GUIDELINES AND RECOMMENDATIONS FOR THE PLANNING PROCESS ACCORDINGLY TO THE REQUIREMENTS OF THE WATER FRAMEWORK DIRECTIVE

Verified by:

Adam JarząbekJanusz KindlerElżbieta Nachlik – co-ordination of works
Sylwester Tyszewski

Under the direction of the co-ordinating group:

Jerzy Grela, Regional Office for Water Management in Kraków

Agnieszka Hobot-Wojna, Regional Office for Water Management in Gliwice

Monika Mordarska, Department of Water Management, Ministry of the Environment

Małgorzata Owsiany, Regional Office for Water Management in Kraków

Yannick Pochon, Resident Twinning Advisor, Phare PL2003/IB/EN/02 project

This document has been elaborated on the basis of the following guidelines and recommendations

Methodological guidance for the creation of the baseline scenario – Stéphanie Blanc, Seine-Normandie Water Agency; Agnieszka Hobot-Wojna, Regional Office for water Management in Gliwice; Małgorzata Owsiany, Regional Office for Water Management in Kraków; Pierre Strosser, International Office for Water; September 2005

Methodological guidance concerning the analysis of risk of non achievement of the environmental objectives accordingly to the Water Framework Directive - Wojciech Indyk; Andrzej Potocki, BRAIN S.C.; November 2005

Guidelines dealing with risk of non achievement of the environmental objectives on the homogenous groundwater bodies and with the establishment of the programme of measures – dr Piotr Herbich, Państwowy Instytut Geologiczny, July 2006

Methodological guidance on the main issues of water management – Katarzyna Banaszak, Regional Office for Water Management in Gliwice; Katarzyna Biegun, Regional Office for Water Management in Krakow; Marie-Claire Domont, Adour-Garonne Water Agency; Agnieszka Hobot-Wojna, Regional Office for Water Management in Gliwice,; Małgorzata Owsiany, Regional Office for Water Management in Kraków; September2005

Methodological guidance on the designation of the heavily modified and artificial water bodies with an economic justification– Agnieszka Hobot-Wojna, Regional Office for Water Management in Gliwice; Małgorzata Owsiany, Regional Office for Water Management in Kraków; Stéphane Robichon, Adour-Garonne Water Agency; Pierre Strosser, International Office for Water;

Study „Designation of heavily modified aggregated water bodies in the pilot river basin of Upper Vistula and choice of four aggregated heavily modified water bodies for the needs of a case study with a justification– dr inż. Adam Jarząbek, Stefan Sarna

Methodological guidance on the establishment of the programme of measures - Agnieszka Hobot-Wojna, Regional Office for Water Management in Gliwice; Yann Laurans, Seine-Normandie Water Agency; Delphine Martin, Artois-Picardie Water Agency ; Małgorzata Owsiany, Regional Office for Water Management in Kraków, March 2006

Recommendations „Experiences from the sub-basin of Narew and recommendations in terms of cost recovery analysis, including the environmental and resource costs" – Arnaud Courtecuisse, Artois-Picardie Water Agency; Maria Salvetti, Seine-Normandie Water Agency, Sarah Feuillette, Seine-Normandie Water Agency (in the part dealing with the environmental and resource costs); Jean-Marc Berland, International Office for Water (in the part dealing with the environmental and resource costs), December 2005 and a corrected version June 2006

Opinion on the recommendations „Experiences from the sub-basin of Narew and recommendations in terms of cost recovery analysis, including the environmental and resource costs" – dr inż. Krzysztof Berbeka, Economical Academy in Kraków

Recommendations on the practical aspects of public participation in the process of the implementation of the Water Framework Directive – Barbara Chammas, Regional Office for Water Management in Kraków ; Stéphanie Croguennec, Ministry of Ecology and Sustainable Development of the French Republic; Natacha Jacquin, International Office for Water; Ksenia Starzec-Wiśniewska, Regional Office for Water Management in Gliwice; Alicja Stęslowska, Regional Office for Water Management in Gliwice, March 2006

ACRONYMS AND ABBREVIATIONS USED IN THE TEXT

€ Euro
BRD Bank Danych Regionalnych / Bank of Regional Data
DPE dobry potencjał ekologiczny / good ecological potential
DSE dobry stan ekologiczny / good ecological status
GUS Główny Urząd Statystyczny / Central Statistical Office
IGWP Izba Gospodarcza Wodociągi Polskie / Economic Chamber of Polish water suppliers
IP istotne problemy gospodarki wodnej / main issues of water management
JCWP jednolita część wód powierzchniowych / homogenous surface water body
JCWPd scalona jednolita część wód podziemnych / aggregated homogenous groundwater body
JST jednostki samorządu terytorialnego / units of territorial collectivity
KPOŚK Krajowy Program Oczyszczania Ścieków Komunalnych / national Programme for the Municipal Wastewater Treatment
KZGW Krajowy Zarząd Gospodarki Wodnej / National Office for Water Management
MPE maksymalny potencjał ekologiczny / maximal ecological potential
MR mieszkaniec równoważny / equivalent inhabitant
MŚ Ministerstwo Środowiska / Ministry of the Environment
NFOŚiGW Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej / National Fund for the Protection of the Environment and for the Water Management
PD program działań / programme of measures
PR prognoza rozwoju / baseline scenario
RDW Ramowa Dyrektywa Wodna / Water Framework Directive
RGWRW Rada Gospodarki Wodnej Regionu Wodnego / Council of Water Management of a water region
RZGW Regionalny Zarząd Gospodarki Wodnej / regional office for water management
ScCW scalona część wód / aggregated water body
SCW sztuczna część wód / artificial water body
SJCWP scalona jednolita część wód powierzchniowych / aggregated homogenous surface water body
SNQ przepływ średni z wielolecia / average flow from several years
SZCW silnie zmieniona część wód / heavily modified water body
WIOŚ Wojewódzki Inspektorat Ochrony Środowiska/ Voivodship's Inspectorate for the Protection of the Environment
WTP skłonność do zapłacenia / willingness to pay
WW SZCW wstępnie wyznaczona silnie zmieniona część wód / pre-designated heavily modified water body
WW SCW wstępnie wyznaczona sztuczna część wód / pre-designated artificial water body
WZMiUW Wojewódzki Zarząd Melioracji i Urządzeń Wodnych / Voivodship's Office for water Melioration and Installations

I INTRODUCTION

The present study is an effect of the realisation of the Polish-French Twinning Project "Continuation of the Implementation of the Water Framework Directive" – PHARE PL 2003/IB/EN/02 realised by the Polish Ministry of the Environment and the French Ministry of Ecology and Sustainable Development and the International Office for Water.

This twinning has consisted in two years of co-operation between Polish and French experts who are daily facing with WFD implementation in their country, at national, regional or basin level. The work in common – consisting in the exchange of opinions and experiences – as well as the tests realised in practice have lead to the redaction of various thematic guidance documents developing recommendations and methodologies in order to implement efficiently WFD in Poland. The elaborated documents contain the results of tests carried out in pilot river basins; in the Upper Vistula river basin for the planning process and in the Narew river basin for the cost-recovery analysis.

Once the tests in pilot basins achieved, draft versions of thematic guidance documents were presented and discussed in the frame of regional workshops, of the working groups' meetings at also at the Technical Committee's sessions.

These documents constitute a basis for the further works at the level of water regions and river basin districts during which they will have to be adapted and revised in order to ensure a pertinent process of the WFD implementation in Poland.

The present guidance document on the planning process has prepared in order to provide a summary of methodologies and recommendations elaborated on the frame of this project. It regroups most of the topics covered during the twinning activities.

The guidelines and recommendations contained in the chapter 2 present the concrete procedures to be used at different stages of the planning process, as required by WFD.

The chapter 3 is a summary taking into account the most important issues that still require solutions at the national level.

I.1 ROLE OF THE STUDY IN THE CONTEXT OF OTHER PROCEDURE DOCUMENTS

The Water Framework Directive introduces new procedure requirements for the water management planning. Those elements are in the Polish context (as in other Member States), relatively new as they require:

- a multidisciplinary integration of the approach to the analysis and evaluation of the status of waters, of the identification of its reasons for the needs of the improvement of this status at the basis of activities in different social and economical sectors,
- a detailed description of procedures adapted to the present administrative conditions, the availability of the input data and allowing a quick education of the personnel responsible for their implementation.

It requires many discussions, studies and pilot solutions that – properly disseminated – will bring effects in form of a proper realisation of the WFD's requirements.

The Twinning Projects oriented at the transfer and exchanges of practical experiences directly between the Partners constitute an important support for this process. The commonly developed procedures have here a particular meaning and the method of their elaboration allows at the same time a quick education of the party that is the beneficiary.

I.2 PLACE OF THE STUDY IN THE WATER MANAGEMENT PLANNING PROCESS

The water management planning character adopted in the Water Framework Directive - that has to ensure the achievement of the good ecological status of waters – contains a series of dynamic stages that result one from another and that are interdependent. What's more, it is necessary to remember that the whole planning process (in the planning periods adopted in WFD - 2004-2015, 2015-2021 and 2021-2007) has a cyclic and iterative character.

The illustration 1 presents the cyclic nature of the water management planning process required by the Water Framework Directive's regulations.

