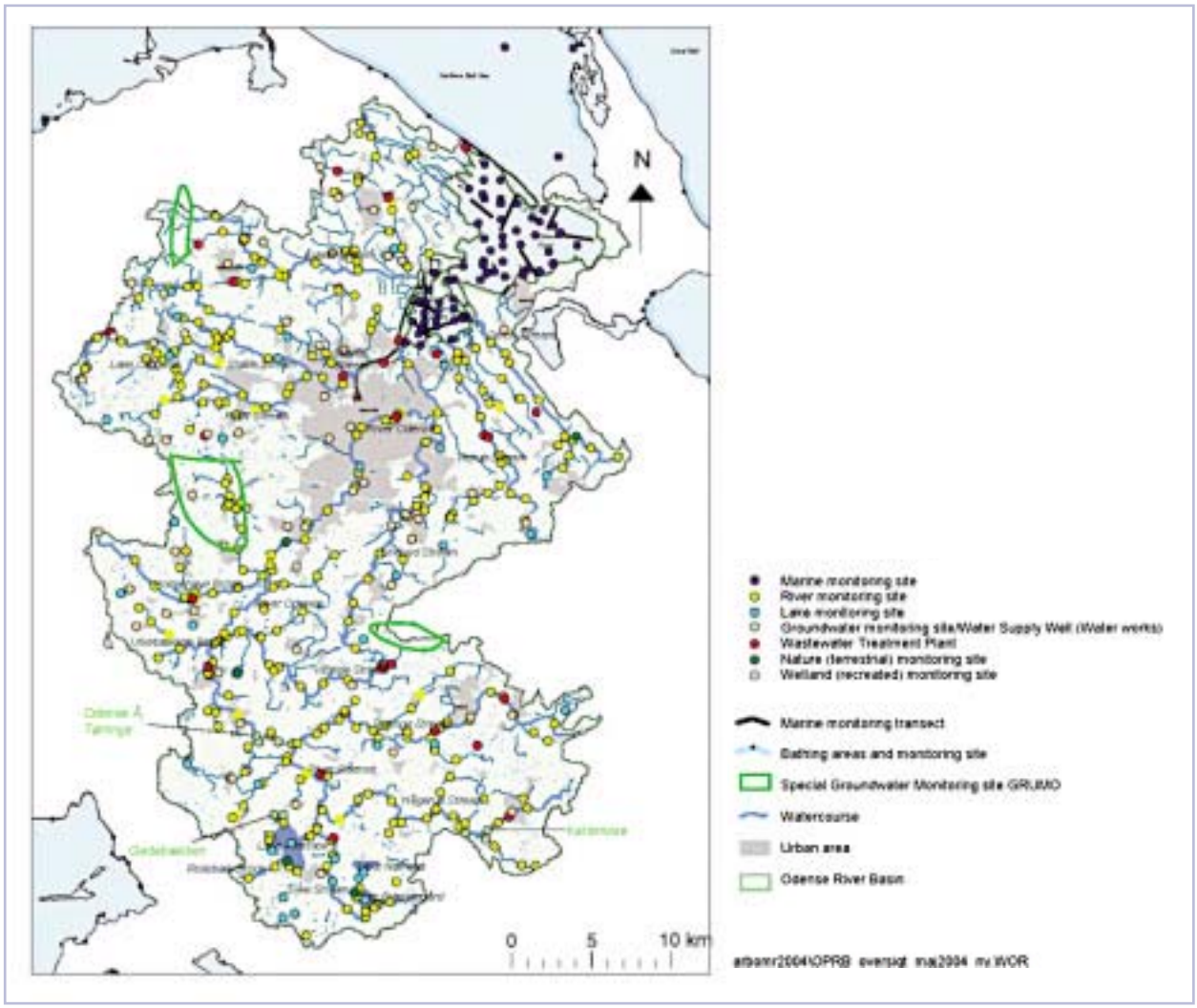
Examples
An example is the regulation of the River Odense, which took place over the period 1941–1960. This resulted in the cultivation of the lowland areas along the watercourses. It has not been possible to maintain this cultivation on all of this land right up to the present time, however. For example, large areas around Ulvebækken Brook are presently meadow and mire. A subsidence survey (Nielsen, 2002) has shown that large parts of the lowland areas have subsided by up to 1 m, while those alongside Ulvebækken Brook has subsided by up to 3 m. The rule of thumb is 1 cm pr year. There are several reasons for the subsidence. When the water level is lowered in peaty soils these dry out, thereby enabling consolidation to take place. At the same time the peat becomes oxidized due to drainage, where after it decomposition increases. The new water table in re-created wetlands will therefore have to be adapted to the subsidence that has taken place; otherwise, very large lakes will form in the watercourse



Consequences of drainage for the river valley along the River Odense/Tarringe Brook. Scenarios for the drainage level in the 1930s, 1960s and in between, which are used when re-creating new wetland in 2003.

systems themselves, which is undesirable from the point of view of fish passage. And historically there have not been large lakes in these areas, but a meandering river.

Since 1890, the area of extensively farmed lowland has decreased by 45% in Odense River Basin. This reduction is typically attributable to drainage and ditching of meadows/wetlands, straightening and deepening of watercourses and the pumping of water away from wetlands. Watercourse maintenance has also influenced the water level in the adjoining wetlands. Prior to adoption of the new Watercourse Act in 1983, the watercourses were maintained frequently, and



in a hard-handed manner. With the new Watercourse Act the purpose was changed such drainage has to be ensured while concomitantly taking into consideration the environmental requirements to watercourse quality.

Abstraction of groundwater for drinking water, industry and irrigation also influence the water level in wetlands. This is particularly the case for wetlands located in upwelling areas. A lower water table will also diminish water flow in the watercourses, however, which will have a more general effect on all the wetlands along the watercourses and hence have a great impact.

An example of a wetland that has been drained, but which has now been re-established under the Action Plan on the Aquatic Environment II, is the reach of the River Odense upstream of Tørringe Brook. This reach was regulated during the period 1944–1950. Scenarios for the consequences of drainage of the floodplain have been established for the 1930s, the 1960s and for drainage state in between. These have been used in connection with the re-establishment of a new wetland in 2003 (See Figure 4.4.1). The whole river valley is permanently laid out as wetland areas and 4 km of the river is restored with new meanders placed like the original ones. During winter time 2003/04 huge amounts of sand and other suspended materials were deposited on the meadows in the river valley. Investigations of nutrient transformation are running. The new wetland of 78 hectares is expected to transform about 205 kg N/ha/yr, corresponding to 16 tonnes N/yr in total.

Especially in relation to rivers and river valleys it is very important with coherence to optimise all aspects.

With regard to the wetlands being re-established under the Action Plan on the Aquatic Environment II, the aim is to denitrify as much nitrogen as possible and retain as much

Quality Elements Odense Pilot River Basin

Monitoring Location	Chemical monitoring Number of locations/ Total number of Stations	Parameter/ Number of stations/ Sample frequency (number of stations)	
Rivers	32 / 32	NPO / 32 / 365 per year (2), 20 per year (10), 2-3 per year (20) HMETAL / 2 / 12 per year HAZSUB / 1 / 12 per year	
Lakes	35 / 71	NPO / 35 / 19 (1), 7 every 3'rd year (9), 6 every 6'th year (16), 1 every 6'th year (9) NPO_SED / 36 / 1 every 6'th year (6), 1 every 10'th year (30) HMETAL/ 30 / 1 every 10'th year	
Coastal Waters	3/11	NPO / 5 / 26-51 (p) per year HMETAL / 2-3 / 1 per year HAZSUB / 2-3 / 1 per year SEDFLUX / 3 / 10 every 3'rd year	
Water supply wells **** (ground water)	63 / 230	NPO / 230 / 1 per 2-5 years HMETAL / 230 / 1 per 2-5 years	HAZSUB / 230 / 1 per 2-5 years MCG / 230 / 1 per 2-5 years
Private Wells **** (ground water)	4000 / 4000	NPO / 4000 / 1 every 5'th year	
Special ground water monitoring program	3/14	NPO / 67 / 1 per year HMETAL / 14 / 1 per year	HAZSUB / 62 / 1 per year MCG / 67 /1 per year
Nature, terrestrial	5 / 180	NPLANT / 50 / 1 per year CNP_SOIL / 20 / 1 every 6'th year	NpH_SOIL / 20-30 / 1 per year
Wetlands (re-created)	3/8	NPO / 8 / 12-24 per year	
Wastewater Treatment Plants	19 / 38	NPO / 38 / 52 per year (2), 2-24 per year (36) HMETAL / 14 / 2-4 per year HAZSUB / 1 / 4 every 3'rd year	

****: The monitoring of groundwater in accordance with Drinking Water Directive 98/83/EC

Parameters:

BACT: Coliforme Bacteria, BENTH: Benthic fauna

BIOLext: Physical index, macrophytes (in-stream, borders, riparian zone), macroinvertebrates, fish, water chemistry

BIOLint: Physical index, macrophytes (in-stream, borders, riparian zone), macroinvertebrates, fish, water chemistry, soil composition/groundwater table in riparian zone

CHLO: Chlorophyll-a biomass (p: may involve profiles, i.e. ≥ 1 sample), CNP_SOIL: Carbon, Nitrogen and Phosphorus in soil

FISH: Fish (**: Survey), HAZSUB: Hazardous substances (pesticides, ……..)

Biological monitoring		
Number of locations / Total number of stations	Parameter/ Number of stations / Sample frequency (number of stations)	
265 / 265	BIOLext / 19 / 1-1/6 per year. BIOLint / 4 / 1 per year. INVERT / 265 / 1 per year. BACT / 10 / 12 per year.	
35 / >35**	CHLORO / 37 / 19 (1), 7 every 3'rd year (9), 6 every 6'th year (16), 1 every 6'th year (9)), 6 every 6'th year (16), 1 every 6'th year (9) PHYTO & ZOOPL / 12 / 19 per yr. (1), 1 every 3'rd year (9) MACRO / 35** / 1 (1), 1 every 3'rd year (9), 1 every 6'th year (25) FISH / 8**/ 1 every 6'th year BENTH / 8** / 1 every 6'th year	
3/80	HAZSUB / 3 / 1 per year BENTH / 50 / 1 per year FISH / **/ 1 every 6'th year MACRO / 9** / 3 per year	PHYTO / 1 / 26 per year CHLO / 5 / 26-51 (p) per year BACT / 12 / 10 per year
63 / 230	BACT / 230 / 1 per 2-5 years	
4000 / 4000	BACT / 4000 / 1 every 5'th year	
5 / 180	VEG / 180 / 1 per year	
3/6	BACT / 6 / 2-4 per year	

HMETAL: Heavy metals , INVERT: Macroinvertebrate survey (Danish Stream Fauna Index)

MACRO: Macrophytes (**transects or surveys, not stations),

MCG: Main constituents of groundwater, sulfur, ammonium, oxygen, iron, aggresive carbon content, chloride, pH, ect.

NPLANT: Nitrogen in plants, NpH_SOIL: Nitrogen, pH and conductivity in soil and soil water

NPO: Nitrogen, Phosphorus and BOD (p: may involve profiles, i.e. ≥ 1 sample), NPOSED: Nitrogen, Phosphorus and other substances in sediments.

PHYTO: Phytoplankton species and biomass, SEDFLUX: Nutrient flux to/from sediments

VEG: Vegetation analysis, ZOOPL: Zooplankton

phosphorus as possible while concomitantly re-creating some natural habitats with natural hydrology as an alternative to cultivated fields. Nitrogen retention amounts to 200–350 kg N/ha/yr for the 21 wetlands that have either been re-established and monitored or have been investigated and calculated in Fyn County. Six of these 21 wetlands are located in Odense River Basin, corresponding to approx. 570 ha. Of this, approx. 220 ha of wetlands have been established by the end of 2003. This corresponds to a nitrogen reduction of approx. 114–200 tonnes N/yr in Odense River Basin. This reduction especially has a positive effect on the Odense Fjord.

Wetlands re-established under Action Plan on the Aquatic Environment II, which is financed nationally and regionally, are encompassed by permanent protection at the national/regional level. The areas are encompassed by agreements – recorded in the Land Registry under the property in question – permanently designating the land as wetland.

Another example is a re-established wetland from 2001 at Wedellsborg on Fyn, Denmark, where the pumping of drain water has been stopped and the drain tiles are cut. Thereby the ground water level has raised and the lowland areas are irrigated with drain water. 40 hectares of mainly agricultural land has been converted to wetland and surrounding meadows with natural hydrology. Some of the 40 hectares have turned into lake, others into swamp and more or less wet meadows. Before the re-establishment there were a few hectares of protected grasslands. Instead nature got a lake and much more grasslands around that. It is important to weigh the different interests, to look at the projects in their entirety and to see the perspectives for the nearest water body and for the final recipient.

This wetland area has been investigated from a nutrient and a biological point of view. The nitrate transformation has with background in measurements been calculated to 230 kg N/ha/yr. Biological this area has developed to a paradise for birds. Even very rare birds for this regizn have found their way to the new wetland, par example Spoonbill (Platalea leucorodia), Little Egret (Egretta garzetta) and Black-winged Stilt (Himantopus himantopus).