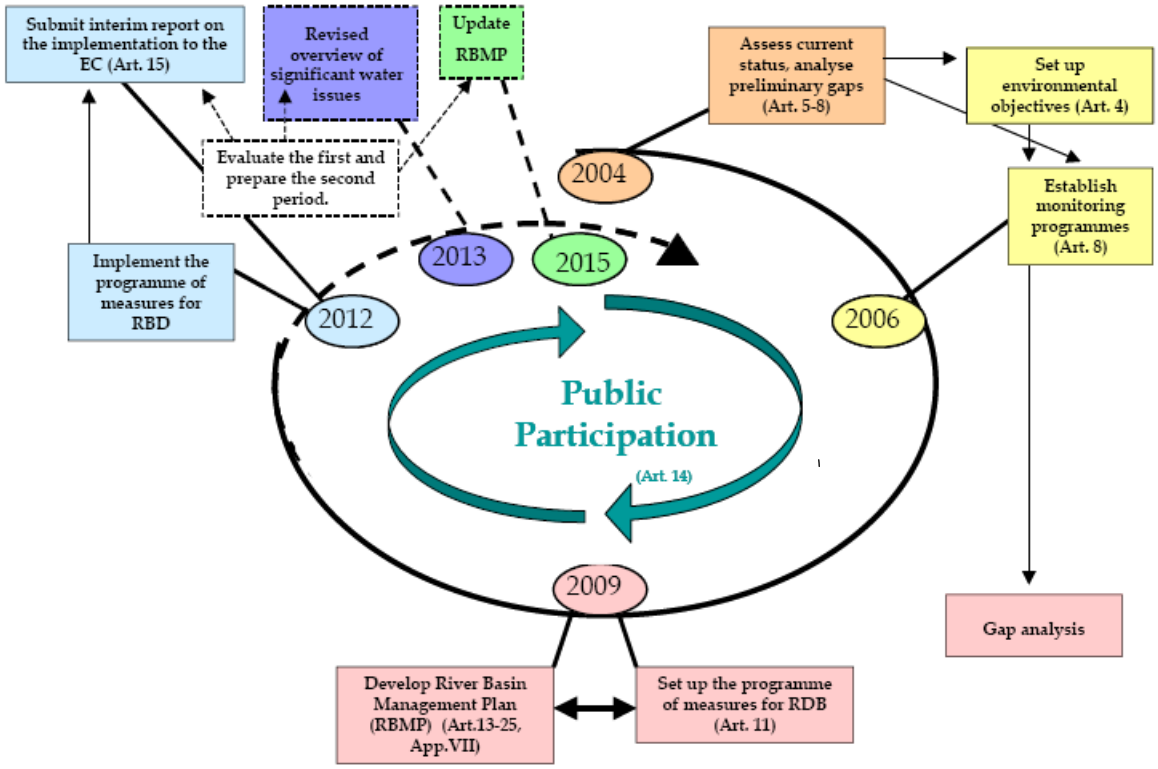


Illustration 1. Cyclic character of the water management planning process accordingly to the WFD.
Source: Common Implementation Strategy (CIS WFD)., Best practices of the river basin management planning.

The present study doesn't show the full scope of the planning cycles described in the WFD but only the works that should be realised by the Polish authorities and institutions involved in the WFD implementation in the period 2006-2009. In particular it doesn't show the works already realised in 2004 that covered the first typology and designation of the homogenous water bodies as well as the river basin characterisation and the first economical analysis (scope of the report presented to the EC in March 2005). The present chapter describes however the procedures of the main planning sequences, the realisation of which will allow to order the planning process and to formulate - at the end of the year 2008 - a coherent water management plan that should be contained in the schedule submitted for the public consultation in December 2006.

The relations between the particular planning sequences to be realised by 2009 are shown on the illustration 2.

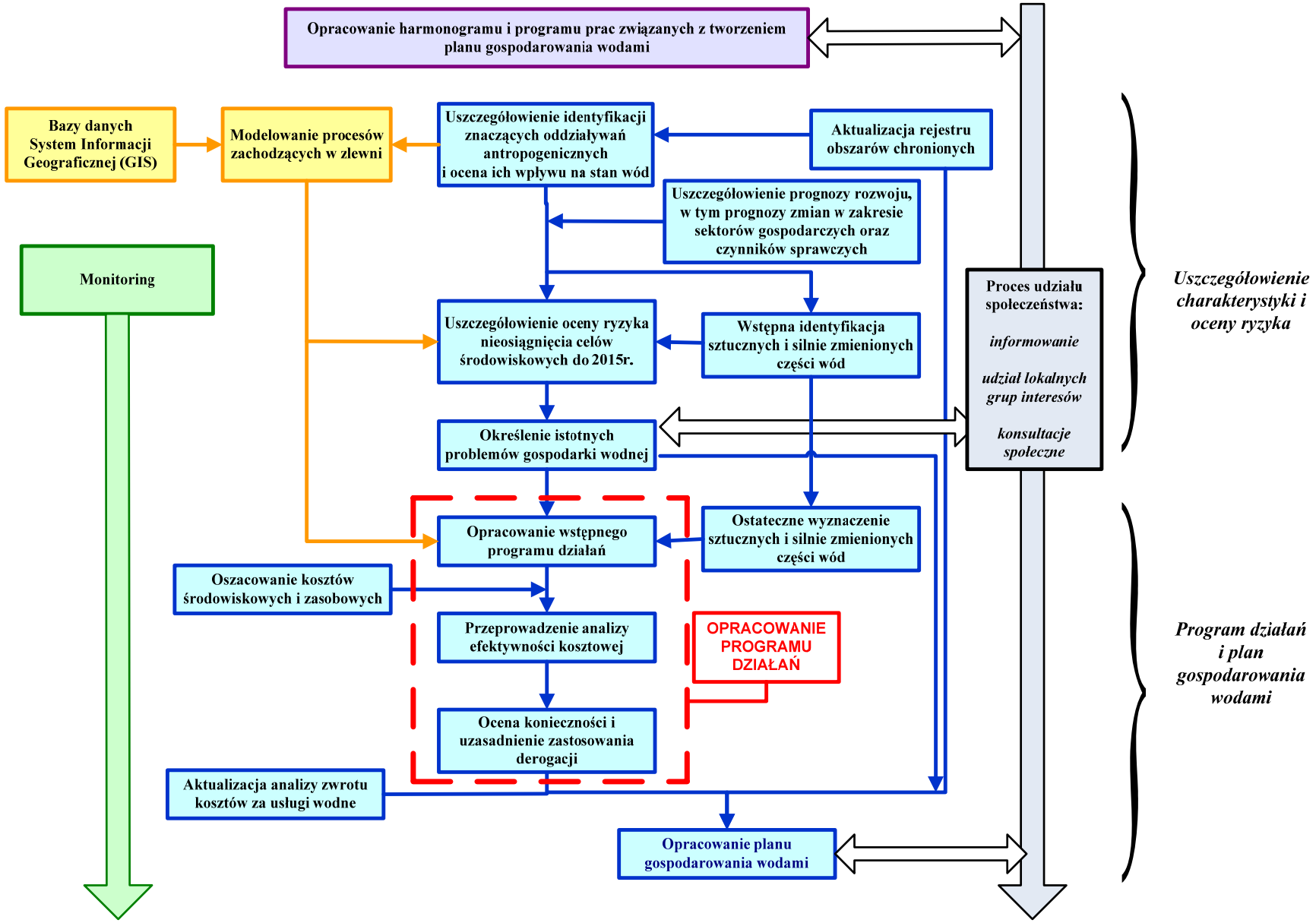


Illustration 2. Relations between the activities of the water management planning process

The scheme shown on the illustration 2 shows a series of activities that were not subject to a detailed analysis in frame of the present project. This concerns the refinement of the evaluation of the anthropogenic impacts and of their incidence on the water status as well as the monitoring issues that are presently being realised on the commission of the Ministry of the Environment and the works related to the updating of the data-bases and of the protected areas register performed by the particular regional offices for the water management. The present document doesn't describe neither the questions related to the modelling of the processes occurring in the river basin even if some activities within the tests of the PEGASE model in the Polish context have been realised in the frame of the project (the information on this subject can be found in separate reports on the Project's realisation).

In the presented planning process two planning stages can be distinguished quite clearly:
- Refining of the characterisation with the baseline scenario and risk assessment concluded by the identification of the main issues of the water management (realisation by the end of the year 2007),
- Process of the development of the programme of measures and of the water management plan (realisation by the end of the year 2009).

The sequence of these stages is evident because first it is necessary to precise the scale of needs for the fulfilment of the WFD requirements and then to define the measures adapted to these needs.
The first stage is in fact a repetition of the activities realised in 2004 but with the verified data and on the modified methodological basis. We will find here a confirmation of the thesis on the iterative character of the planning process. This stage covers also an evaluation of the present status of the anthropogenic activities and an estimation of their influence on the aquatic environment, the baseline scenario till 2015 for these factors and an assessment of risk of non achievement of the desired status by that deadline.
The second stage is the definition of the measures and determination of the modalities of their realisation in form of a plan that is to lead to the realisation of the fixed environmental objectives.
Between the particular elements of the planning process a series of relations and interdependencies occur. The planning's departure point is an analysis of the factors that presently influence the aquatic environment, called pressures and impacts analysis. The subsequent activity is the baseline scenario. Both activities concern the analysis of the same factors and processes, so the type of data to be collected or created for the needs of the baseline scenario should correspond to the type of data collected for the needs of the pressures and impacts analysis.
The relations between the refined pressures and impacts analysis and the results of the baseline scenario should be reflected in the analysis of risk of non achievement of the environmental objectives accordingly to WFD that consumes the results of the previous stages.

When we analyse the text of the Water Framework Directive and of the Polish legislation in the water management planning domain, we find there a clear place for the elaboration of risk of non-achievement of the environmental objectives in 2015. Such analysis shows that the refinement of the risk assessment should take place after the elaboration of the pressures and impacts analysis with the baseline scenario and before the identification of the main issues of the water management.
There are also close relations between the designation of the heavily modified water bodies (HMWB) and the programme of measures (PoM), especially because of the necessary analysis of the so called restoration activities.
The first designation of the heavily modified and artificial water bodies has been done within the surface waters characterisation (report from the art. 5 of WFD). The first designation of the heavily modified water bodies could have been based only at the first assessment of impact of the activities necessary for the restoration of the hydromorphological conditions

favouring the respect of the good status of waters. The first designation has been conducted also in those cases when the level of knowledge of the environment was not sufficient and also when there was a doubt on the efficiency of measures meant to favour the biodiversity and the protection of the ecological habitats. The characteristic feature of the first designation is the fact that it is done when the evaluation of the water status is based on a provisional definition of the good status (and good potential), the final values of which should be determined at the European level by the end of the year 2007.
The final identification and designation should be concluded for the needs of the river basin management first planning cycle related to the publication of the water management plans in 2009. Identification of the heavily modified and artificial water bodies, definition of the maximal ecological potential (MEP), identification of the good ecological potential (GEP) and programmes of measures allowing to reach the environmental objectives constitute a part of the river basin management plans that should be published by 2008 as the first projects for the consultation and in 2009 – as final plans. These plans – and the process of up-dating of designation of the heavily modified and artificial water bodies along with them – will be submitted for up-dating every six years.
The designation of the heavily modified and artificial water bodies is neither a punctual nor a definitive process. The Directive admits a modification of the designation within the revision of the water management plans in order to take into account the changes of the environmental, social and economical conditions occurring with time.