RE-ESTABLISHED WETLAND
AT ODENSE RIVER BASIN

B) CASE STUDIES ON MONITORING

Monitoring programme of the OPRB-area, Fyn County

The Danish monitoring programme was started in 1974 by the regional authorities, the Danish counties, due to the obligations of the first Danish Environmental Act. In 1989, a national and regional combined monitoring programme was started in agreement between the regional authorities and the state. This programme was revised in 1998, and again in 2003. The present national and regional monitoring programme is conducted by Fyn County as a part of the obligations in the Environmental Act, the APAE I and II, and the Danish transposition of the WFD.

The purpose of the present monitoring programme is to describe:

- the present ecological state of the surface waters and the chemical state of the ground water and drinking water.
- species diversity and quality of terrestric nature (Habitats areas).
- pressure factors in terms of loads of nutrients and hazardous substances and water abstraction.
- impact of the described pressure factors on the ecological status of the water resources.
- effects of measures (point sources, diffuse sources, physical improvement etc.).
- nutrient removal and development of recreated wetlands.

Through this programme, a sound basis is established for describing the necessary means of regulating the man-made impact of the aquatic environment, and thus facilitate the political decision process.

Traditionally, the Danish monitoring programme, running since 1976, has been focused on nutrients and eutrophication, which has been considered the main problem in the Danish aquatic environment. Since 1998, however, attention has

also been paid to hazardous substances. The programme has been revised in 2003, and now includes terrestric nature quality. The programme will be revised again in 2006, when the WFD-monitoring programme shall be established, to meet the requirements of the WFD.

Physical pressure factors have not been an integral part of the program till now, but will be an important factor to consider in the new programmes designed for the WFD.
A general overview of the monitoring programme in the OPRB-area is presented in the map, showing all monitoring sites located in the area, and a table summing up number of stations, frequencies and parameters.

SHANNON

ASSIGNMENT OF SHARED GROUNDWATER AND ASSOCIATED WETLANDS BETWEEN RIVER BASINS IN THE SHANNON PILOT RIVER BASIN

Introduction & Methodology
Groundwater bodies were delineated in the Shannon Pilot River Basin (PRB) using no-flow geological boundaries. In some cases this resulted in shared groundwater between river basins, mainly in areas of karst groundwater where the influence of topography is diminished (see Figure 1). Article 3(1) of WFD states that 'Where groundwaters do not fully follow a particular river basin, they shall be identified and assigned to the nearest or most appropriate river basin district'.

The decision to assign groundwater to the most appropriate river basin was based on the existing surface water boundary, groundwater flow regime, tracer studies, bedrock & structural

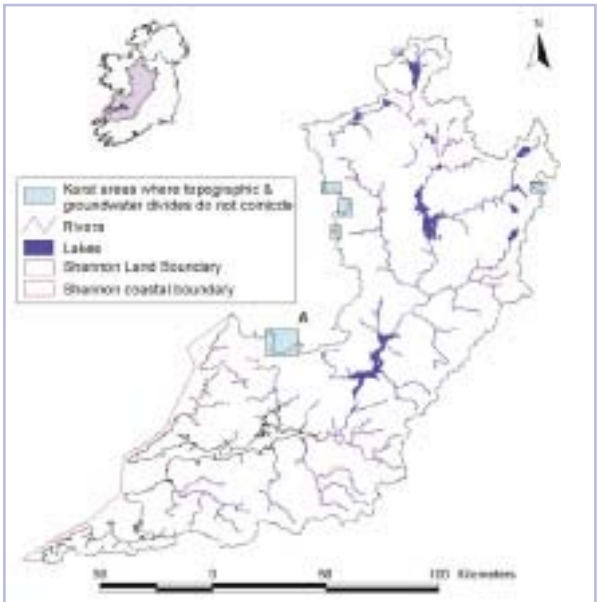


Figure 1 Karst areas in the Shannon PRB where the topographic & groundwater divide to not coincide.

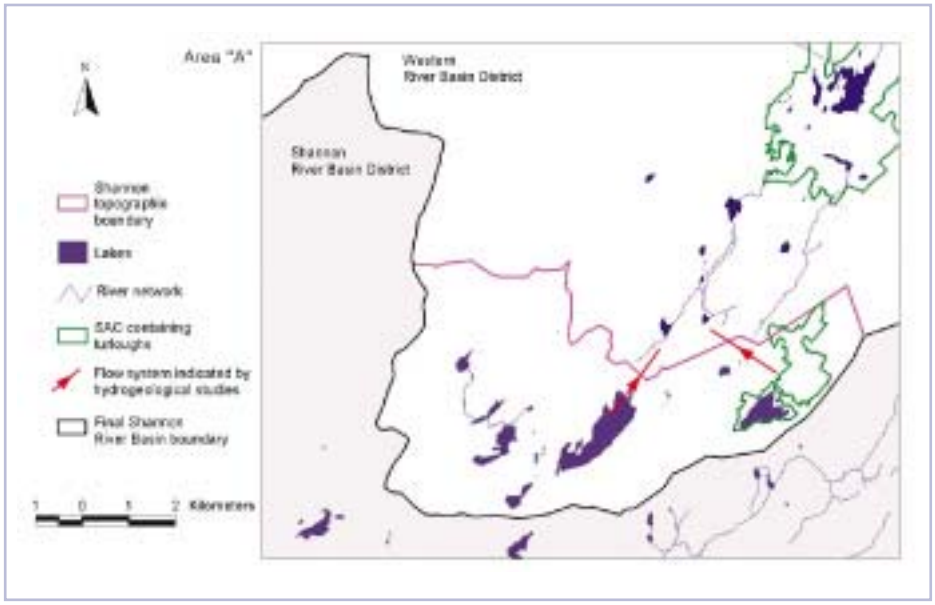


Figure 2 Area "A" of Figure 1 in more detail. Whilst the topographic divide indicates a gradient to the south, hydrogeological studies indicate that groundwater flows to the northern river system and turloughs (groundwater fed lakes). In this case the area was assigned to the Western RBD.

geology, modelled groundwater source protection areas, and the presence of dependent ecosystems (e.g. groundwater fed lakes). Figure 2 illustrates this process for area "A" of Figure 1.

Conclusions

Cooperation between neighbouring river basins will be essential in developing programme of measures and river basin management plans, to ensure that such interconnected water bodies and associated ecosystems are adequately protected.

Acknowledgements: Environmental Protection Agency and Geological Survey of Ireland.

ANNEX II: SUMMARIZED EXPERIENCES OF THE PRBS WITH GDS

In ANNEX II the answers to the ToR given by the PRBs were summarised for each Guidance Documents in order to highlight the main outcome for each of them.

SUMMARIZED EXPERIENCES OF THE PRBS WITH GDS, PHASE 1A

Since that water bodies delineation is an horizontal guidance a dedicated report was prepared and it is available on CIRCA under Pilot River Basin/PRB Outcome Report – Phase 1a/ANNEXES.

GD: PRESSURES AND IMPACTS

General issues

The Guidance document on pressures and impact was supposed to be tested on the following 12 PRBS: Suldal (Su), Jucar (Ju), Oulujoki (Ou), Mosel/Saar (MS), Neisse (Ne), Odense (Od), Marne (Ma), Pinios (Pi), Shannon (Sh), Tevere (Te), Cecina (Ce), Scheldt (Sc).

Key issues

QUESTION: IS THE LIST OF "PRESSURES" AND THE RELATED "CRITERIA" ADEQUATE AS A BASIS TO DEFINE THOSE SIGNIFICANT PRESSURES AT WATER BODY LEVEL THAT POSE A RISK OF FAILING TO MEET THE ENVIRONMENTAL OBJECTIVES?

The responses are quite mixed however, overall it seems that the list of pressures listed in the IMPRESS documents are adequate.

- It is stressed however that the list strongly focuses on pollution sources while not sufficient attention is given to morphological pressures, and pressures linked with water use and management, which seems to be the case in Norway. This point is also underlined by the Scheldt. In this context a integration of the HMWB analysis and the analysis of potential significant pressures is recommended by Suldal,
- The Mosel/Saar PRB would have preferred a more detailed and more extensive list of criteria for identifying significant pressures, especially when it comes to groundwater. Others (Marne; Shannon) appear to be more skeptical about absolute criteria for individual pressures and therefore look for integrated approaches that take into account the potential impact. Oulujoki have not determined yet the criteria for assessing the significance of pressures.
- A major issues emerges from the fact that some PRBs can not see how a detailed analysis including the whole list of pressure at a water body level could be conducted considering the large number of water bodies present in their catchments (Odense). Furthermore such detailed analysis would require a huge amount of data that might not be available (Neisse), or could not be done in a timely manner (Scheldt).
- Some of the responses included details about local approaches to identify pressures (Jucar), and how the list of pressures was included into a methodological risk assessment approach (Shannon).
- It appears that the LAWA screening tool has been used in several PRBs to start the pressure and impact analysis

QUESTION: IS THE LIST OF "IMPACT INDICATORS" AND "THRESHOLD SIZES" ADEQUATE TO ASSESS THE RISK OF FAILING TO MEET THE ENVIRONMENTAL OBJECTIVES?

Most of the responses agree that even though the list of impact indicators is quite thorough and complete, there is a lack of specific threshold values. Suldal and Mosel/Saar call for a more specific list of indicators combined with specific threshold values. It seems that many PRBs will rely on already existing national thresholds values when possible for conducting the pressure and impact analysis as no specific values are given in the guidance document or are not yet available.

- several PRBs noted the necessity to include water bodies vulnerability in the analysis process
- several PRBs also stressed the need of data in order to assess the state of water bodies, which are not always available, in particular as far as impacts from changes in the hydrological regime or in the morphology of the water bodies are concerned, whereas the data availability concerning the physico-chemical quality elements is better although quite often not yet desegregated to the water body level.

Marne hints to the limits of indicators with regard to assessing the biological impact and recommends the use of additional sources of information like expert judgement, modelling results, investigative monitoring.

It is highlighted that the criteria and thresholds can be helpful to identify a potential impact but are not sufficient as a basis for a decision whether a water body might be at risk of failing to meet the good status.

QUESTION: IS THE DPSI(R) CONCEPT APPLICABLE IN PRACTICE?

Most of the PRBs agree on the applicability of the DPSI(R) framework even though the various PRBs are at various stages of implementation of the process, especially the response part that should be tested later on.

- One of the major concern is that the distinction between “state” and “impact” is not always clear as mentioned by the Scheldt, Neisse, and the Odense
- Different methodologies are being used going from expert judgement (Odense), to simple and sophisticated models (Mosel/Saar, Odense, Neisse)
- The Czech part of the Neisse states that the DPSI(R) framework is only applicable to large basins, and has limited applicability to small water bodies due to extensive data requirement
- It was also underlined that clear links between impact and pressures do not always exist

QUESTION: HOW WAS DEALT WITH THE PROVISIONAL IDENTIFICATION OF HMWB AND WB?

Many PRB made reference to the HMWB guidance for a detailed answer (Odense, Oulujoki, Scheldt, Suldal, Mosel/Saar and Marne). Work is still under progress for the Scheldt, Shannon. For Suldal, a screening of hydropower installation was carried in the identification of water bodies.

- Many PRBs noted the lack of available definition of good ecological status. For the Jucar, since no definition is available concerning good ecological status, it classified the HMWB only on significant hydro morphological alterations using the following criteria: large reservoir or dams, urban river stretches, water bodies downstream of dams, and artificial channels. The Marne performed the classification of the HMWB independently from the pressure and impact analysis. Mosel/Saar also stresses the lack of available definition of good ecological status in relation to HMWB.

QUESTION: HOW WAS DEALT WITH THE IMPACT OF "AUTONOMOUS DEVELOPMENTS" AND "EXISTING POLICIES" IN THE IMPACT ASSESSMENTS?

Most of the responses state that work concerning autonomous development and existing policies is still underway or has not been assessed yet (Jucar, Oulujoki, Shannon. Scheldt). Some research work is performed on the Odense to assess the trend in agricultural production and expected trends in wastewater discharge in response to improvement

already decided. Mosel/Saar stresses the necessity to take into account the requirements of other EC directives and the respective schedules for implementing these directives, the measures required by existing national or regional legal obligations or political decisions as well as all existing information on already determined developments like the closing down of industrial sites.

QUESTION: HOW IS/WILL THE GAINED INFORMATION BE SYNTHESISED TO BECOME THE OFFICIAL ART. 5 REPORT FOR THE COMMISSION?

- For the Suldal, the gathered information can be presented at different aggregation levels from natural boundaries (basin, sub-basin) to administrative units. Aggregation level will depend upon the EU decision on reporting requirement. Similarly, the Oulujoki waits for guidance from the CIS reporting group. No answer was possible for the Scheldt because work is still under way.
- For the Mosel/Saar information could be aggregated at water body scale, river basin or management unit. The final scale will take into account the clarity of the information to be provided
- Jucar will report results at the water body scale.
- For the Odense and the Shannon the scale of the GIS map will dictate the degree of aggregation. However, guidance on the EU requirement is needed.