Another very important relation is the links between the water management plans and the programmes of measures. The programme of measures contains a list of activities necessary to reach the environmental objectives fixed for the year 2015 in the water management plan. The water management plan and the programme of measures should be developed simultaneously and the derogations from the good status or good potential objective have to be motivated with technical/technological difficulties in the realisation of measures or by too high costs of their implementation.
The relations of the planning cycles described above imply that the present document also has to take into consideration a larger scope allowing to achieve properly the objective fixed in it. That's why more place is devoted to the three following issues:

- elaboration of the programmes of measures (chapter 2.6),
- recommendations on the analysis of the costs recovery, including the environmental and resource costs (chapter 2.7),
- recommendations on the public participation in the WFD implementation (chapter 2.8).

II GUIDELINES AND RECOMMENDATIONS DEALING WITH THE PARTICULAR COMPONENTS OF THE PLANNING PROCESS

The present guidelines and recommendations cover this part of the planning process that directly serves the establishment of the programme of measures but at the same time "consumes" the previously elaborated typology of waters and the refined identification of important anthropogenic impacts on waters with the evaluation of their consequences. Looking at the illustration 2 these are the following activities described in form of guidelines-recommendations:

- elaboration of the refined baseline scenario,
- identification of artificial and heavily modified water bodies,
- refining of assessment of risk of failure to meet the environmental objectives,
- definition of the main issues of water management,
- elaboration of programme of measures through a step by step approach.

They have been supported by the recommendations in terms of costs recovery analysis, including the environmental and resource costs, and of public participation at each stage of the planning process through the consultations.
Already at the beginning the attention should be paid to an unequal treatment of particular issues. This results from one of two essential reasons:
different levels of practical experiences at which the recommendations are based
inequality in terms of the available information in our local conditions.

However, considering the fact that the planning process has in general a cyclic character and additionally in the first cycle – by 2013 – it is possible to verify its results, it doesn't constitute a serious problem. It encourages even to build systematically the experiences that result in a systematic improvement of the approach so that in the nearest future a refined interpretation of the available data could be used. What's more, such an assumption eliminates fears related to the realisation of initial responsible works in the context of limited knowledge and information thanks to the possibility of completing them during the further works.
In this situation the present study should be treated as a certain stage of the procedural methodological works aiming at the achievement of the desired results. It has however an essential importance for the process of standardisation of a homogenous approach in all regions of the country where the detailed works will be performed by different teams.

II.1 BASELINE SCENARIO

II.1.1 Definition and place in the planning process

The baseline scenario is a set of one option or multi options scenarios of changes in a defined time horizon for all the sectors of the social and economical life as well as of the legal conditions that impact the aquatic environment in a direct or indirect way. The baseline scenario should be perceived as an analysis of the effects of the implementation of the present and future social and economical policies taking into account the interests of different parties and the different development trends.
Because of the social and economical activities during the nearest years, some presently observed modifications of the homogenous water bodies' status may not occur in the future while the other ones – not observed at present - can appear. The baseline scenario should provide general information on such changes in the nearest future treating equally all the factors important for the elaboration of the river basin management plan and of the programme of measures.

The baseline scenario till 2015 covers two elements: the scenario of changes of the anthropogenical impacts and of their influence on waters and the scenario of the results of the programmes of measures oriented at the improvement of the waters' status.

It should be however highlighted here that it is not a tool allowing to determine precisely what will happen with the homogenous water bodies and should not be used as a justification of efforts aiming at the preservation and protection of the aquatic environment.

The baseline scenario depends on the following factors:

- trends and dynamics of the social and economical activities influencing the qualitative, quantitative and morphological status of waters,
- implementation of the national and European regulations (ex. Water Law, programmes for the protection of the environment, UE directives),
- realisation of the planned investment programmes (ex. national programme for the treatment of the municipal wastewater, investments previewed in the spatial management plan).

The basic purposes of the elaboration of the baseline scenario are the following:

- to prepare the information necessary to assess the status of waters in 2015 and for the designation of the water bodies that are not risk, that are potentially at risk or that are at risk of non achievement of the environmental objectives as well as to assess the level (of the probability) of these threats,
- to prepare the information necessary to designate the most important problems of water management,
- to assess the effectiveness of the implementation of national and European law regulations and of the realisation of the planned investments.

In the planning process, the elaboration of the baseline scenario takes place after the identification of the important anthropogenic pressures and after the evaluation of impacts on the homogenous surface and groundwater bodies' status and before the assessment of risk of non achievement of the WFD's objectives (see illustration 2).

II.1.2 Necessary data and their sources

To elaborate the baseline scenario it is necessary to have the following set of data referring to the area for which the scenario will be elaborated:

1. Refined identification of important anthropogenic impacts and evaluation of their influence on the homogenous surface and groundwater bodies' status;
2. Data from the Regional Data Banks, GUS;
3. Planning and prognostic documents (spatial management plans with the scenarios of impacts on the environment (on the voivodship's and poviat's level), programmes for the environmental protection (on the voivodship's and poviat's, eventually on the commune's level), operational programmes of the voivodships, sector programmes (at the national, voivodship's level)
4. Data of the Regional Offices for the Water Management dealing with the planned investments related with the water management;
5. Information obtained during the „sector meetings"

II.1.3 Recommended methodology of study

a Short characterisation of the approach

The work on the baseline scenarios of the possible changes requires to gather a series of information on the planned activities dealing – in a direct or indirect way – with the aquatic environment's status. The proposed methodological approach supposes a „step by step" character of this process accordingly to which we can distinguish six proper stages and an optional one – the so called sector meetings. The baseline scenario requires an analysis of the available planning and prognostic documents in order to indicate the changes that may occur in the water management by 2015. It is necessary to present the „background" of the scenario through a scenario of external conditions such as: macroeconomy, social and economical development, changes in the natural environment or the planned activities resulting from the implementation of the national and UE legislation. The activities planned for the considered sub-basin or the river basin district are the basis of the scenario as they are the so called basic measures that have to be necessarily implemented in the first planning cycle. All the basic measures indicated in the scenario – as well the investment as the non investment ones – should be „transferred" into the programme of measures. The subsequent stages consist in the indication of the scenarios of the possible changes within the main activities and planned investments. The effect of this work should be a creation of one or several scenarios of the possible changes in terms of environmental activities. The next stage is the translation of the scenarios of main driving factors and planned investments into the pressures on the water resources by 2015. The methodology of the realisation of such an analysis can be very different depending on the analysed sector of the economy and on the type of pressure. The evaluation of consequences of a given scenario is the last of the proposed elements of the forecast. The task here is to show the consequences of the implementation of the scenarios and to choose the most probable one so that it would be possible to take it into account within the elaboration of the assessment of risk of non achievement of the WFD objectives by the water bodies.

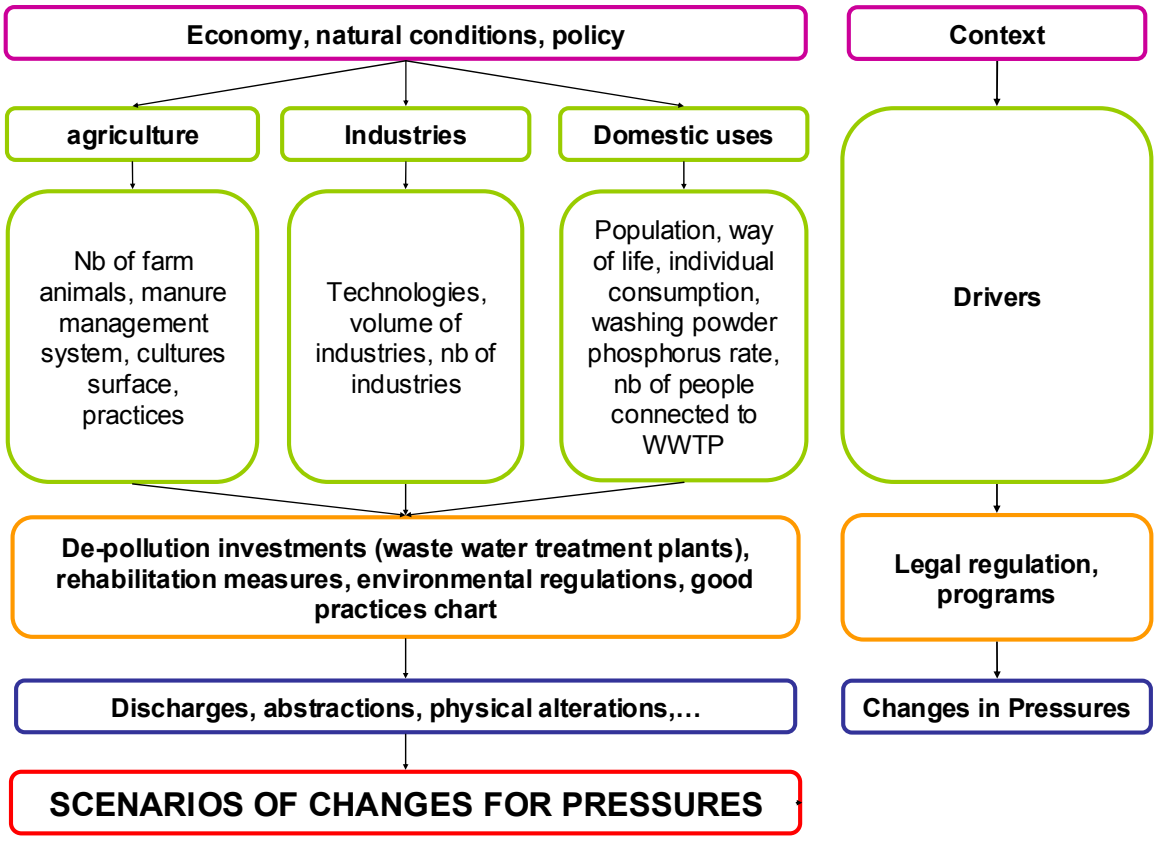


Illustration 3: Presentation of the scope of baseline scenario

b Stages of the elaboration of the baseline scenario

STAGE 1 – Analysis of the available information related to the status of the aquatic environment