QUESTION: HOW TO IDENTIFY SIGNIFICANT WATER MANAGEMENT ISSUES (ART 14.1 WFD)?

Jucar and the Scheldt are still investigating the issue of identification, while for the Odense this process will only be possible once the pressure analysis is completed.

- For the Marne PRB, the most significant problems linked with human activities are already known and have been identified independently from the WFD implementation. Similarly, for the Shannon some issues are known a priori, the human impact analysis will confirm a posteriori the significant issues in a consistent and transparent manner.
- For the Suldal, the major issue is the need of a tool for data collection and management, with the requirement that all data be linked to the River Network.
- For the Mosel/Saar, common modelling approach (PEGASE model) will be used on the whole international basin to asses (and to simulate) the impact of the point pollution sources (organic matter, nutriments), taking into account the diffuse sources (agricultural) as a background.
- Oulujoki has organised stakeholder workshop concerning this issue
- Odense underline that the most significant problems linked with human activities are already known, and have been identified independently of the WFD, during the national legislation since 1974. This is clearly mentioned in the Art-5-report Summary and conclusion, and is also to be extracted from the Odense ToR - answers. Odense also underline how management details related to all specific water bodies will first be identified through the water management planning

QUESTION:
CLARITY OF THE GUIDANCE

Suldal and Mosel/Saar gave answers to this question. For the latter, the shortcoming of the guidance is that no threshold is given for groundwater, and it is expected that the groundwater daughter Directive will remedy this. For Suldal, the guidance lacks clarity and could be improved in the link between IMPRESS and HMWB guidance. Suldal also requests to provide a better description of what the recommendations are concerning the assessment of the impact of different pressures.

GD: REFERENCE CONDITIONS

General issues

It emerges from the answers that the establishment of reference conditions for surface water bodies in the pilot river basins is at the early stages of the implementation due to different reasons. Firstly because the spatial based

approach seems a priori the most desirable way to proceed for PRB since it is the most direct, suitable and trustful of them, and so this method is applied whenever possible. But the main difficulty for its implementation, besides the requirement of infrastructure, depend on finding sites within basins for all the homogeneous regions (ecoregions) with no or very minor deviation from undisturbed conditions. Secondly because as a result of it, PRB have to use indirect methods as predictive models or temporally based techniques like historical data or paleo-reconstruction which are time-consuming to set up since they need to be calibrated and validated for each ecoregions and water body type they are created for. This has led to adopt expert judgement or the use of the practical pressure criteria approach as the interim last resorts in many cases, while the others methods are tuning. And finally because the final step of setting RC is the validation and the establishment of value for the boundary between classes will be established through the intercalibration exercise to be finished by the end of 2006.

Key issues

AVAILABILITY OF INFRASTRUCTURES.

The availability of infrastructure on expertise, databases, models and organisational structure is present in more or less extent in all River Basin, though its grade vary from basin to basin. The next conclusions can be drawn from the responses to the ToR.

Several PRB (e.g. Sudal, Odense) agree that while their infrastructure provide good level of information for the broad surface of the basin, there is a need for improvement in some parts of the basin because "...almost no data exist." or some type of information "is well known for major catchments, but not for small areas", or that monitoring network provide not enough information for small streams, and so on. Others PRB giving the intricacy of the subject have set up an expertise group for dealing specifically with the establishment of RC (Odense, Shannon and Scheldt)

There are a diversity in the use of the monitoring network, some PRB are using the monitoring network for surface waters which is run and established at level state (Neisse), while others is using its own network specially set up for the follow-up of its currently in force Water Management Plan in its territorial domain (Jucar).

The joint apply of models and land use coverage as a practical pressure criterion seems the more common and appropriated approach adopted by PRB for assessing the impact associated to pressures on diffused pollution (Oulujoki, Odense)

WATER BODY DELINEATION SYSTEM.

There is a common position of the majority of Pilot River Basins for all types of water bodies on the use of System B (Annex II, WFD).

Obligatory factors of system A are also being used as a regular basis for this matter, though some basins report there is a lack of information (e.g. in the Suldal basin depth data are not available for Norwegian lakes).

Some of the PRB (Jucar, Odense) are still deciding which factors of system B will use jointly with the obligatory factors of system A. For instance the Jucar PRB is conducting a spatial analysis technique for the defining and characterisation of ecotypes/ecoregions prior to the selection of the factors, while the Odense due to the abundance of relatively small waterways have proposed the use of special factors and tested an alternative typology in a particular sub-basin.

It is to note that some of the pilot basins (Shannon, Jucar) are doing the delineation of water types within the context of an ongoing national program.

Finally the Flanders part of the Scheldt basin reports that it has not been decided yet which system to use for lakes.

PRACTICAL PRESSURE CRITERIA.

From the answers it follows that the majority of basins are making use of this criteria in greater or lesser detail for the identification of reference conditions sites and the quality class boundaries. Yet, this is an ongoing activity and no final results are available for any basin.

In the Odense basin the criteria are used, and in

general about half of the river courses, 75% of the lakes and all the coastal waters are at risk to fulfil the good environmental quality in 2015, because of high impact of nutrients, physical disturbance and for the coastal waters also influence of hazardous substances.
On the other side is interesting the proposal adopted by the Jucar basin as a preliminary evaluation of reference sites that will use models for carrying a quantitative analysis of pressures and impacts, which produce a pre-ordination list of water bodies indicating the level of pressure.
Generally it may be concluded (Scheldt, Jucar) that the list provided by table 2 covers all possible spectrum of pressures, which lead to assessment of ecological impact.
On the other hand drawbacks were reported for the implementation related to:
Subjective interpretation and should consider also water quality trend criteria (Oulujoki),
Practical Pressure Criteria is "a useful initial screening tool but not a basis for reference condition establishment" (Shannon), and finally Not enough data to characterise all quality elements mentioned in table 2 (Odense).
In addition, the practical pressure criteria is been considered as a tool for risk assessment of failing to achieve the GES, as an alternative and parallel method than more direct and suitable techniques (spatial analysis, predicted modelling), but it is also clear by the answers that the method to put it in practice is still being developed (Suldal, Jucar).

SETTING REFERENCE CONDITIONS.

It follows from the answers that whenever possible the spatially based method is the most desirable option for the establishment of Reference Conditions (Suldal, Jucar, Oulujoki, Odense, Shannon, Scheldt). Nevertheless, two simultaneously conditions are needed for its implementation: enough monitoring data and sites with low pressure and impact.
Since usually one of the two conditions fails some pilot basins foresee the use of different techniques (indirect methods, paleo-reconstruction, regionalisations etc), but as a regular basis almost all basins agree in the use of expert judgement (Suldal, Jucar, Oulujoki, Odense, Pinios, Scheldt).
In particular the Pinios basin allege that due to the lack of biological monitoring data "RC will be based mainly on expert judgement", or in the case of the Scheldt "...in most cases using expert judgement".

VALIDATION

It seems from the answers that the process of establishment RC is in the early stages for all pilot river basins and no validation process has been carried out yet. Nevertheless some of the basins specifically point out that once the RC are set out, the validation practice will be done (Jucar, Shannon and Scheldt).

STATISTICAL TECHNIQUES.

The responses to this matter are quite similar to the previous one, it seems that is too early for this question since RC are not set yet. Anyway it seems that no pilot river basin is considering this technique useless in future implementation of WFD.

QUALITY ELEMENTS SELECTED FOR ECOLOGICAL ASSESSMENT.

Many of the PRB are not reporting this matter since RC are not yet established, nevertheless Suldal and Oulujoki basin give some biological quality elements as a reference (phytoplankton, macroinvertebrate, etc), while Jucar and Odense basin have not especially disregard any quality elements since the process of setting RC is being carried out and the natural biodiversity is high and "many elements are needed to ensure a robust classification".

SETTING CLASS BOUNDARIES.

Many of the PRB are not reporting this issue, only Oulujoki specifically states that will use the "a priori" method but only the phytoplankton data was sufficient enough to test the setting of the class boundaries. It seems that is too early for this question to be asked and should be addressed during the intercalibration exercise.

GD: COAST

General issues

The Pilot River Basins network has been established to test the Guidance Documents for the implementation of the Water Framework Directive (FWD). There are 15 Pilot River Basins (PRB) proposed to date and 8 PRBs, i.e. Jucar, Oulujoki, Odense, Pinios, Shannon, Guadiana, Tevere, Scheldt, had agreed to test the Guidance Document on Typology, Reference Conditions and Classification Systems for Transitional and Coastal Waters (COAST).

The report is based on the responses from the PRBs submitted through the questionnaire Terms of Reference (ToR).

This is a preliminary report as not all PRBs have completed this exercise (6/8 answers).

According to the PRBs answers, the GD is well written but there are three important aspects that could be improved:

Even though in the GD is stated that regular interaction with experts from other Working Groups of the CIS had occurred the PRBs felt that cross references and a common approach between GD 2.2 (HMWB, coastal part) and GD 2.3 (REFCOND) is not fully developed.

Concrete examples are needed on:

How to define the limit between transitional and coastal waters?

Which are the best practices?

The GD does not answer in how to establish Reference Conditions

Key Issues

DEFINING SURFACE WATER BODIES

There are several different responses to this question. The Directive defines coastal waters (Article 2(7)) as "surface water on the landward side of a line, every point of which is at distance of one nautical mile of the seaward side from the nearest point of the baseline from which breadth of territorial waters is measured, extending where appropriate up to the outer limit of transitional waters". This is the Jucar answer based on already national legislation (Decree 627/1976) and Oulujoki using GIS-based data. This is the first step as proposed for the hierarchical approach to the identification of water bodies, but then it is necessary to divide the coastal/transitional waters into types using factors listed in Annex II (System A and B). For example Odense and Pinios have chosen system B. Shannon is also using System B because this typology is largely being derived from a joint UK and Ireland typology for Ecoregion 1.

ASSIGNING COASTAL WATERS WITHIN THE RIVER BASIN DISTRICT

This assignation has been carried out following existing administrative boundaries (Jucar, Oulujoki, Odense, Pinios and Shannon). No problem of cross influence between river basins has been reported yet. However, there is no answer for the case of big watersheds as Guadiana and Scheldt where its influence may extend to boundary river districts.

COASTAL LAGOONS

The question of the ToR concerning the differentiation of lagoons between coastal and transitional has not been answered because there were no lagoons (Oulujoki, Odense or Scheldt) or because its identification has not been completed yet. A clear example is missing and could help other river basins on this issue.

COASTAL AND TRANSTITIONAL WETLANDS

The answers to the question concerning the association between transitional and coastal waters and wetland have been answered in different ways. Some PRBs like Jucar and Odense ensures a high degree of registration of wetlands, due to the national legislation and also because the wetlands are part of the Nature 2000 Network. Other basin, i.e. Pinios, Shannon and Oulujoki did not answer due to lack of data or not presence of wetlands in the basin.

DEFINING TRANSITIONAL WATERS

Several problems have appeared in this aspect.

Pinios and Odense have chosen to define only coastal waters. In the first case due to physiographic features of the river mouth whereas in the Odense because there is no a clear indication in the Guidance for what is meant by "substantially influenced by fresh water flows" in the WFD definition and the special salinity situation in the Baltic Sea. Oulujoki employed a mixture of the first three approaches suggested by the GD: using the boundaries defined under other European and national legislation such as the Urban Waste Water Treatment Directive (method 1), Salinity gradient (method 2) and Physiographic features (method 3). Jucar has still not identified their transitional waters but there is an study being conducted. The modelling method (method 4), was not use by any PRBs. Odense reports some critics to the GD especially in the lack of consistent quantitative approach.

SIZE OF TRANSITIONAL WATERS

The minimum size of transitional waters of 1 km2 suggested by the GD was considered useless. Shannon report minimum size of 0.1 km2 and maximum size of 124 km2. Jucar, Pinios and Oulujoki did not report with quantitative data to this question while Odense did not comment the issue for similar reasons as stated above.

DESCRIPTORS FOR TYPOLOGY/ OPTIONAL DESCRIPTORS.

Oulujoki and Scheldt did use the descriptors in the GD, but the Scheldt PRB did not consider the order as a ranking. Oulujoki introduced several modifications, i.e. 30m depth is high for the definition of shallow waters, they used 20 m instead; salinity 3‰ was used. Odense underlines that they applied the Danish national typologization proposal, which was launched before the GDs were prepared. This national legislation is comparable with the descriptor listed in the GD for system B and, based on this proposal, there are 16 types in Denmark of which 3 occur in Odense PRB. Jucar, Pinios and Shannon did not answer to the question.
No additional descriptors have been used in the PRBs.

REFERENCE CONDITIONS

About the methods used to define reference conditions all the PRBs answer that RC have not been established or that there is a problem with lack of data. Oulujoki could not apply the method a), b/ and c/, i.e. existing undisturbed site or with minor disturbance, historical data and models, therefore they applied the method d) expert judgement.
Odense reported that dynamic as well as empirical modelling has been used based on existing biological (macrophytes) data to establish some sort of reference conditions but further verification is needed since there is no a clear procedure to define RC in coastal waters. Being an agricultural catchment their main pressure is nutrient load on the fjord and hence simulation has been employed to study different nutrient loads on macrophytes biomasses (Ulva sp.). They also plan to use data from similar river basins for other types of biota. i.e. macrobenthos. Furthermore, they explain that the relationships between nutrient load and response in the marine ecosystem are poorly known for several variables, i.e. HAB, fisheries, priority substances, etc.

CLASSIFICATION TOOLS

Oulujoki and Odense were the only two PRBs answering to the question if any of the classification tools suggested in the Annexes were used. Odense report that the suggested tools are not applicable to Danish coastal waters, but some might be useful after adaptation to local conditions. Oulujoki has to adapt the methods because of highly different nature in Bothnian Bay.

CLASSIFICATION SCHEMES

There are also problems on combining all the quality elements into a single score. Again only Oulujoki and Odense answered this question. Oulujoki could use only chlorophyll a data whereas Odense stressed the need to keep the concept "one out- all out" since there will be only few variables well documented and measured for many marine ecosystems. They propose to use a running 6-year mean (which coincides with the EU reporting interval) instead

of the 5-years running mean they are using in Denmark.

GD: WATECO

General Issues

Pilot River Basins have not reported on difficulties in testing that could be linked to the content of the Guidance on Economics itself. The difficulties encountered seem to be more likely related to an overall lack of data or lack of methodology, particularly in the assessment of resource costs and environmental costs. In practice, most of the PRB seem to be at the beginning of their reflection on cost recovery assessment and evaluation of environmental costs.

To fulfil this gap, some further development could be useful for some specific issues. This could be addressed within the two Drafting Groups on Economics under the umbrella of Working Group 2B (Integrated River Basin Management), especially to the drafting group "environmental costs" created under the WFD CIS, which will give a common approach regarding the environmental and resource cost in the future weeks.

All reporting PRBs are currently involved in the data collection on water uses and water services. This data collection is well advanced in some PRBs. However in most PRBs, the analysis has not really begun concerning the repartition of costs between categories of users (cost recovery assessment). The methodologies for trend analysis have been set up or are being set up in most PRBs. For the cost recovery, lack of data on environmental costs and resource is often noticed. For the moment, no work has been done about cost-effectiveness analysis (except in Odense PRB).

Key Issues

Some specific key issues can be distinguished:

- a lack of data for the description of water services and water uses
- a lack of data for the assessment of environmental and resource costs
- cost recovery assessment
- trend analysis
- scale (for data collection, for analysis)

LACK OF DATA FOR THE DESCRIPTION OF WATER SERVICES AND WATER USES

A list of these water services and water uses are the basis for the cost recovery assessment. In general, PRBs have used the list provided by the WATECO Guidance but they mention problems of data availability.

- Public statistical data have been used (Somes/Szamos and Odense): For the Hungarian part of Somes/Szamos, a huge amount of detailed data has been collected for the characteristics of water services concerning water production, water supply, water demand, wastewater treatment, irrigation water supply, other services (storage, reservoirs). The water uses have been identified and will be characterised with a number of indicators concerning agriculture, industry, gravel and sand extraction from Somes, flood control. For the Romanian part of the Somes/Szamos, general socio-economic indicators have been collected according to Romania Statistic Annual (2001). Also data regarding the water uses and water services like water demand, water supply irrigation, flood protection and other services (storage, reservoirs) was collected from the National Administration “Apele Romane” (Somes Tisa branch) data base which are in charge which such kind of services. A large number of data regarding the water production, waste water treatment, was collected from the Local Councils. The Odense PRB used statistical information from the national Statistic Bureau.
- Existing public statistics need to be complemented: Some specific data provided by other sources are necessary (from water companies in Odense or Somes). Specific models and studies are used in Jucar, Marne or Tevere.
- The description of water uses has been more difficult than the description of main water services: Thus, for Odense, the description of water uses and the assessment of their economic importance has been a difficult task. The main water uses identified are households,

industry, public institutions, agriculture and nursery gardens, and leisure and tourist activities. There is in general a few data available, particularly for the agricultural sector, for which the Guidance document does not give suggestions or examples. In general, the water uses issues are less addressed in the Guidance than other issues. A similar difficulty is noticed in Romanian part of Somes particularly when looking at sub basin level. Some other lacks related to hydropower activities and material abstractions as well as some leisure activities such as hunting and fishing were pointed out in Marne.

- Links were made with the IMPRESS activities: The WATECO guidance indicates that internal private costs of services should be taken in the analysis where necessary. In the Marne process, it was assessed that "where necessary" would apply to services that have a significant impact on water status. As a consequence, this assessment was co-ordinated with the inputs from pressures and impacts. The French part of the Mosel Saar PRB underlines that works on economics and works on pressures are closely co-ordinated.

LACK OF DATA FOR THE ASSESSMENT OF ENVIRONMENTAL AND RESOURCE COSTS

The lack of available information about environmental and resource costs has been outlined by all reporting PRBs. Moreover, Tevere is considering that, at the present stage, cost recovery of environmental and resource costs can be noticed only indirectly.

To fulfil the gaps, PRBs used several types of methodologies for evaluating the environmental and resource costs.

- Simulation models: Jucar used simulation models both for evaluation of resource costs and environmental costs. The Flemish part of the Scheldt will also develop an environmental costs model.
- Expert judgement: For the Somes/Szamos, these costs have been evaluated based on the assessment of experts' panels.
- Economics methods: Marne uses a combination of three methods: current economic transfers from agriculture, industry and households towards environmental protection, assessment of willingness of citizens to pay for a better environment, assessment of costs for restoration (wetlands, river flow, treatment of pollution, etc).

Odense mentions that there is no comprehensive collection of data on environmental expenditure in Denmark because these costs are often integrated into changes in production process. Odense underlines also the lack of methodology to take into account subsidies and incentives to agriculture and the lack of suggestions / examples of the Guidance Document in this field.

COST RECOVERY ASSESSMENT

Pilot River Basins gave only few informations about the methodology they used for cost recovery assessment. It seems that most of them did not conduct these works to the end.

The work which has been done by the Somes/Szamos PRB (shared by Hungary and Rumania) should be especially underlined. Data for year 2000 have been investigated and collected for a number of indicators. But cross-subsidy between the different economic sectors (agriculture, industry and households) could not be defined. In particular, an interesting work concerning data on efficiency of water bills collection has been conducted with Water Companies.

Some PRBs (Mosel-Saar, Odense) are considering that annex IV- 1 of the guidance document is an excellent tool for calculating cost-recovery.

TREND ANALYSIS

For the Mosel Saar PRB, Rheinland Pfalz has not begun with the trend analysis. The French part will base its analysis upon past tendencies so to be able to forecast as much as possible the future tendencies. The list of indicators is not definitive but these indicators will concern the evolution of population, agriculture and industry. The Land of Saar will study the same indicators plus the environmental evolution and underlines that these evolutions will be quite unprecise due to uncertainty about climate change, technological improvements, globalisation and

therefore the impacts about the resource and water demand cannot be forecast.

For the Jucar it is not foreseen to conduct a trend analysis since this issue is not a competence of water administration but of the Ministry of Economics and its Departments in Autonomous Regions to which information will be requested.

The Somes/Szamos PRB is defining the methodology for the trend analysis. For the Hungarian part, an expert panel was established to identify the drivers. A qualitative description will be given for each driver in co-operation with the Romanian part. The Romanian part has evaluated the importance of the economic increase and the corresponding evolution of water demand and the necessary investments in water sector to meet the requirements of the European Directives. Also data regarding the water uses and water services like water demand, water supply irrigation, flood protection and other services (storage, reservoirs) was collected from the National Administration "Apele Romane" (Somes Tisa branch) data base which are in charge which such kind of services. A large number of data regarding the water production, waste water treatment, was collected from the Local Councils. They have then taken into account the regional developments tendencies in the main economical sectors but they face a high uncertainty with regard to the consequences of the restructuring process of economy to the market conditions that make more difficult policy projections.

Odense used the list of potential drivers provided by WATECO guidance and considers it is as a good checklist. The business as usual scenario was developed based on the statistical forecasts of population growth, the current water consumption level for each sector, the evolution of price elasticity and income elasticity, in order to have a forecast of the total consumption level. Losses in the pipes and unaccounted for water were also taken into account.

Marne has organised three meetings dealing with future studies to identify driving forces. Studies and forum were also conducted to determine the evolution of point source and non point source of pollution as well as the impacts on ecosystem.

After a first general analysis related to the characterisation of different water uses, Tevere is focusing on the geographical areas dealing with actual or future scarcity of water resources.

SCALE

- Scale for data collection: The scale at which data are available (or not) is an important issue. The Jucar reports that lots of data needed are not known at the level of the river basin and must be requested to other levels. For the Romanian part of Somes/Szamos, data about costs are available at the level of the entire Water Division and Water Management Systems and most of data concerning socio economic indicators are available only at administrative level (county). For water user characteristics, data are mainly available at district level and there is a lack of data at sub-basin level. Economic data are often available at an administrative level when technical data (pressures and impacts) can be collected at district level.
- Scale for analysis: Jucar considered two scale for analysis (Jucar and each one of the Agriculture and Urban Units) and will compare the results after aggregation. Somes/Szamos (both parts) succeeded in restructuring the available information according to hydrological boundaries and this provides high quality information but is very costly and time consuming. This was done using the publicly available statistical information and calculation of weight averages in proportion of number of population or geographical territory. For Odense, reporting on economic analysis and trend scenario were made at the Odense River Basin level but lower spatial scales have been investigated during the collection of data (municipal level) and have been aggregated at the Odense RB level. In the Mosel Saar PRB, the data were also collected at the lowest level possible (municipality) in order to use them at the level of the management unit / water body. The Marne PRB used mainly the district level but used the sub-basin level for the establishment of the baseline scenario. For the Scheldt, the economic analysis is assessed at the scale of river basin district and when possible some information can be provided at

the sub-basin or regional level. It is underlined that it would be really useful to have an assessment at the level of some water bodies but this is not possible on account of cost or data confidentiality. Tevere will provide an overall analysis for the entire basin; studies in depth will be focused on geographical areas for which a critical state of water resource (scarcity) will be assessed.

GD: TOOLS ON ASSESMENT AND CLASSIFICATION OF GW

General issues

Guidance document related to the assessment and classification of groundwater is focusing on the statistical methods and procedure to be undertaken in order to assess pollution trends and aggregate monitoring results.

This procedure was tested in the seven following PRBs:

- Denmark (Odense)
- Finland (Oulujoki)
- Spain (Júcar)
- Marne (France)
- Pinios (Greece)
- Tevere (Italy)
- Shannon (Ireland)

Key issues

The following key issues have been identified by the PRBs that responded to the questionnaire:

UNDERSTANDING OF THE TOOLS

- At this stage, the statistical methods proposed in the technical report of the WG 2.8 are not tested (Oulujoki PRB), being considered too complicated and difficult to use.
- The groundwater directive orientations are considered to be generally understandable (Odense PRB), although it would benefit from more illustrative examples. The choice of the arithmetic mean rather than the median has been questioned.
- The accompanying software GwStat is difficult to use with respect to converting data from other tools (e.g. Excel95) for calculating the representativity index and status, and other tools were used e.g. by the Odense PRB (MapInfo and Excel). GwStat could be used for studying trends.
- Marne and Pinios PRBs consider the description of tools in the guidance document is understandable even if in Marne some language problems appeared.
- In Shannon PRB, the applicability of those tools is rather limited due to specific geophysical conditions.

SPATIAL REPRESENTATIVITY OF MONITORING SITES

- Efforts for upgrading the groundwater level network in theJúcar PRB will enable to improve the assessment of the quantitative status of groundwater bodies, which represent one of the key issues of groundwater management within the WFD. This involves the establishment of new piezometers (measurement stations) and the full use of historical data.
- Waterworks in the Oulujoki PRB are focusing on monitoring groundwater quality especially in areas without any risk activities. Monitoring in the PRB will hence focus on two waterworks and one national monitoring station.
- The Odense PRB monitoring network will not be able to fulfil the requirements of the technical report of WG 2.8 with respect to the reprentativity index (0.56 in comparison to 0.80 required under the WG 2.8 report). Shannon PRB points on many gaps to fulfil all the requirements. Marne PRB focuses on the difficulty to ensure a spatial representation for each groundwater body.
- Pinos PRB considers they have no problems with the guidance document proposed procedure.
- Tevere PRB is checking if the specific criteria used to define the networks will ensure consistency with recommended procedure.

QUALITY DATA

- The monitoring of groundwater in the Oulujoki PRB (areas with low risks of pressures) is not adequate for a proper

assessment of groundwater chemical status.

- On the basis of the status description of the individual groundwater bodies, data availability and coverage are considered appropriate in the Odense PRB for the description of groundwater status, which is not the conclusion reached when using the representativity index for each groundwater body. This is due to the placement of some boreholes, which does not represent an ideal monitoring network. The removal of some wells would enable to comply with the requirement of a representativity index of 0.8 at the expense, however, of a far lower data coverage.
- The use of the quantification limit (LOQ) as stipulated in the GWD proposal may represent a difficulty for historical data for which it was not reported (instead a value of 0 was given).
- Marne, Pinios and Tevere PRBs are considering that available data can meet the minimum requirement of the tool whereas Shannon PRB is still examining data in the context of pressures and impact assessment.