The first stage of the work on the baseline scenario is the collection of the available planning, analytic and statistic documents in the scope necessary to determine the future changes in the water management. This requires analysing many documents, not only the ones directly linked to the water management. All the information should be gathered in form of databases for different spatial scales of the study:
national (ex. macroeconomic scenarios or the scenarios of the climate changes),
regional (ex. scenarios of changes in the spatial management, scenarios of changes in the agricultural structure and culture),
local (ex. GUS indicators for the loads discharged from the wastewater treatment plants, for the water abstractions, data bases of the RZGW [regional offices for the water management] or list of investments contained in KPOŚK (national programme for the depollution of the municipal wastewater).

STAGE 2 – Determination of the basis of the baseline scenario

At this stage it is necessary to elaborate a scenario for the external conditions that constitute the „background" for the changes occurring in the water management. This stage should cover an elaboration, at least in a descriptive form, of:
- macroeconomic scenario,
- scenario of the social and economical development,

- scenario of changes in the natural environment,
- planned activities resulting from the implementation of the national and UE legislation.

Due to the availability of data and the prognostic errors' cumulating possibility, it is proposed to elaborate the forecast of external conditions at the national or regional level on the basis of the available expertise prepared for the needs of the strategic and planning documents.
For the period till 2015 the forecast of the external conditions may be developed on the basis of the governmental strategic documents such as National Strategic Reference Framework 2007-2013 or other governmental policies being in force or in course of preparation. It is also possible to use the planning documents created at the voivodships' level, ex. strategies of development of the voivodships.

STAGE 3 – Determination of the changes scenario for the main driving factors (indirect factors).

The first stage aims at the formulation of the quantitative or descriptive information on the changes in the main types of social and economical activities (indirect driving factors) impacting the waters' status. The elements of the scenario developed at this stage should cover the following aspects:
- demographic scenario,
- changes in the tourism sector,
- changes in the municipal sector,
- changes in the industries,
- changes in agriculture and forestry,
- changes in the fishing management and fishery.

Based on the results of the identification of the anthropogenic impacts and of the evaluation of their influence, we should concentrate on the important types of the activities and on the corresponding pressures impacting the homogenous water bodies. It is necessary to pay attention to the problems that can appear in the future - ex. presence of pesticides in water - even if, at the present stage, they are not considered as an important problem.

„Optional" STAGE – Sector meetings

As a complement to the previous stage, it is proposed to organise the meetings of the „experts' groups" from these sectors of the national economy in which a specialised knowledge is required to elaborate the baseline scenario. The result of these meetings will be the collection of the accessible scenarios or of the quantitative or descriptive information allowing to formulate the scenario of evolution of the selected types of water use impacting the status of waters. Thanks to the sector workshops it is possible to obtain additional information in a reasonable time and/or in frame of a reasonable budget.
Here below is presented a proposal of the way of organisation of a sector meeting.

Objectives of a sector meeting:
- determination of the main driving forces that will influence the given sector and indication of the pressures on the aquatic environment that they will generate,
- determination of the possible changes / scenarios dealing with these driving forces on a chosen hydrographic area by 2015,
- evaluation of the organisation and animation of the working sector meetings (level of active involvement and of the interest of the participants, quality of the obtained results, informational gaps) in order to improve the organisation of the next meetings.

Preparation of the meeting:
- choice of experts / participants (A limited number of chosen local experts should participate in the workshop – maximum 10. These experts should be chosen because of their knowledge and experience in a given economical sector and not because they represent a given organisation),
- preparation of a short information on the objectives of the meetings as well as on the expectations that should be sent to all the participants together with the invitation,
- preparation of a short summary of the existing situation in terms of the chosen driving forces and indicators – description with an illustration on the maps – to be distributed to the participants at the meeting,
- preparation of a synthetic information on the past trends in terms of values of the key variables in the considered sector (based on the accessible data, reports) and, if possible, of an initial scenario – multimedia presentation,
- logistic preparation (board, projector)

Course of the meeting:
1. Welcome, short presentation of every participant
2. Introduction:
- presentation of the analysed hydrographic area to the participants (general characterisation)
- justification of the need of the organisation of the informal sector meetings
- answers and explanations (in the participants have doubts)

3. Presentation of the hitherto functioning of the given sector and of the first version of the baseline scenario for a given sector (if such data exist):
- evaluation of the hitherto level of the activity (at the national and of the hydrographic area's scale)
- evaluation of the hitherto impacts on waters (at the national and of the hydrographic area's scale)
- initial prognosis of the level of the activity (at the hydrographic area's scale)
- initial prognosis of pressures and impacts (at the hydrographic area's scale)
- eventual presentation of experts on the same issues (if they have prepared one before the meeting)

4. Summary of the main pressures generated by a given sector:

- present the pressures generated by a chosen sector at the given area
- summarise - determine the main pressures that will be then discussed (write them of the board)

5. Evaluation of future changes in terms of driving forces and variables:
- present selected tables and maps presenting the present situation for some driving forces / variables that will be the basis for the discussion,
- together with the participants fill the „trends" column of the table presented above (giving qualitative and quantitative information whenever possible)
- ask the experts to present their evaluation of the future changes (qualitative and quantitative if possible).
- ask the participants what are the main reasons of the incertitudes within these changes
- ask the experts to indicate the source of information that could be used in order to refine and to complete the baseline scenario (collection of additional information, meetings with other experts, review of studies, etc.)

6. Summary of the working meeting: proposal of one or several scenarios (preferably presented in form of a table: PRESENT STATUS – SCENARIO FOR 2015)

7. Evaluation of the meeting (its form, results etc.) done by the participants

8. Conclusion

STAGE 4 – Definition of the scenario of changes in terms of planned investments and environmental activities (direct factors).

Realisation of this stage allows to determine the existing and forecasted for the nearest future reparation measures (regulations, legal instruments, investments for the depollution of the environment), in order to evaluate their efficiency in terms of the reduction of pressures on water and of the improvement of the waters' status by 2015.
It is necessary to proceed to an overview of the planned programmes, of the existing regulations, of the environmental measures on the basis of the up to date documents. The analysis should concern at least the following elements:

in frame of the municipal sector:
- investment plans for the construction, development and modernisation of the WWTPs and sewage systems,
- investment plans for the development of the water supply systems,

in frame of the industry
- investment plans for the implementation of a rational water management,

in frame of agriculture
- investment and non investment plans for the implementation of good practices,

in frame of hydromorphological changes
- small retention programmes,
- programmes related to the protection against floods,

Based on the realised analysis it is necessary to prepare a description or an information containing the quantitative data on the expected results in terms of the reduction of pressures and the improvement of the water status.
It is possible to elaborate several scenarios of realisation, depending on the expected efficiency or the implementation's tempo (ex. the KPOŚK will be fully realised or 75%, 20% or 25% of farms will introduce good agricultural practices).

Then, the forecasts (scenarios) of the realisation of the investment programmes and the forecasts of changes of the main driving factors should be combined together and translated into the volume of pressures. In this aspect there are two principle ways of proceeding:

creation of different combinations of scenarios and analysis of the coherence of meaning of every combination through a determination if the forecasts of the planned investments and environmental measures are adequate to the forecasted changes of the main driving factors

Table 1 Example of combination of scenarios of main types of activities generating pressures and of the scenarios of the mitigation measures

Main driving factors scenario Scenario of planned investments and environmental measures	Scenario 1 (increase of the number of inhabitants of 5%)	Scenario 2 (increase of the number of inhabitants of 10%)	Scenario 3 (increase of cattle breeding of 10%)	…
Scenario A (KPOŚK realised in 100%)	Coherent	Coherent	Coherent	
Scenario B (KPOŚK realised in 75%)	Coherent	Incoherent, no interpretation is possible	Coherent	
…				

Integration of the mitigation measures (forecasts of the planned investments and of the environmental measures) into the scenarios of changes for the main driving factors. These last scenarios are the „leading" ones and every scenario of the mitigation measures corresponds to one or several scenarios for the main driving factors.

Table 2 integration of the mitigation measures scenario into the scenarios of the main types of activities generating pressures

Main driving factors scenario	Scenario 1	Scenario 2	Scenario 3
Planned investments and environmental measures scenario	Scenario A	Scenario A	Scenario B

It may be helpful to use the water management related investment programmes of communes and the knowledge of the local experts. Here below is a list of the existing directives related with the water management and with the protection of the environment that should be taken into account within the evaluation of the planned investments and of the environmental politics. These are the following directives:
- *directive concerning the quality of the surface waters (75/440/EEC)*
- *directive concerning the dangerous substances (76/464/EEC)*
- *directive concerning the municipal wastewater (91/271/EEC)*
- *directive concerning the nitrates (91/676/EEC)*
- *directive concerning the drinking water (80/778/EEC)*
- *directive concerning the bathing zones (75/160/EEC)*

The utility of the baseline scenario depends on the degree of its realism that is on the level of reflection of the differences between the present status of waters and the status that will be achieved in 2015 in result of the proposed measures. The same applies to the scenario of measures, or better to the scenario of the effectiveness of their results. Only a high level of

the realism of the forecasts authorises to make a choice of the desired activities that will allow to obtain the fixed environmental objectives.
Of course this is seriously conditioned by costs. It is therefore necessary to bring together the costs of the investment projects and programmes what will be useful within the realisation of the cost effectiveness analysis (comparison of the costs of the programme of measures with their efficiency in terms of the improvement of the status of waters). It will be also an indication concerning the implementation of the supplementary measures useful at the subsequent stages.

STAGE 5 – Elaboration of the baseline scenario in terms of the anthropogenic pressures

The result of this stage will be the forecasts of pressures (impacts on waters) for the scenarios prepared within the stage 4. To evaluate the future pressures on waters (ex. volume of water abstractions, load of pollution in the evacuated wastewater, length of embankments) he results of the scenarios will be superimposed on the present pressures. It should be done through a translation of the combined scenarios for the main driving factors and of the scenarios for the planned investments and environmental measures into the future pressures on waters.

In that purpose one should identify the links between the sources of pressures:
baseline scenario for the municipal sector (ex. number of inhabitants, standard of the sanitary installations, level of services' activity)
baseline scenario for the agriculture and forestry (ex. size of breeding, surface of irrigated areas, surface of fish ponds)
baseline scenario for the industrial sector (ex. volume of production, level of use of the best available techniques)
and the main pressures (impacts) on waters generated by these sectors:
quantitative pressures: volume of water abstraction and wastewater discharge,
qualitative pressures: volume of pollution loads from the punctual and diffuse sources
hydromorphological pressures: scope of works in the river-beds, volume of reservoirs, scale of transversal and longitudinal hydrotechnical constructions.

In most cases these relations cannot be described in a simple way as it is not easy to identify the relations of the „reason – result" type or the localisation of the activity that generates the pressures isn't known.
If there is a possibility to establish the causal-consecutive relations, at this stage it's possible to build a data base that will be used later to illustrate the links between the present water uses and related pressures and also, if possible with the status of waters. For a selected hydrographic unit this data base can be elaborated in three sheets:
Uses sheet. All types of uses for a given unit should be considered and their technical-economic dimensions are described (limited to measurable dimensions of the characterisation of pressure: volumes abstracted by activity, pollution flows produced by activity…).

Infrastructure Sheet. Data characterising the particular water uses (ex. standard of the sanitary equipment of flats, non-returnable use of the abstracted water, performance of the WWTP, indicator of compensation of the outflow of water from the reservoirs).

Pressures Sheet. Pressures (impacts) related to different types of water use (ex. volume of water abstraction, volume of wastewater discharges, load of pollution in the wastewater for the given unit). Such data should be expressed in typical units corresponding to the defined indicators of pressures (ex. abstraction of water in l/s or in m3/day, m3/year). Functions allowing to translate the characterisation of water uses into pressures can be very simple (ex. the volume of water abstraction is proportional to the volume of production). In case of many types of anthropogenical impacts or of many different protection measures we cannot determine the exact functional dependence between the scale of impact /activity and

the expected result/effect; in many cases the estimations of effects can be done using the indicatory methods; often the only estimation will be a more or less precise experts' opinion.

Net pressures related to activity and equipment: consumption ratios, net pollution discharges located in the given unit. These data can be expressed in any pressure parameter: abstracted volumes per month/year, pollution discharges in quantity/day or /year… The functions that translate activities characteristics into pressures can be very simple (fixed value for a general kind of production) or more sophisticated.

If there is no link formula between drivers (activities) and pressures, but pressures are known and localised and activities are not, a general method to forecast pressures up to 2015 can be to apply a percentage evolution of changes based on experts interpretation of drivers scenarios and/or statistical study of past pressure data.
When there is no easy quantification of pressures (habitats alterations for instance) but some of them can be described by several quantity or quality indicators, the changes of these factors can be used to justify the description of the resulting changes in terms of this pressure. This is done through experts' knowledge. Workshops might be organised to deal with specific issues: biology, ground waters, wetlands... or statistical study of past trends in the quantified indicators can be used.

In case of the qualitative pressures on water – it might be simpler and easier to try to translate directly drivers scenarios in water status scenarios, meaning not going through pressures but directly to the impact. The illustration 4 shows an example of calculation of the forecasted volume of pollution loads evacuated to the environment and of the percentage of their reduction, through the realisation of the investments previewed in the KPOŚK and of the individual treatment systems.

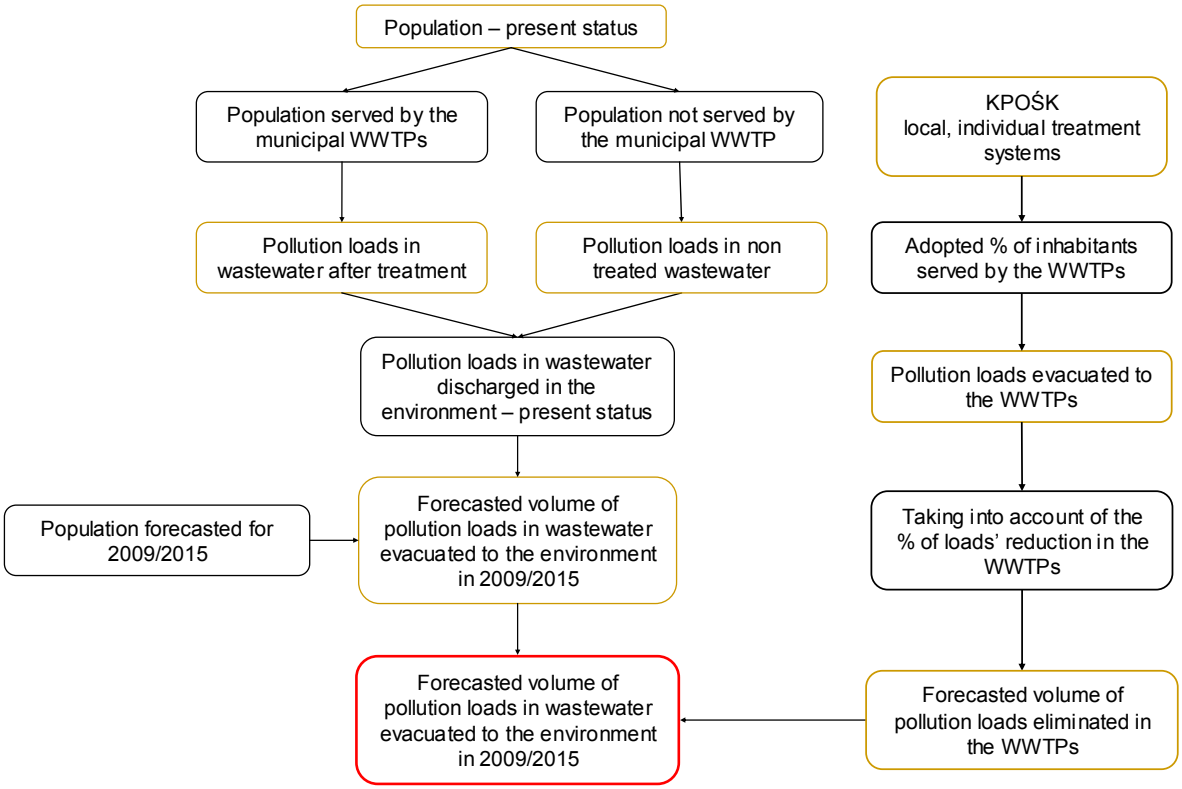


Illustration 4. Example of scheme of procedure within the calculation of the forecasted volume of pollution loads evacuated to the environment and the percentage of their reduction after the realisation of the investments planned in KPOŚK and of the individual treatment systems

During the subsequent stages of the planning process (analysis of risk of failing to meet the environmental objectives) it may appear that not only the links between factors and pressures are difficult to identify. It may be even more difficult to find the links between pressures and impacts.

Remarks:

1. The scale of pressures forecasts can be determined depending on the type of pressures: the quantitative data at the level of water bodies may come from the data base of discharges and abstractions created with use of the GIS system; the information on the qualitative status can be given for the aggregated homogenous water bodies' scale.
2. Maps and graphic illustrations presenting the results of the analysis can constitute a good basis for the discussion with experts.
3. A sensitivity analysis is needed to evaluate the difference in the level of pressures according to pressures scenarios derived from drivers scenario. The latter can seem very different but their translation into pressures might not show such a difference. Thus, developing different drivers scenarios might, at this stage, not prove useful.
4. The method to assess pressures must be thought in a continuous process of updating, upgrading and reviewing of the possessed information.

STAGE 6 – Determination of the consequences of the realisation of the scenarios of the possible changes

This stage is the final stage of the elaboration of the baseline scenario. It consists in the definition of the possible water status resulting from the adopted baseline scenarios and of the probability of realisation of the selected scenarios. In this part it is necessary to prepare the pertinent materials for the determination of the pressures on the aquatic environment through the establishment of links of the pressures with the waters' status.

The quantitative pressures may be evaluated in the following way:
- Using the digital modelisation on the basis of the 2015 pressures scenario.
- Through approximate estimation of every indicator refined by the experts' opinion and during the discussion.

As concerns the qualitative pressures or the pressures for which we don't have a sufficient quantity of data, the evaluation of impact on the water status should be done on the basis of the experts' knowledge.

The next stage in terms of the preparation of the programmes of measures is the assessment of risk of non achievement of the environmental objectives determined in the WFD for the homogenous water bodies (good status) taking into account the trends and the planned mitigation measures. In the baseline scenario one can realise the first determination of the principles of the modelisation of this risk.

II.2 ASSESSMENT OF RISK OF FAILING TO MEET THE WFD'S OBJECTIVES BY THE WATER BODIES

II.2.1 Definition and place in the planning process

Water Framework Directive says that: "For the water bodies, for which a risk of non-achievement of the environmental quality objectives has been stated, a further characterisation is carried out, in order to optimise the monitoring programmes required accordingly to art. 8, as well as the programmes of measures required accordingly to art. 11."