TIME SERIES

- Monitoring by waterworks in the Oulujoki PRB would allow establishing trends for parameters such as nitrates, chloride, ammonia and conductivity but not for other parameters.
- In the Odense PRB, insufficient data collection would hamper a clear identification of trends. The GWD proposal does not describe how to deal with fragmented or temporally limited time series. The only attempt of trend study could focus on nitrates and chloride.
- Another problem noted in the Odense PRB is linked to the use of an average for the whole groundwater body and not to look for time series at individual locations. This aspect will be further discussed in the light of the negotiation process of the Commission proposal of groundwater directive.
- Marne, Shannon and Tevere PRBs are considering it is rather difficult to clearly assess the various trends whereas Pinios PRB is more optimistic even if this issue is still under consideration.

GD: PUBLIC PARTICIPATION

General issues

1. On the one hand PRBs that seem to judge the PRB-exercise too early for stakeholder and public involvement, on the other hand PRBs that started the active involvement at a very early stage in a satisfying way. No clear explanation for the reasons to take the first or second position. Yet, the more hesitant attitude towards public participation seems to be dominant (only 2 of the 9 PRBs testing the PP guidance started early in the beginning with involvement).
2. The little 'real' experiences with participation make it difficult to draw firm conclusions from the pilots. PRB exercise gives some examples to lean on.
3. A thorough stakeholder analysis at the beginning of the process is helpful, together with an analysis of their positions (in this process the stakeholders optimally are involved). It helps in managing the expectations, but at the same time plans might be adjusted at a very early (and therefore easy to perform) stage (e.g. Ribble changed from virtual to 'real' testing after comments from stakeholders).
4. At this stage, PRBs feel little need to involve the 'general public'. Stakeholders are the first priority.
5. Stakeholders are involved through direct contact, or via intermediates like a 'stakeholder forum'.
6. The expectations of stakeholders towards the implementation of the WFD can be high. Some PRBs make the formal margins in which they operate very clear from the beginning.
7. What's the use of the Internet? On the one hand, PRBs see it as 'involving the public', on the other hand, PRBs realise that it's a 'public place', but no guarantee that the public will find or use it.
8. No PRB seems to have developed a method of giving access to background documents.

Key issues

SCALE ISSUES; PP APPLIED AT WHICH SCALE?

Stakeholder analysis; how to guarantee that no stakeholders are missed?

- Stakeholder analysis performed by the project team/competent authority
- District and basin level analyses were undertaken. For this approximately 50 regional and local external and Agency partners have been put together in a group called the Stakeholder Forum. They have undertaken an exercise to put in priority order the stakeholders that need to be involved (stakeholders themselves determine whether parties are missing)

What techniques were used to contact the stakeholders? (direct contact via a stakeholder board)

- Directly addressed to stakeholders, in combination with attention in regional media (Oulujoki)
- Fyn County has established a homepage for the Odense Pilot River Basin through which members of the public can learn about the progress and nature of the project. The homepage address is: http://prb.fyns-amt.dk From the homepage it can be seen, for example, that two advisory boards were established in spring 2003 – a National Scientific Advisory Board and a Regional Political Advisory Board. These two boards have different aims, but among other things shall help ensure that public interests are incorporated in the coming management plan for the Odense River Basin.

What techniques were especially useful (at which scale?)

- Internet
- Bilateral meetings, workshops of approx 12-15 people and presentations at larger gatherings

How to organise the comments between the different scales?

- No comments

GENERAL PUBLIC; HOW INVOLVED WITH WHAT EFFECT?

- Website
- Not yet developed; only for raising awareness of the WFD
- Lack of willingness of the public to participate, and no history in PP within the country
- Too early in the process to analyse the effects
- Public not involved. Our Stakeholder Forum is happy that the public is too wide a group to be involved in everything – yet.

MANAGEMENT OF EXPECTATIONS

- The role of stakeholders is regulated by legislation.
- A broad public has huge expectations on implementation of WFD. In order to prevent disappointments the participants have been informed of their role, of the content and meaning of WFD and of the frame in which changes in practices at local level can be waited.
- The regulation of the International Commission of the Scheldt determines that representatives of NGO's can be involved as observers. This involves that NGO's can make suggestions but that they can't vote nor make decisions. Expectations are managed as follows

1. The Communications Plan sets out the role of the directive and the project.
2. Expectations form a major risk in or project. The risk register is reviewed monthly and actions to reduce them are actively pursued.
3. Work wil be done to develop with priority regional and local stakeholders (governmental and NGO) a basin "vision" describing what they wish to see happen in the basin. This will be used to align as far as possible these aspirations with the directive and to manage expectations of what can and cannot be delivered.

TIMING

Two opinions seem to be predominant:

- Once the scale of the process has been finally established (now it is only temporarily) the

process designed will provide all the appropriate information on the implementation to the stakeholders with the maximum possible anticipation.
- In order to improve social learning and create co-operation networks, every party should be involved in the beginning of the process. Local actors at local level, regional actors at regional level etc. Parties that are needed in the successful implementation of WFD must be involved in the beginning of the planning process.
- In general: in the beginning of the project only the directly involved public (administrations, NGO's) a determined group, once the project is developing informing a broader public.
- The visioning work with the priority stakeholders (see above 2.9-5) is good at this early stage. We need to manage expectations right from the start. Later, when we start planning individual actions, participation will be more focussed around what can be done and who needs to pay.

MANAGEMENT OF COMMENTS

- Collecting comments by feedback forms, by writing down the comments and suggestions given in face-to- face meetings or by phone. Number of responses in two local meetings: over 40 feedback forms and several face-to-face comments; in addition: dozens of comments in information meetings, in seminars, in expert meetings, in project team, by phone etc. No systematic approach for giving feed-back on the comments has been established but responses have been taken into account e.g. by arranging meetings which have been wanted
- We have set up a web site for the project and an email address. This is carefully managed. We have regular team meetings to ensure key messages are fed back in to the project.

INFORMATION SUPPLY

- No PRB understood this as 'access to background documents'.

EVALUATION

- Not developed yet

KEYS TO SUCCESS

We hope that early engagement, especially of NGOs is very important. Many of these groups have specific issues they want addressed. If you wait too long in the implementation before engaging them then you run the risk that they will object to what you are doing. It is far easier to build a positive relationship with stakeholders with time and when they understand the constraints you are working within.

SUMMARIZED EXPERIENCES OF THE PRBS WITH GDS, PHASE 1B

GD: HEAVILY MODIFIED WATER BODIES

General Issues

The Pilot River Basins network has been established to test the Guidance Documents for the implementation of the Water Framework Directive (FWD). There are 15 Pilot River Basins (PRBs) proposed to date, 12 of which (Cecina, Guadiana, Jucar, Marne, Moselle/Sarre, Oulujoki, Odense, Pinios, Scheldt, Shannon, Suldal and Tevere) have agreed to test the Guidance Document on Heavily Modified Water Bodies (HMWB) and Artificial Water Bodies (AWB). This report is based on the responses submitted by the each PRB through the questionnaire Terms of Reference (ToR). Not all PRBs have yet completed the testing exercise (6/12 answers), thus results reported should be regarded as preliminary.

From individual PRB replies to the ToR it can be inferred that the HMVB GD is well written but there are few issues that need further clarification. In particular, the steps in the procedure for "Identification and designation of HMWB and AWB" are sometimes not entirely clear, or more specifications for the carrying out of individual steps is needed:

it is felt that steps 3 and 4 should actually be regarded as one step;

steps 5 and 6 do not offer clear distinction between changes in hydromorphology and physical alterations;

- the criterion to establish thresholds for hydromorphological alterations to WBs in order to assess substantial changes in character has not always been sharply defined, especially in those PRBs where the same hydromorphological alterations are very common (e.g. dams, weirs, channeling, etc);
- some difficulties arise in the identification of AWB, as the definition set in the GD is felt to be limiting or insufficient in some cases;
- no clear concept of MEP and GEP for AWB is available at the moment.

Considering that very likely PRBs are doing are applying extra means and resources for this exercise than the average basin will do in the real WFD implementation, it can be inferred that these unsolved or undefined issues should be tackled by MS or Competent Authorities, and the subsequent guidance should be developed at national, regional or even local scale, to render implementation of the process more straightforward and clear-cut. As a matter of fact, those PRBs that advanced further on the identification of HMWBs have tailored the procedure set in the Guidance to their particular characteristics and needs.

However, it must be noted that most of the PRBs answering the questions from the ToR document are still at the stage of HMWB identification (i.e. only the Odense PRB has proceeded further that step 6 in the mentioned procedure), although all of them have integrated and developed the steps prescribed in the procedure. It is likely that many issues that are currently uncertain will be clarified once properly tackled.

Key Issues

AVAILABILITY OF INFRASTRUCTURES

It is generally felt at this stage that infrastructure availability in terms of expertise, data availability, tools and organizational structure is quite adequate in all PRBs that have already started testing the HMWB GD.

In-house expertise (from local WB authorities) or expertise at national level has been recruited for the purpose of the exercise or was already in place as part of the local/national task-force for water body management and protection. In the case of the Scheldt PRB (transboundary waters) a panel of national experts from each of the countries involved has been specifically appointed

for the purpose of the exercise. Such expert panels have been formed in all PRBs, independently of the status of information basis and the infrastructure, or the WB characteristics. However, the concern arises that such panels may not be available after completion of the exercise and will not be of direct assistance for ordinary basins in the real implementation, which could be a shortcoming.

Meteorological and hydrological databases with adequate time series for characterization of the WB were in all cases readily available (only in the case of Scheldt a considerable effort had to be made to recover dataset from institutions of different countries), as all of the PRB had monitoring networks and gauging stations already in place, in particular at those points where large infrastructures are present (e.g. dams, hydropower plants). GIS support is available at all PRBs. However, some difficulties were encountered in the availability of data related to biological and ecological quality (Oulujoki and Scheldt PRBs), morphological changes (Oulujoki PRB had to recover information sifting in some cases through huge amount of documentary material), economical data (Odense PRB, for further development of the exercise to step 7, were evaluation of consequences on the wider environment is required).

Some PRBs have modelling tools available, as a result of routine activities on the PRB or especially set up for the exercise.

Organizational structures were already in place (local watershed authorities, International Scheldt Commission) or especially set up for the exercise (Jucar PRB).

PRACTICAL QUALITATIVE "PRESSURE CRITERIA"

The questions posed in this section relate mainly to Step 6 of the procedure for "Identification and designation of HMWB and AWB". However, some of the PRB have commented on all the steps carried out insofar (Marne, Scheldt PRBs), as the procedure outlined in the GD on provisional identification of HMWB has been tailored to individual needs (not all PRB have simultaneously surface WBs, transitional WBs and coastal waters) and existing procedures in each PRB. It must be noted that not all PRBs have been able to test all the steps of the procedure yet, due mainly to difficulties in identification of Good Ecological Potential and Maximum Ecological Potential standards, as well as Good Ecological Status. Such delay arises from the complexity of establishing relationship between the alteration and the associated impact on the WBs when taking into account hydromorphological pressures only, that is, the comparison between ecological status in the absence of alteration and the ecological status after an alteration in the WBs due only to hydromorphological pressures, since WBs are also subjected to others types of pressures as a regular basis.

In general, mixed opinions have been collected about the exhaustiveness of the lists of pressures and impacts presented in Table 1 of the GD; some PRBs felt that the list was well compiled (Jucar PRB) but had to be somewhat adapted to individual cases (Odense, Suldal PRBs) or given a more quantitative cut (Scheldt PRB). However, the value of the list as good starting point for setting more precise criteria has been generally acknowledged.

A more difficult task is to separate the impacts of individual pressure factors and pinpointing the cause for failure to reach GES. It is clear to all PRBs that physical-chemical water characteristics deriving from diffuse or point sources cannot be taken into account in the definition of HMWB, and only changes due to altered hydrology/morphology can be taken into account. However, clearly separating the effects of hydrological or morphological alterations on WB physical-chemical quality, from those due to agricultural or other activities may not be possible. For example, it is difficult to separate between individual impacts of water abstraction for different purposes; determining the impacts of hydrological alterations on fish stock characteristics may also be unfeasible if strong fishing activities are also present (Oulujoki PRB). The Marne PRB notices that assessing morphological impacts is extremely difficult, especially in those cases were little to no data/documentation exist. Sometimes intercalibration is not possible, as no WBs with similar characteristics are available for definition of GES.

STEPS OF THE HMWB AND AWB IDENTIFICATION AND DESIGNATION PROCESS

It is generally felt that there is sufficient coherence between the HMWB and other GDs. However, it has been duly noticed that all GDs should have a common glossary of terms (Scheldt), and terminology should be more precise: e.g., hydromorphological changes are not defined so as to be clearly distinguished from physical alterations, and a more accurate definition of significant versus substantial change would be helpful (Odense).

Provisional designation (step 6) is almost complete for all responding PRBs. Although changes in hydromorphology on WB have been identified, the decision on setting limits has not been taken (either for a single or a combination of hydromorphological variables) to establish when a change in character of the WB is taking place. The Suldal PRB has developed several indirect criteria e.g. lake water level raised more than 10 meters, winter temperature always above + 1 deg C as a first screening to identify candidates to HMWB. Low or slight thresholds on hydromorphological pressures may lead to designating a great percentage of surface water network as heavily modified (e.g. Jucar PRB), which is an outstanding decision full of consequence. In particular, some PRBs (e.g. Oulujoki and Suldal) have tailored a provisional designation procedure taking also into account indications given in the GD. However, it has been noted that steps 4 and 5 could be easily combined into one step (as the Suldal PRB has done). Furthermore, it has been noted that all watercourses in Europe have been subject to substantial hydromorphological modifications since remote times, so that it is difficult to set the ground for assessment of GES or MEP and to identify natural water bodies for all cases, to help in such assessment. The Odense PRB noted that upper part of water reaches would be difficult to treat if culverted/piped or strongly channelized/deepened. Implementation of step 5 is deemed to be difficult because the identification procedure is not entirely completed and databases have not been completed for all PRBs.

It is also foreseen at this stage that advancement beyond provisional identification of HMWBs will be difficult, as steps 7 through 11 will be the result of technical as much as political evaluations (Odense PRB and Suldal PRB). GES, MEP and GEP are not yet clearly and precisely assessed for all PRBs; in particular the Oulujoki PRB commented that magnitude of restoration measures is not clearly defined in the GD and too much room is left for subjective judgment. Moreover, MEP and GEP are felt to be not too different from each other in those WB that have a very high degree of alteration and where most attenuation measures have already been applied. The Oulujoki PRB gives the example of fish species for which the effort of restoring river continuity for migration is useless if most of the spawning areas have irreparably compromised. The assessment of disproportionate costs, as required by step 8, is also influenced by political inclinations. The Odense PRB suggests that more specifications about the technical and economical evaluations be provided in the GD, to avoid the influence of political subjectivity on the outcome of the exercise.

No derogations have been taken into account so far in any of the participating PRBs.

ARTIFICIAL WATER BODIES

It is generally felt that the biggest challenge is to distinguish between natural water bodies, were and if those are present, and other types of water bodies. The criterion for distinction between HMWB and AWB is clearly stated although not agreed upon by some PRBs (e.g. Odense, Oulujoki PRBs). All the same, some doubts for distinguishing between HMWB and AWB arose within the exercise when establishing thresholds to the size of a pre-existing water body that was located on where now a water body exists as a result of human action.

INTERCALIBRATION OF HMWB AND AWB

All PRBs are still not enough advanced in the procedure to comment effectively on this point. Nevertheless, answers indicate that this exercise will depend on the final percentage between HMWB and natural WB present and which is the dominant type of water, after conducting the designation process within PRBs.

GD: INTERCALIBRATION.

General issues

The Pilot River Basins network has been established to test the Guidance Documents for the implementation of the Water Framework Directive (FWD). There are 15 Pilot River Basins (PRB) proposed to date and 6 PRBs, i.e. Guadiana, Jucar, Odense, Pinios, Scheldt, and Tevere, have agreed to test the Guidance Document "Towards a guidance on establishment of the Intercalibration network and on the process of the Intercalibration exercise" (INTERCALIBRATION).
The report is based on the responses from the PRBs submitted through the questionnaire Terms of Reference (ToR).
This is a preliminary report as not all PRBs have completed this exercise (2/6 answers).

The Intercalibration guidance focuses on the establishment of the intercalibration register in 2003-4. This process is carried out by the Member States simultaneously with the work in the pilot river basins. The guidance document contains few issues that are suitable for testing in the pilot river basins. This is also reflected in the low response of the pilot river basins to the issues raised. From the six PRB's that wanted to address intercalibration, only two (Jucar and Scheldt) answered the questions related to intercalibration.

Key Issues

1. SELECTION OF SITES FOR THE INTERCALBRATION NETWORKJ

QUESTION : Is it possible to develop agreement / a common view on reference conditions and class boundaries, as a basis for the selection of sites for the IC-network?

The Jucar and Scheldt PRB both stated that at this stage such agreement does not exist. Because of this, the site selection can initially only be done at a national leve, while the common view should be the outcome of the intercalibration process. These conclusions are in line with the progress of the intercalibration process to date.

2. TYPOLOGY INCOMPATIBILITY

QUESTION : How was dealt with the fact that MS do not use comparable typology systems?

Both Jucar and Scheld PRB recognise that MS use different typology systems, but stated that this issue was not relevant at the river basin scale.
It can be noted that in the intercalibration process this issue has been addressed in 2003-4 by identifying common intercalibration types shared by different member states within 'geographical intercalibration groups'.

3. DATA AVAILABILITY

QUESTION : Is it possible to carry out an IC-exercise based on limited data (e.g. some quality elements only or focussing on specific pressures only)?

The Scheldt PRB states that at this moment it is impossible to work out a common view on reference conditions and class boundaries as a basis for the selection of sites, and that sites can only be selected at a national level at this stage.
The Jucar PRB states that it should be possible to develop a common European view, but that this depends on the development of the IC exercise.
Nevertheless, MS must do the selection of sites included in the IC network and that may mean different interpretations of the normative class boundary definitions. Hopefully, the outcome of the IC exercise will make consistent and agreeable the class boundary system finally adopted.
It can be noted that WG2A Ecological Status reached similar conclusions, and that it is expected that in the autumn of 2004 a new guidance document will be agreed setting out the further intercalibration procedure.

GD: MONITORING

General issues

The Pilot River Basins network has been established to test the Guidance Documents for the implementation of the Water Framework Directive (FWD). There are 15 Pilot River Basins

(PRB) proposed to date and 11 PRBs, i.e. Cecina, Guadiana, Jucar, Neisse, Oulujoki, Odense, Pinios, Scheldt, Somes/Szamos, Suldalsvassdraget and Tevere, had agreed to test the Guidance Document on Monitoring under the Water Framework Directive (MONITORING).
The report is based on the responses from the PRBs submitted through the questionnaire Terms of Reference (ToR).
This is a preliminary report as not all PRBs have completed this exercise (7/11 answers).

According to the PRBs answers, the GD is well written but there are several important aspects that are missed:

- The issue of monitoring in HMWB for whose the environmental goal is to achieve "good ecological potential" is not addressed in the GD.
- A link between the knowledge of the impacts and the conditions to be monitored in the surveillance-monitoring chapter could have been done.

The need for integrating several monitoring networks to achieve a cost-effective use of resources is a current issue in all PRBs. This includes not only protected areas, bathing and drinking waters but also the need to integrate the monitoring programs for surface and groundwater bodies.

Key Issues

DEFINE WATER BODIES AND SURVEILLANCE MONITORING

In general the PRBs consider that Art. 5 has allowed the identification of surveillance monitoring needs. In some cases, for example the Jucar river an improvement in the monitoring network for surface as well as groundwater seems necessary whereas in other cases, for example the Odense, the existing monitoring network seems adequate to meet the WFD requirements with the exception of hazardous substances where the existing network is inadequate to calculate loading into the water bodies. In the Oulujoki a new WFD compliant surveillance monitoring procedure has been defined based on Art. 5 analyses. Suldal PRB consider that for groundwater bodies the size of the drainage area connected to them should be considered in the characterization work, since this is an important parameter for assessing the magnitude and effects of the pollution sources. Member states should also adequate the monitoring in case of parameters not included in the WFD when relevant as in the case of Norway that has introduced bacterial pollution and cooper (Cu) in mining areas. Furthermore, in some cases historical data is available and this has to be used as starting point for defining/improving the compliant WFD monitoring network.
Concerning the relationships between monitoring and reference conditions, still there is not a complete set for all water bodies defined in the PRBs but a considerable improvement has occurred since Phase 1a. The main problem being the absence of biological information. This has been deal with several approaches. For example Oulujoki and Suldal use reference sites in the same ecoregion, whereas in the Jucar a two phased analysis has allowed the definition of 12 reference conditions from the 15 ecotypes established. In Somes/Szamos, REFCON was not tested during Phase 1a (Art. 5 report) and, hence, the development of a monitoring network is still not delineated.
In Tevere River Basin the surveillance network seem to fulfill WFD requirements but they face a singular problem with lakes. The typology volcanic lakes in this basin seem not match with other similar water bodies of another MS in the Mediterranean Ecoregion. This means that those lakes will be not included in the intercalibration exercise but they must reach the environmental objective. In other words there are national typologies that cannot be compared within MS.

WATER BODIES AT RISK

The Surveillance Guidelines do not specify the kind of monitoring necessary for HMWBs which is important for several PRBs, e.g. in the Suldal there are 54 potential HMWBs identified and in all Norway around 2000 HMWBs at risk. Based on the high number of HMWBs probably at risk and the fact that these have many common characteristics, the following generalization has been suggested

Group	Need for monitoring
Dried-out tributaries below tunnel inlets (hydropower)	Normally not
Rivers with reduced water discharge all year/parts of the year.	Normally yes. Some river reaches have instructions of minimum flow with additional requirements for operating hydrological measuring stations. This existing operational monitoring will be used together with the principle of representative locations and dose-response relations.
Reservoirs (hydropower)	Water level is already being monitored in the majority of Norwegian reservoirs.

Tevere has proposed that rivers, that for natural reasons, have not water flow during more that 120 days every year should not be monitored. This is a typical situation in the Mediterranean arc that should be considered.

On the question relating the lack of information and the need of a more extensive surveillance there are several opinions. Jucar PRBs considers that this will be the case, at least during the initial stages if the implementation and in the years 2006 and 2004. On the other side the Suldal PRB considers that if the existing documentation does not show appreciable impacts then surveillance monitoring is not necessary (provided trend analysis and reference conditions have been identified). A self-explanatory table summarizing their suggested approach is shown bellow:

Information and data on the impacts exist (+) or not (-)	Additional information and data on water body exist (+) or not (-)	NEED FOR SURVEILLANCE MONITORING?
-	+	Only if existing data show an actual need
+	-	Only if there is a sound reason to suspect a problem
-	-	Yes – but lacking data may also mean that there are no problems e.g. no environmental pressures present.
+	+	No. In this case there is a need for operational surveillance.

INITIATION OF MONITORING PROGRAMMES

Most of the existing monitoring programmes in PRBs does not meet the WFD requirements, however they are useful for obtaining the necessary relevant information to design a WFD compliant monitoring programme. On the other side, it has not sense to dismantle the existing networks to build a new one from scratch. Therefore, a compromise between the existing networks and WFD network is the optimal solution. Concerning the initiation of the WFD monitoring programme, Odense PRB consider that surveillance should be initiated as soon as water bodies at risk have been identified, i.e. 2004, whereas Oulujoki consider that budgetary constraints are the main factor in determining when to start. and Suldal PRB will until 2006 give priority to make available existing monitoring before supplementing the monitoring programmes.

Jucar has prepared a phased approach with the development of new surface and groundwater monitoring stations to arrive to 2006 with a fully operational network. Similar approach is followed in Somes/Szamos. All PRBs agreed that in terms of biological parameters the existing monitoring programmes are insufficient.

CHOICE OF LOCATION FOR MONITORING STATIONS

Is generally agreed between PRB that the number of monitoring locations should depend on the complexity of the impacts and on the amount of available information. Transboundary river basins, e.g. Somes/Szamos, have emphasized the need for monitoring bordering WBs and bilateral agreements for sharing the monitoring data.
Tevere remarks that in any case, at national level, monitoring programmes will include catchments lower than 2500 km2 and that this aspect will have an impact on the results of the Reporting working group. The guidance dimension proposed in the WFD will suggest to MS to report only for water bodies with a catchment over 2500 km2!
Another point about the reporting obligation made by Tevere is how to integrate the WFD Reporting with the EIONET reporting?

MONITORING IN PROTECTED AREAS

There is a general need to achieve integration between the different monitoring programmes which are carried out at different levels. For example, in Oulujoki PRB, the Ministry of the Environment is in charge of monitoring in protected areas. In Norway, drinking and bathing waters are already monitored according to the relevant directives. Good links between various directives are important, especially in terms of monitoring. In Jucar PRB there is a monitoring programme for drinking water abstraction in the principal metropolitan areas. With the implementation of the WFD it would be auspicious if a further integration of monitoring programmes is developed for using the resources as cost-effectively as possible. In Italy the Ministry of Environment is in charge for WFD and also Protected areas issues but monitoring of drinking and bathing watesr is a matter for the Ministry of Health.