The Water Framework Directive assumes the achievement of four main environmental objectives:
non-deterioration of the status of the water bodies,
good status of waters in 2015 in particular:
ecological and chemical status for surface waters,
chemical and quantitative status for groundwater,
good ecological potential and chemical status for the artificial and heavily modified water bodies,
fulfilment of the special requirements for the protected areas,
cessation or progressive elimination of the discharges of priority substances in the environment, or the reduction of such discharges.

To enable the identification of the possible activities which will help to achieve the above objectives, it is necessary to assess the probability of fulfilling them by 2015, i.e. to assess the risk of non-achievement of these objectives. Accordingly to the annexe III of WFD, within the elaboration of the risk assessment one should use the information gathered during the identification of the important anthropogenic impacts and the evaluation of their influence on the status of waters as well as all the other information, including the existing data from the monitoring of the environment.
When analysing the regulations of the Water Framework Directive and of the Polish legislation regarding the entire water management planning process, we find a clear place for the elaboration of the assessment of risk of non-achievement of the environmental objectives by 2015. As results from these regulations the refinement of the risk assessment should take place after the identification of the important impacts and the assessment of their influence on the water status as well as after the elaboration of the scenarios of possible changes (baseline scenario) and before proceeding to the identification of the important issues of the water management.

II.2.2 Necessary data

1. The initial analysis of risk of non-achievement of the environmental objectives for the homogenous surface and groundwater bodies, developed for the needs of the 2005 Report to the European Commission.
2. Identification of the important anthropogenic impacts and of their influence of the status of the homogenous surface and ground waters' status;
3. Baseline scenario;
4. Surface water bodies;

5. Monitoring data - quantity, quality (biology, physics/chemistry) for the SJCWP, as well as quantitative and qualitative data for the groundwater bodies;
6. Hydromorphological conditions;
7. Results of the groundwater monitoring from the national network and the regional networks of WIOŚ;
8. Data base of the hydrogeological map of Poland 1:50 000;
9. Hydrogeological documentation defining the disposable resources of the groundwater;
10. Documentation determining the hydrological conditions for the establishment of the protected areas of the main groundwater reservoirs in Poland;
11. Determination of the perspective resources on the areas of activity of the regional offices for the water management (PIG Warsaw 2003).
12. Inventories of the groundwater that constitute or can constitute a source of drinking water supply for the population;
13. Lists of protected areas

II.2.3 Recommended methodology

a Short characterisation of the approach

The identification of the water bodies at risk of non achievement of the WFD objectives is a planning stage allowing to distinguish those sub-basins for which it will be necessary to apply – despite the basic measures – also the supplementary measures. The methodology differs depending on the category of the considered water bodies. The present Guidance shows a possible way of proceeding for the surface and groundwater bodies as well as for the coastal and transition water bodies. The process of the elaboration of the risk assessment consists in comparing the water status forecasted for 2015 determined on the basis of the following ideological algorithm:

current status of waters + baseline scenario = status forecasted for the year 2015 comparison with the water status required from the point of view of the WFD's environmental objectives

Due to the lack of data and the use of information not acquired on regular basis, the establishment of the first water management plans will necessitate the use of a series of approximations and to involve many experts from various domains. For these reasons the proposed methodological solutions dealing with the risk assessment should get refined in the future. The step by step character of the risk assessment elaboration consists first of all in the analysis of the present status and in the indication of lacks and needs in terms of its realisation. The next step is the „translation" of the measures planned in the baseline scenario and aiming at the improvement in 2015 of the water status. At this stage the proposed approach differs importantly depending on the considered category of water bodies. In this place it is also possible to use supplementary instruments of the planning process, such as numerical models. However the summary of the risk assessment, independently on the category of the water bodies, should consists in indicating the water bodies at risk and not at risk of failing to meet the WFD's objectives by 2015. It is also allowed to determine the water bodies potentially at risk, i.e. the water bodies for which the lack of data involve an impossibility in present and forecasted status assessment.

b Stages of the elaboration of the risk assessment for the surface waters

The process of the risk assessment risk elaboration is mainly based on the analysis of the water status forecasted for the year 2015.
The overall algorithm of procedure within the elaboration of the risk assessment for the surface water bodies is illustrated hereafter;

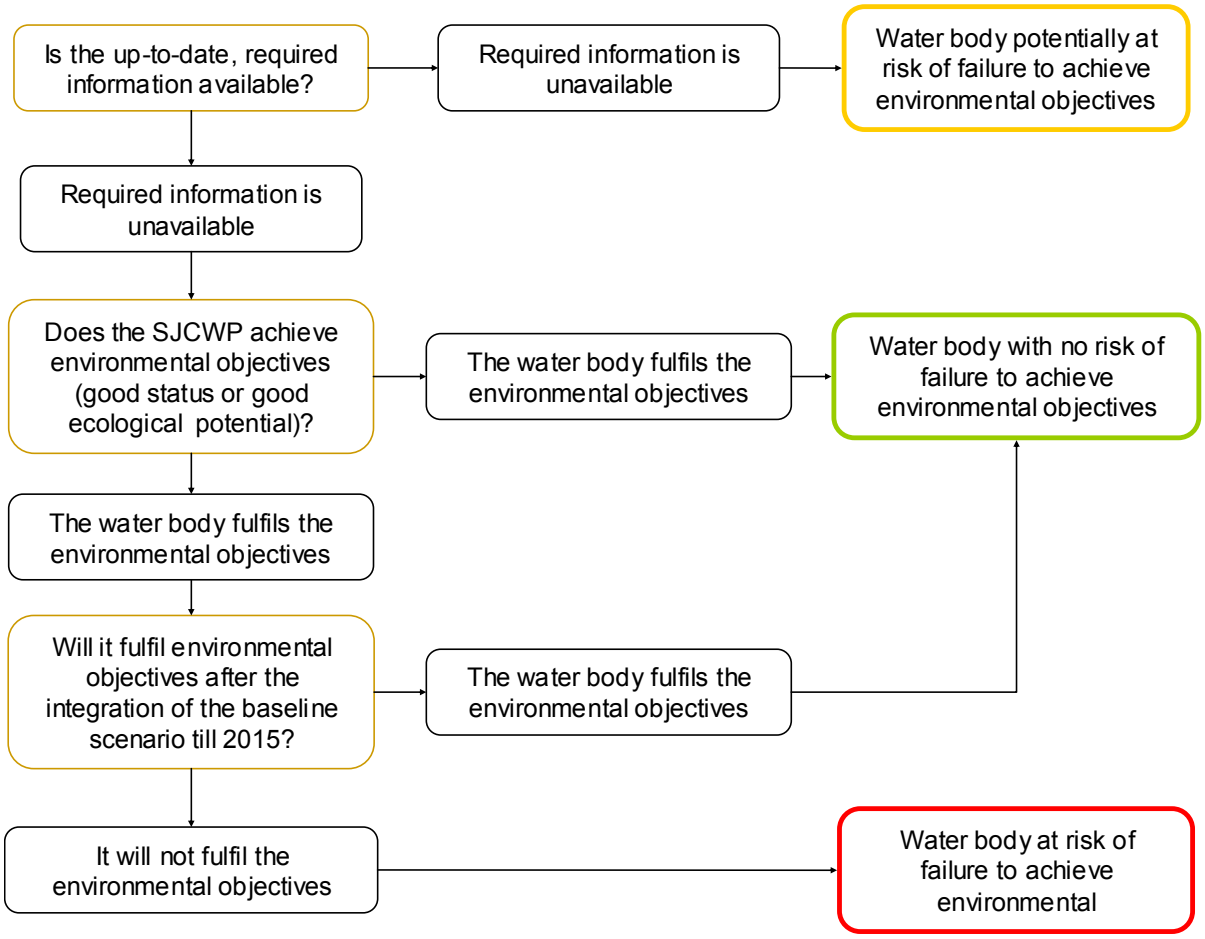


Illustration 5 Scheme of an overall algorithm of the elaboration of the assessment of risk for the surface waters

Attention! The illustration 5 presents only the procedure of the definition of classes: at risk – not at risk of non achievement of the environmental objectives. There is no estimation of the probability of "non achievement of the environmental objectives", i.e. of risk here.

STAGE 1 – Analysis of the present status of the water bodies

Generally, the aggregated surface water bodies were designated in a way that would ensure a potential determination of those waters' status through an analysis of the monitoring results in the points that are closest to SJCWP's closing cross-section. Should there be no monitoring point for water quality at SJCWP's closing cross-section (physics/chemistry, biology) the closest point located above or below the closing cross-section allowing to present the status of waters in a given SJCWP should be considered (accordingly to the methodology presented in the „Guidance on the aggregation of the homogenous water bodies using GIS system for the needs of the Water Framework Directive UE 2000/60/EC", RZGW Kraków and Gliwice, 2005.).

Should there be no qualitative monitoring to refer to, because of too big values of the variables (significant tributaries, numerous pollution sources, change of morphologic conditions), the analysed SJCWP is automatically classified as potentially at risk of non-achievement of the environmental objectives.
When receiving data from the monitoring points displaced respect to the SJCWP's closing cross-section, a special attention should be paid to the existing impacts (pollution discharges, water withdrawals, hydraulic engineering structures, etc.) located between the closing cross-section and the monitoring points.
The first step towards the determination of the waters' current physical/chemical condition is an analysis of concentrations of the indicators adopted for risk assessment and a comparison with the limit values of these indicators for the adopted substitute environmental objectives, e.g. the appropriate category of surface water used to supply the public with drinking water, water fulfilling the requirements for inland waters that are a living environment for salmon fish, or water used for bathing and recreation.
If, in result of the realised comparison, we conclude that no scores of indicators corresponding to the "good status" haven't been exceeded, we assume that the status of the given SJCWP will not deteriorate, i.e. it is not at risk of failure to achieve environmental objectives. The above principle should be treated as obligatory to be met in all of the SJCWPs, there may however be cases for individual examination by experts.
If the comparison of the concentrations of the indicators shows that the values of at least one of the indicators have been exceeded in a given SJCWP, then we move on to a further analysis.