GD: PUBLIC PARTICIPATION IN PHASE 1B OF THE PRB EXERCISE

The guidance document on public participation was supposed to be tested on the following 10 PRB: Odense, Oulujoki, Marne, Scheldt, Pinios, Jucar, Tevere, Cecina, Suldalsvassdraget and Ribble. 6 PRB submitted responses based on the questionnaire Terms of References.
It emerges from the answers that PRB are at various states of progress in public participation. It is also obvious that the active involvement of stakeholders is in general more developed than the consultation of the broad public. This is mainly due to the different steps of the WFD implementation process specified in Article 14 of the WFD and the CIS "Public Participation" Guidance document. Indeed, an active involvement of the interested parties is required from the beginning of the implementation process, while the broad public is to be consulted on clearly specified documents, which are still being performed (definition of the timetable and the work programme, definition of the key issues, project of management plan).
However, even if responses are quite mixed, it appears that PRB are making efforts to enhance the participation of stakeholders and are developing actual communication tools specifically dedicated to the broad public.
It is obvious that this issue will have to be further accounted for during the next WFD stages. RBD will have to take advantage of the successful experiences and tools developed by some PRB in order to carry on improving stakeholder involvement and going on initiating consultation of the broad public.

SCALE ISSUES

Most of the PRB have built up a stakeholder analysis at the RBD level (Scheldt) or PRB level (Ribble, Jucar, Marne). This analysis often involved the competent authority (Oulujoki, Scheldt), jointly with some stakeholders (Ribble, Jucar).
Brainstorming, questionnaire surveys, notifications by email were mainly used in order to conduct this analysis. Several PRB have gathered the information in databases, to be updated during the implementation process. Some PRB admit they cannot totally be assured that no stakeholders are missed. However, they develop ways of improving their database continuously.

Emails, organisation of and invitations to presentations, newsletters have been the more

general communication tools being used to contact the interested parties. They have been considered as the most effective tools at the 'used' level. Telephone and personal contacts have also been reported by some PRB.

Oulujoki pointed out the usefulness of local meetings. Scheldt has organised periodical meetings in order to build up a common and coordinated strategy and make sure that the transmission of reactions from the local scale to the international scale takes place. Marne has involved the interested parties through the existing sub basin committee, taking place once or twice a year. However, the limited number of reactions showed that documents had to be simplified in order to be more understandable and workable.

Ribble has worked in close link with a stakeholder forum (comprising approximately 50 individuals coming from key partner organisations), helding regular meetings to consult and explain how the process relates to national and international implementation.

Odense has involved NGOs in the testing exercise through several meetings and workshops, enabling a good collaboration with the county of Fyn.

BROAD PUBLIC

At this stage, most PRB have not directly included the general public yet. However, some actions have been carried out by some PRB. Thanks to a perception survey, Ribble identified the views and opinions of a sample of the general public living in the basin and assessed the level of interest in water management, in parallel with 'Vision Building Events', gathering members of the public interested in WFD implementation. Oulujoki also opened two local seminars and one regional seminar to the broad public. Focus groups were organised in Marne (and in other 14 French sub basins) during the second half of 2003, in order to specify views of the broad public on water management. Results of this first consultation are expected to help improve and adapt the information dedicated to the public, considering needs and current misunderstandings expressed during the discussions. In particular, the necessity to release legible documents has been underlined.

In almost all cases, web pages have been developed in order to involve the general public (Jucar, Scheldt, Odense). Further actions are foreseen during the next stages of WFD implementation. Jucar is preparing summaries of Article 5 analysis, articles, leaflets and a booklet, dedicated to the general public.

Scheldt also focuses its communication actions on the press, considered as an intermediate between the PRB and the public, the press being able to transfer the information to the public at a larger scale.

However, effects of involving the general public are still difficult to estimate, due, for instance, to the limited actions dedicated to the broad public. Marne notes that the characterisation is carried out at the level of the RBD. This level makes it difficult to involve the broad public at a very local scale for this first stage of the WFD implementation. Nevertheless, public consultation is foreseen for the next steps, and will also involve NGOs and local authorities.

For PRB that already developed specific actions, effects have been encouraging. Ribble has been able to evaluate the level of interest of the broad public and to point out the logistic support required by local environmental NGOs. Oulujoki noted an increasing awareness of WFD issues, thanks to seminars provided.

MANAGEMENT OF EXPECTATIONS

It emerges from the answers that expectations can be managed during appropriate meetings especially dedicated to stakeholders.

PRB have dealt with these expectations by assuring adequate information on the roles of the different parties, the content and the meaning of the WFD as well as on the frame in which changes can be expected. The main challenge has been to keep a high level of stakeholder involvement, making clear from the beginning the rules of participation and consultation. Some PRB want to avoid disappointments and misunderstandings on the WFD implementation process and consequently try to provide stakeholders with regular and updated information on the state of play.

TIMING (WHEN TO INVOLVE THE INTERESTED PARTIES)

It appears that the way of targeting interested parties in each implementation step of the WFD mainly depends on the nature of the issue and the type of stakeholder (local, regional, national, degree of involvement of each stakeholder for each issue addressed). In general, PRB report that the nature of the issues defines the interested parties to be involved.

Jucar has also decided to assign, in a flexible way, specific subjects to stakeholders listed in a database. Marne is focusing on the next steps, as regards the identification of the key issues and the definition of the work programme. Consultation of general councils, regional councils, regional economic and social councils, and council assemblies will take place on these matters during the second half of 2004. The broad public will be consulted on the same issues from April to October 2005.

MANAGEMENT OF COMMENTS

For the time being, comments of the public have generally been collected through websites but many PRB also value conclusions and results of meetings taking place at local, regional and/or national levels. Written comments are also taken into account. Ribble has required consultees to submit comments in limited ways, either by annoting a hard copy of the document or by completing a standard Quality Review form.

The number of responses directly depends on the nature and the scale of the events being organised.

In general, the responding public have not been provided with individual feed back. All PRB have found it more appropriate to provide the public with information on how their contributions have influenced the project. The output released can be an outcome of the consultation, a description of what is to happen next, newsletters and updated site, new meetings provided.

Odense also intends to turn its website into a debate forum at certain periods especially during the preparation of the programmes of measures.

INFORMATION SUPPLY

- Seminars, meetings (local meetings, expert meetings, working groups, …)
- Presentations
- Webpages, websites
- Newsletters
- Technical reports (to specialists and small audiences)
- Telephone
- Access to background documents
- Information center
- Intended by Jucar PRB: announcements in Town Halls, televisions, news and feature programmes, press
- Informal chats

The investment in time and money varies considerably from one PRB to another. PRB have spent 1 to 15 months for information supply. Financial expenditures related to this supply have been estimated from 100 000 _ to 210 000 _.

In order to improve this information supply, Ribble has offered the opportunity for stakeholders to form additional discussion forum and technical groups. Indeed, presentations and chats have often been considered as the most effective means in providing information. Combining this organisation with request for written comments is also recommended.

Marne highlights the necessity of disseminating information on water management and aquatic environments, due to the significant lack of knowledge emerging from the focus groups and opinions pools. This communication is to be carried out at different levels: the national level, the RBD level and the sub basin or local level through actions supported by local organisations.

EVALUATION

It seems that tools for evaluating the process are still under development. However, some PRB (Scheldt) have already asked an evaluation of their workshops and seminars to participants in these meetings. Ribble also asked to HarmoniCA an independent evaluation of the efficiency of its work on public participation.

KEYS TO SUCCESS

One of the main keys to success is to assure the involvement of stakeholders at the early stage of the process, as capacity building is essential and stakeholders need time to learn and understand the WFD implementation process. Clear, accurate and updated documents and messages are needed in that purpose. Oulujoki also noted the need to increase the participation of NGOs particularly in sparsely populated areas.
Access to sufficient economic and human resources also seems to be an essential condition in order to guarantee the success of the process, as public participation is considered time and effort consuming.
In any case, actions already carried out on public participation have been considered very enriching by PRB, for the WFD implementation process.
PRB often obtained new information that was interesting for management, even if they have not undertaken RBMP yet.
Many PRB have also underlined the opportunity given by public participation to learn from one another, leading to an actual "social learning".
From now on, PRB will have to focus their next actions on the consultation of the broad public, whilst enhancing their efforts on stakeholder involvement.

GD: IMPLEMENTING THE GEOGRAPHIC INFORMATION SYSTEM (GIS)

Implementing the Geographic Information System (GIS) elements of the Water Framework Directive presents the common understanding on terms and on the role of GIS in the WFD. It also specifies the maps that must be reported to the European Commission and when, the different GIS layers those make up these maps, the level of detail and spatial accuracy expected from the data and the reference system to use for reporting the data. The document goes on to discuss the validation procedures that should be employed in the validation step and the standards that should be followed when validating data. Guidance is given on the documentation of GIS layers including the metadata fields that should be delivered with each GIS layer and the standards to be followed when preparing the metadata. The format for transferring layers to the Commission in the short-term is defined and the way forward for the development of a distributed reporting system in the long-term discussed. The Guidance document also discusses the harmonization of data at borders and methods for co-coordinating the reporting process. Finally the introduction of a European feature coding system is outlined.

According to the PRBs answers, the GD is well written. The first point to be verified was dealing with the fact that the specifications of the GIS-datasets and the data model are a translation of the reporting obligations mentioned in the WFD into technical requirements. PRBs was asked to comment if using the technical specifications will results in datasets be adequate for reporting obligations and to make the desired maps?

Key Issues

IS THE SPECIFICATION OF THE REQUIRED GIS-DATASETS AND THE RELATED DATA MODEL ADEQUATE FOR THE REPORTING OBLIGATIONS?

PRBs reported that the technical specifications set out in the guidance document are seen as satisfactory and sufficiently detailed for delivering the WFD requirements. The Júcar PRB is developing a software application for automatically generating maps to be use to reporting to the Commission. Marne highlighted that data corresponding to monitoring measurements from national and local network ("Réseau National de Bassin" and complementary network respectively) and to data concerning protected areas were structured following a relational model according to "Merise" principles and the compatibility with UML modelling (recommended by GIS working group) was successfully tested. Oulujoki underline that in some cases the reporting obligations seems not to be clear yet even for 2004 reporting. If databases are gathered only map making purposes in some cases too detailed information has been asked and some important information

missing (i.e. in water bodies maps, the relevant information is the type of water body not the parameters used to define the type). Oulujoki highlighted that also some other technical requirements are too tight (for instance the requirements of river networks in GIS is too ambitious expectation).

General Issues.

The second general issues treated was dealing with spatial detail and accuracy of the GIS data used within the PRBs. More specifically the following questions were made to PRBs:

HOW WAS DEALT WITH THE SPECIFICATIONS ON SPATIAL DETAIL AND ACCURACY?

All the PRBs met specification on spatial detail and accuracy as specified by the Directive. Shannon produced maps used for the construction of the river and lake network were 1:50,000 scales. This level of detail is sufficient to view first order streams. The GIS guidance document recommends a reporting scale of 1:250,000. This reduction in scale will result in the loss of many smaller features, which would otherwise prevent clear visualization of maps. A clear distinction is required between reporting objectives for the Commission at 1:250,000 scale and reporting objectives for each River Basin District at larger scales (e.g. 1:50,000). The Romanian part of the Somes/Szamos initially used map with a scale of 1:200,000, then in a second step, the accuracy position were scaled to 1:100 000 to better define detail of the basin. Marne shared the same position as the Shannon. 1: 250,00 scale is suitable to be used, but when it was possible, 1:50,00 scale maps were used. Scheldt has the problem to homogenize the data coming form different countries. In the first step, partners generate the operational data for the maps per party on a 1:250 000 scale. For the elaboration of maps of the entire RBD, we keep the same level of accuracy but we adapt the thresholds of representation. The choice of the threshold representation value of one of the layer depends on technical constraints and on political choices.

ARE ALREADY EXISTING DATASETS USED, OR WAS PROCESSING NECESSARY TO MEET THE SPECIFICATIONS?

The spatial detail and accuracy used in the practise of water management can be different for local, regional, national or international purposes. PRBs deal with the translation of already operational datasets to the (probably more general) level specified in the guideline in a different way. As already mention, Jucar did not need to process maps to improve the accuracy of the datasets since the already existing data were at the same scale. Oulujoki reports the same situation, their national data is gathered using databases, which correspond to the scale 1: 250,000. In general in Scheldt Basin datasets were elaborated, starting from existing data, which were priory treated, selected and/or generalized. On the contrary Marne reports that to full fit the 1: 250:00 scale as specified by the commission specific treatments will be necessary to aggregate all our data.

The third general issues on which PRBs reported in relation with GIS GD, is dealing with Metadata. A specific selection (profile) of meta-data elements of the ISO 19115 standard is made for the WFD datasets. Does this profile correspond to the national implementation of metadata standard, and what choices are made to fulfil the requirements? How is the meta-data generated and maintained?

WHAT EFFORT WAS NEEDED TO FULFIL THE REQUIREMENTS ON META-DATA?