STAGE 2 – Analysis of the status of the water bodies in 2015

As it has been presented at the beginning, the water status forecasted for 2015 will be determined in such a way that the results obtained in the baseline scenario for the major sectors of economy, i.e. the changes in pollution volumes evacuated from the particular sectors in result of socio-economic transformations, will be superimposed on the current status of waters. When determining the condition of waters in 2015, special attention should be paid in the case of consecutive SJCWPs, i.e. those whose status depends on the status of the SJCWP located upstream. Thus, with river basins consisting of e.g. a few SJCWPs, a "source-down" principle should be adopted, so that a course-wise continuity of assessment among the particular SJCWPs can be preserved.

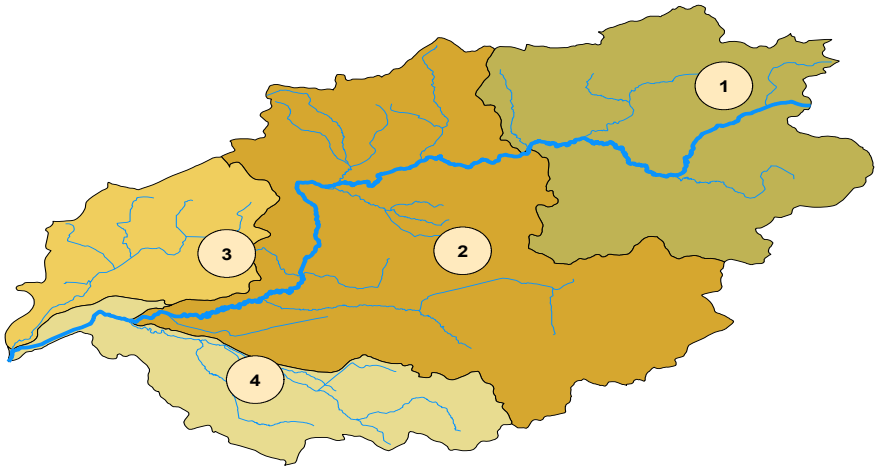


Illustration 6: An example of a "source-down" SJCWP assessment sequence

In order to determine the status of SJCWP for the Vistula and the Odra, at the scale of the water regions, it will be essential to cooperate and relay the information concerning the

results among the individual RZGWs so that it could be taken into consideration in further SJCWPs.

In order to determine the status of waters in 2015, pollution loads for each aggregated homogenous surface water body need to be calculated using qualitative and quantitative monitoring results for those waters.
The manners of loads' calculation at the basis of the monitoring measurements can be found in: "Identification and evaluation of athropogenical impacts on the water resources for the indication of the water bodies at risk of non achievement of the environmental objectives", Cracow Polytechnics, Monograph nr 118, 2004 and in "Identification of athropogenical impacts on waters and evaluation of consequences at the basis of the Upper Narew sub-basin", Warsaw 2005.

The load volumes should be determined at "input" and "output" cross-sections of the aggregated water bodies to enable a calculation of the increase in pollution load (ΔL).

In case of difficulties in the calculation of ΔL accordingly to the proposed methodology (ex. lack of necessary data at „output" and „input") it is allowed to use the experts' method to assess ΔL.

According to the adopted principle, the load at the SJCWP "output" is at the same time the load at the "input" of a next SJCWP situated downstream.

Based on the baseline scenario, it is necessary to calculate the share of the individual economy sectors in loads for the baseline year, and then indicate the percentage of reduction or growth of the loads of the individual indicators according to the forecasts for 2015. The result obtained represents the concentrations of the individual indicators in SJCWP's closing cross-sections.

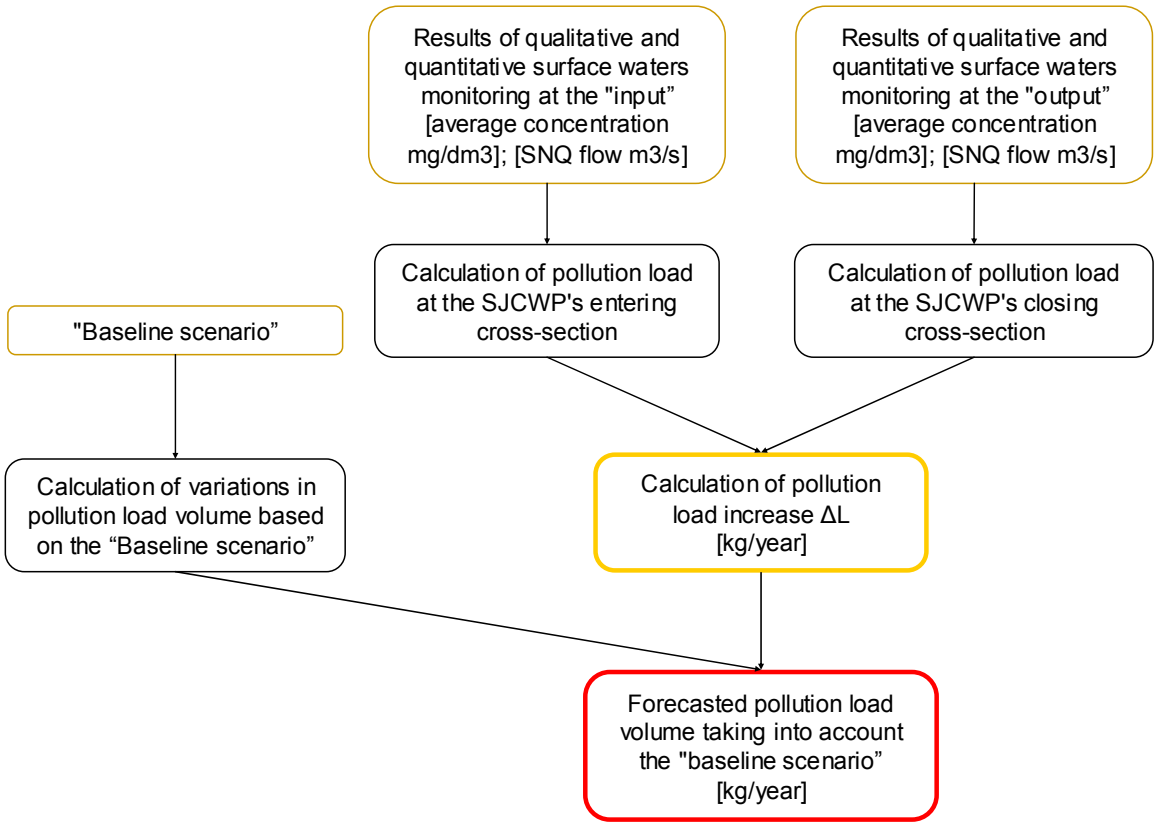


Illustration 7 Scheme of loads' balancing within SJCWP

STAGE 3 – Indication of the water bodies at risk of non achievement of the environmental objectives

The results obtained in stage 2 should be compared with the limit values of the concentration of the individual indicators for the particular environmental objectives. Exceeding any of the indicators defined as the limit value of „good status" implies the classification of the SJCWP as a SJWPC at risk of failure to achieve „good status" and leads to a detailed analysis of this situation. This concerns the trend of changes of the physico-chemical quality indicators in the recent years, the identification of causes of the unsatisfactory values as well as the initial evaluation of their improvement.

Hydromorphological Elements Supporting the Biological Elements
The presented way to proceed with the risk assessment of failure to achieve good status of waters in physical/chemical terms can be applied in a similar way for the elements of biological quality, where changes in the SJCWP's hydromorphology will be auxiliary indicators. The decisive factors in terms of the possibility of changing the habitat conditions by 2015 will be the planned investments and activities in the water management sector (hydrotechnical structures, construction or closedown of water intakes, growth or drop in demand for water in the municipal, agricultural, industrial etc. sectors). The key element in the present analysis will be the results of the biological monitoring of waters. However now there are no possibilities of determining the biological elements for the classification of the ecological status of rivers and lakes because the works are still in course. The elaboration of the methodology of determination of the ecological status of waters and the realisation of tests are planned for the end of the year 2006.

In general, in result of a detailed physico-chemical analysis of the waters' status and of the hydromorphological parameters, we proceed to a final decision on presence or absence of risk of non achievement of the environmental objectives for a given homogenous water body.

c Stages of the elaboration of risk assessment for the groundwater

The purpose of the present part of the guidance is to lead to the designation of the groundwater bodies which are at risk of non-achievement of the environmental objectives by 2015. Here below is presented a procedure elaborated with the assumption that the evaluation of the qualitative and quantitative status will be mainly based on the experts' knowledge and on the available information so that the cost of such a procedure would be relatively low and would constitute a basis for the further activities dealing with the homogenous groundwater bodies whose status has been determined as a bad one.
The risk assessment will consist in estimating the probability of non achievement of the objectives set out by the WFD – good quantitative and qualitative condition – by a given homogenous groundwater body.
The evaluation of risk of non achievement of the environmental and social objectives of the Directive in terms of the groundwater consists in realisation of a procedure in two separate modes taking into account the hitherto considerations on the status of the homogenous groundwater bodies.

For the groundwater bodies whose status has been determined as good (no risk for the realisation f the WFD's objectives), it is recommended to apply a simplified procedure having a character of verification and control:
Has any important error in terms of the evaluation of the groundwater bodies' status been committed at the stage of the initial characterisation,
Do the limits and the requirements for the protected areas change during the scenario's period in a way the would imply the revision of status,

Can the baseline scenario for the driving factors threaten by the appearance of such pressures that would imply the change of the groundwater bodies status into the bad one.

For the groundwater bodies in bad status – potentially at risk of non achievement of the Directive's objectives and requiring a designation of lower environmental requirements - it will be necessary to conduct a deepened analysis of risk of non realisation of the Directive's objectives based on larger analysis of the input data, on more accurate baseline scenarios of pressures and impacts because these water bodies will necessitate the elaboration of a programme of supplementary measures.
At the same time – given the dual character of the characterisation of the groundwater bodies – separate procedures will be developed for the evaluation of the quantitative status and for the analysis of the chemical status of a given groundwater body (illustration 8). Each of these procedures starts with the verification of the correctness of the initial evaluation of the homogeneous water body and with the realisation of a scenario of analysis of pressures originated by structures and activities potentially harmful for the groundwater. The procedure is continued to build a scenario of important impacts of these pressures on the groundwater bodies' status, on the groundwater dependent ecosystems and on the conditions of supplying the population with the drinking water (taking into account the requirements for the protected areas).