Shannon Basin highlights that EPA is developing a specific meta-data system centrally. This system will be used in all RBDs in Ireland for the purposes of WFD implementation. This meta-data system will allow users to create, edit and view meta-data about datasets they have created and/or improved. In the Hungarian part of Somes/Szamos national competent authority for coordinating the national meta data managing is currently under development, therefore, the project used only basic ISO 19115 meta data information for its purposes. These information were readily available, while in the Romanian

part of the basin metadata elements regarding ISO 19115 standardization are continuously updated. In the context of the Júcar PRB exercise the metadata information has been implemented only for the inventory level or internal use. However the contains and structure established at that effect have followed particular criteria and not the ISO 19115. Nevertheless, it is to be expected in the future to carry out its regularization according to the criteria of the Guidance. Marne will produce data according to the ISO 19115 standards as recommended by the GIS working group. However, it will not be possible to fill in the whole 300 descriptors that fully characterise each type of data. A priori, only the main 12 core elements will be filled in. Within the Oulujoki all datasets have been described using national metadata-standards. The metadata-system will be modernized during next few years and also ISO 19115 standard will be taken into account. Finally for the Scheldt Basin, it was decided by the Heads of Delegations of the ISC not to put in place a GIS on the level of the RBD. Therefore, the elaboration of GIS metadata is no longer a priority. However, a file with basic metadata (non ISO) has been created and is being updated on a regular basis.

A specific object of the working group GIS is to facilitate free, non-proprietary access to the complete set of information that is reported by the Member States, river basin districts.
Data policy differences are to be expected considering the many organizations involved, and can influence the choice which datasets to use.

ARE THERE ANY RESTRICTIONS FOR FURTHER USE OF THE REPORTED DATA?

For the Shannon PRB exercise obviously, free and readily available data sets were primarily used even though data policy differences were encountered, but these are or soon will be overcome through various bilateral agreements. The layers of information for the Hungarian part of the Somes/Szamos are free-to-use, but at national level, in Hungary, the open GIS concept is not in practice. Witin the Jucar mandatory data to be reported has not restrictions for further use since is mainly comprised of public information (rivers basin district, basins, rivers, lakes, transitional and coastal waters, groundwater bodies, authorities, ecotypes, protected areas, monitoring networks, etc), though its origin may be of different administrations. Nevertheless, it may arise some kind of restriction on data copyright on complementary and not mandatory information to be supply as Digital Elevation Models or Aerial Photos, which could be useful as background documentation on some subjects. Marne PRB reporting that at national level rights about hydrological data depends on the IGN (National Geographic Institute) and the Ministry of Ecology and Sustainable Development. PRB Oulujoki, generally use of datasets is not free of charge. For instance the 1: 250 000 water body datasets are owned by National Land Survey and the use of these datasets is not free. In the trasnational Scheldt Basinagreements among several organisations responsible for the management and/or the diffusion of the data were made. These contractual links must be taken into account. For that purpose, an agreement between the 6 partners, concerning the supply and the use of data within the framework of the international collaboration for the international river basin of the Scheldt, is in preparation.

International standards on meta-data and data-exchange/access (gml/web-mapping, Open GIS standards) are preferable. Are these standard already used in practice?

IS THE USE OF INTERNATIONAL TECHNICAL STANDARDS ON META-DATA AND DATA-EXCHANGE/ACCESS ALREADY APPLICABLE IN PRACTICE?

Shannon is currently developing the meta-data system using the XML language. Marne is using ESRI shapefile standard because it corresponds to the current GIS format of the Agency. The DIREN (Seine Normandy regional office of the ministry of environment) use the MapInfo format and data will be easily convert into shapefile format. The GIS working group recommends to use GML in the long term. GML is still not operationally integrated in GIS software, so we

don't consider using GML presently. The Hungarian team of the Somes/Szamos is no appling international technical standard on meta data. A Meta data standard is not operational at national level in Hungary .

Feature coding is the assignment of unique identification codes to each spatial feature in the dataset. The recommended coding approach should allow European harmonization and continuing use of national coding structures.

HOW WAS THE RECOMMENDATIONS ON THE EUROPEAN FEATURE CODING SYSTEM DEALT WITH?

In the Shannon, the latest Irish river coding system was established in 1970s and based on hydrometric areas, 40 of which are designated clockwise around the country. Within each hydrometric area, rivers and tributaries are identified by one character (first letter of the name) and two numeric. A modified version of the pfafstetter system is being developed to identify river segments, whilst accommodating the current national system. Somes/Szamos in Hungary applied the recommendations of the modified Pfaffstetter Coding system. During the PRBs exercise the coding was implemented for all GIS layers. In the Romanian part of the basin, after a try to develop the Pfafstetter river coding system recommended by ICPDR, which was not successful because the river basin is too complex, the Pfaffstetter coding system was adapted using the dot for the delineation of magnitude sizes. Jucar is still using a Spanish coding due to the Júcar basin Authority. Nevertheless the CEDEX is conducting the task of the coding at a national scale the basins and associated Surface Water Bodies following the modified Pfafstetter method. In the Marne, the GIS working group recommends to keep national coding systems when existing and to add a national prefix, e.g. "FR" for France. With regard to surface waters, the recommendation is to use a coding that respects a hierarchical and hydrological structure (such pfafstetter) ; the French coding system of 1968 (modified in 1991) follows this principle and describes rivers, basins, lakes, humid zones. Oulujoki will add the European coding (additional 2-character MS-code) to datasets. Anyway all needed features have already widely used national codes. Scheldt did not analysed yet the coding issues, because priority was given to the elaboration of maps of the entire RBD, independent from a GIS structure for the RBD.

GD: PLANNING PROCESS

Issues considered by PRBs regarding the lessons abstracted from the guidance document

Definition of River Basin District boundaries: establishing the boundaries of a river basin district involves on the one hand neighbouring districts (national or international) and on the other implies consistency at a national level. Nevertheless, in most cases, it should be the task of the river basin to propose technical references and supportive arguments to any definition following a 'natural' division rather than an administrative one. In case discrepancies might arise in some areas, field staff walked these particular areas thus allowing updating river basin district boundaries.
In Denmark, the division of river basin districts was primarily done following the borders that separate the existing regional administrative authorities – the counties – as close as possible. However, some adjustment of the boundaries has been made to avoid dividing of catchments. In the case of the Scheldt river basin district, the division was made using official topographic maps.

Methodology used to assign and define groundwater bodies for shared aquifers: in case of national river basins, the criteria was defined at a national level and adapted to particular circumstances at a river basin district level. This criterion also defines how to assign portion of ground water bodies to every river basin district depending on particular circumstances. Criteria for sharing ground water bodies is also defined and tailored made for any particular circumstance. In the Shannon PRB, the decision to assign groundwater to a particular river basin district was based on available hydrogeological information (bedrock geology, tracing study

results, groundwater flow regime and direction) and the presence of dependent ecosystems (groundwater fed lakes, rising from underground streams, groundwater dependent terrestrial ecosystems). It is important to underline that cooperation between neighbouring river basin districts results to be essential, particularly in the development of the programme of measures and river basin management plans, to ensure that such interconnected water bodies and associated ecosystems are adequately protected.

In Denmark the river basin district of Fyn county groundwaters follow the river basin district boundaries. Therefore, it is intended to subdivide the river basin district into four sub-basins. Each of these sub-basins represents catchments that drain into more or less well-defined and hydrographically distinct coastal areas. The ground water bodies that are shared between the sub-basins are identified and assigned to only one sub-basin according to the principle of dominance, i.e. when most of the ground water body is located inside one sub-basin, or if it is equally shared between two or more sub-basins where most of the water abstraction is taking place.
In case of transboundary river basins, as the Scheldt case, the ground water line is established regarding surface watershed and location of important aquifers. In some cases the delineation has been done following other criteria such hydrogeology, groundwater deep flows and administrative arrangements. Groundwater bodies shared at international scale administrative discussion have to take place (regarding upstream and downstream). Finally, another criterion considered is when the ground water body was feeding wetlands in different river basins.

HORIZONTAL GUIDANCE DOCUMENT ON WETLAND

General Issues

The received answers – by four PRBs (Shannon, Júcar, Odense and Oulujoki) out of seven PRBs who tested the GD – are in some cases quite general and, in most cases reflect the Guidance Document's content.

Hereafter some considerations summarised from the answers are presented, while more detailed issues are presented in the "Key Issues" section below:

- Tendency to include wetlands into other water bodies and risk disregarding small but significant wetlands.
- PRBs support their work on wetlands using existing data and existing nature protection legislation.
- PRBs recognise the need to improve their knowledge about wetlands functioning and water needs in terms of quantity and quality
- PRBs identify the need to restore and maintain wetlands if they want to take advantage of their positive functions for the achievement of the WFD objectives.
- PRBs have not dealt in detail with the role of wetlands in the Programme of Measures although they recognise its importance. However, this will likely be addressed in more detail during Phase 2 of PRB testing.
- PRBs have not specified how they will assess the significance of pressures and impacts on wetlands, although they are aware of which these pressures and impacts are.
- PRBs consider that restoration of wetlands must be carefully designed to avoid adverse effects on other parts of the catchment

Key Issues

IDENTIFICATION OF WETLANDS UNDER THE WFD

The PRBs consider that the information provided in the Guidance Document is a good start for identifying wetlands under the WFD. However, more examples or the definition of some thresholds on wetland parameters would be useful to support the identification of wetlands.

The current way of identifying wetlands has the risk of ignoring smaller wetlands or wetlands that are currently significantly damaged.

On the other hand, the Oulujoki points out that more than 30% of its area should be classified as wetlands as a large percentage of the RB drainage

area is linked to groundwater-related wetlands.

IDENTIFICATION OF WETLANDS AMONG SURFACE WATER BODIES

In most cases wetlands are not defined as water bodies themselves but as part of rivers, lakes, transitional or coastal waters. They are only considered as a separate water body if they are already defined in an official inventory (Shannon) or if it is not possible to associate them to other water bodies (Odense).

The Júcar did not consider any of its wetlands as part of a surface water body, but only as ecosystems connected to surface water bodies or terrestrial ecosystems directly dependant on GWBs.

Shannon points out difficulties to delineate wetland boundaries and the need for more detailed field survey for better delineation.

Odense underlines that different measures can be necessary to achieve objectives for the WB and for the associated wetlands.

IDENTIFICATION OF TERRESTRIAL ECOSYSTEMS DIRECTLY DEPENDING ON GROUNDWATER BODIES

Júcar stresses the lack of knowledge on the water needs and the consequent need for hydrological and ecological studies to fill this gap.

Shannon also identified this knowledge gap particularly regarding delineating the zone of contribution of wetlands.

Oulujoki underlines that groundwater dependent terrestrial ecosystems in its RB are dominated by peatland (aapa-mires).

IDENTIFICATION OF WETLANDS AMONG SMALL ELEMENTS OF SURFACE WATER CONNECTED TO WATER BODIES BUT NOT IDENTIFIED AS WATER BODIES (2.5)

PRBs points out that it is not feasible to identify all those small elements, hence they are included into bigger water bodies. In Shannon the identification of a wetland as a water body is based on thresholds; in Oulujoki only small water bodies with a very high value was selected as a specific water body.

IDENTIFICATION OF OTHER ECOSYSTEMS SIGNIFICANTLY INFLUENCING THE QUALITY AND QUANTITY OF WATER BODIES (2.6)

This can be done either with models (Odense) or by analysing pressures and impacts in the catchment (Oulujoki).

WFD ENVIRONMENTAL OBJECTIVES AND WETLANDS

This aspect has not yet been dealt with in Shannon.

Oulujoki and Odense consider that the current poor status of some several wetlands in their RB goes against the achievement of the WFD environmental objectives but that the restoration must be done carefully to make sure that it will not cause problems in other parts of the catchment.

WETLANDS AND HM AND ARTIFICIAL WB

Júcar has not yet defined HMWBs

Shannon may require derogation up to 2027 while wetland restoration is achieved for areas of worked peat-land.

Odense and Pulujoki consider that in some cases restoration can cause adverse effects, but that it is a matter to design good solution or to disregard solutions that are really damaging.

WETLANDS AND PROTECTED AREAS.

In general, PRBs plan to include in the Protected Areas Register the already protected wetlands according to international, national or local legislation.

In Shannon there has been a specific project to identify and rank nature conservation designated areas, where the status of water is an important factor.

In Oulujoki they will start this work in autumn 2004.

WETLANDS AND THE IDENTIFICATION OF IMPACTS AND PRESSURES ANALYSIS

Significant pressures are due to water abstraction, regulation works, drainage, earth-filling, urban development, point and source pollution, air pollution, peat extraction from mires, harbor construction. Impacts are the lowering of water levels and pollution.

However, PRBs have not specified how they will assess the significance of pressures and impacts on wetlands.

THE PROGRAMME OF MEASURES AND WETLANDS

The PRBs recognize the positive functions of wetlands (biodiversity enhancement nutrient attenuation and storm flow abatement), and consider that the original wetlands need to be restored and the existing ones maintained to contribute to the good status of the whole catchment.

Odense highlights the need to consider the catchment as a whole and not as a mosaic of water bodies as the different elements of the hydrodynamics of a river valley are strongly interlinked.

However, PRBs have not defined in detail yet how to cope wetlands with the programme of measures.

MONITORING AND WETLANDS

Wetlands belonging to water bodies will be subject to monitoring requirements set by the WFD, while those included in the Register of Protected Areas will be subject to the requirements established by their specific protection status (Ramsar, Birds and Habitats Directive etc.).

PRBs pointed about the need for further studies wetlands to understand their functioning and how significant pressures could affect them.

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