In the final phase there is a summary of the whole procedure with a formulation of the forecasted evaluation of risk of non achievement of the Directive's objectives resulting from the evaluation determined for the 2015 status. Such evaluation constitutes a basis for the definition of pertinent programmes of supplementary measures aiming at – depending on the decided qualification of a homogenous groundwater body [JCWPd] – the preservation of the good status in the JCWPd with no risk, achievement of the good status in the JCWPd potentially at risk or at the reduction of negative effects of the bad status in JCWPd qualified as those that necessitate to lower the environmental requirements.

In the cases when some doubts exist on the reliability of the results of the groundwater status' evaluation in the light of the environmental and social objectives defined for the JCWPd, the lack of pertinent information required for the evaluation results in a qualification of a given groundwater body among the group of water bodies potentially at risk, that need to be covered by a work programme, including especially the groundwater monitoring. The decision on the mode of works and on the scope of the information necessary for the definition of the risk assessment depends in a great measure on the general knowledge of the hydrobiological and environmental problems, important for the analysed JCWPd.

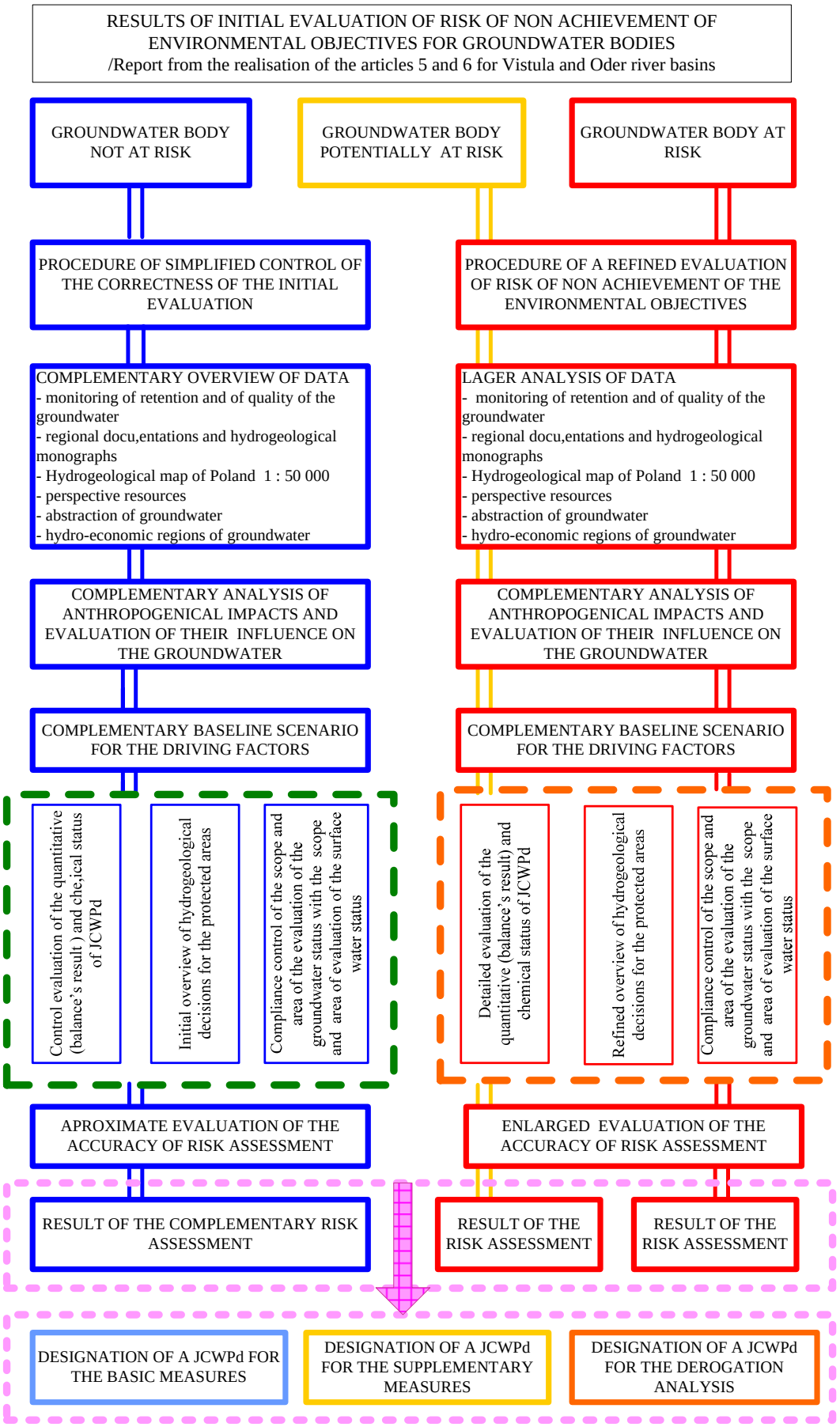


Illustration 8 Scheme of the algorithm of the risk assessment for the JCWPd

STAGE 1 – Analysis of the current status of the groundwater

Accordingly to the general rule of experts' elaboration of the assessment of risk of non achievement of the Directive's objectives and accordingly to the rule implying to base this evaluation on the available input data, the procedure of risk assessment is realised at the scale corresponding to the status of the informational materials. In a situation that authorises the delivery of a reliable risk assessment only on the basis of the results of the pressures' analysis, the procedure can be shortened (Illustration 9).

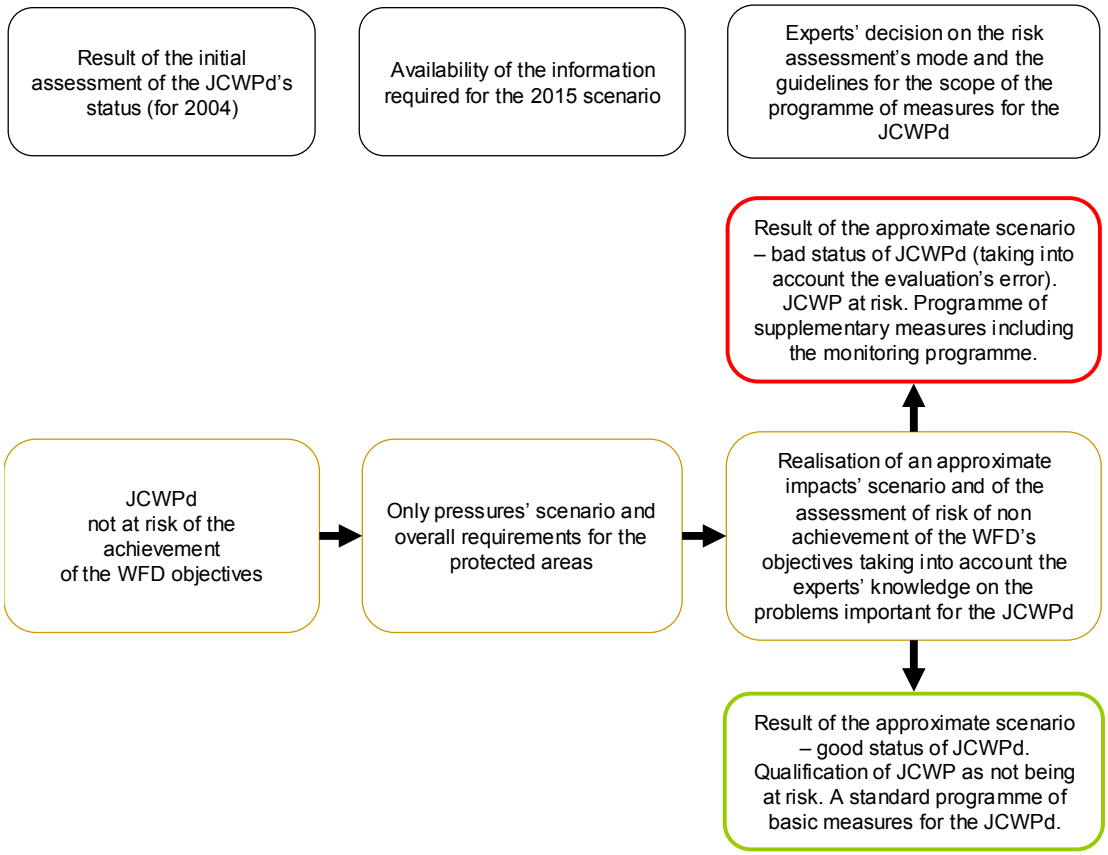


Illustration 9 Overall algorithm of the elaboration of an approximate assessment of risk of non achievement of the objectives of the Water Framework Directive by a homogenous groundwater body (JCWPd).

Accordingly to the above remarks and in relation to the kind of the characterisation of the groundwater (hydrodynamics or chemism) being the object of the JCWPd's status evaluation and independently on the period for which the evaluation is established, this evaluation will cover the determination of the degree of recognition and then the identification of the following elements:

Evaluation of the quantitative status of a homogenous groundwater body:

1. Priority environmental objectives - requirements dealing with the location groundwater-plane and with the directions and intensity of flow defined for the protected areas for the aquatic and continental ecosystems having determined water needs,
2. Priority social and economical objectives - requirements dealing with the location groundwater-plane and renewable resources of the groundwater defined for the protected areas that constitute the present and the future source of drinking water supply for the population and of the water for the alimentary production,

3. Hydrogeological conditions of a JCWPd deciding about its hydrodynamics (renewable resources, forms of drainage, hydrogeological properties and spatial formation of water-bearing and isolating levels, hydraulic contacts),
4. Pressures – zone of groundwater withdrawals' and drainages' concentration (municipal and industrial intakes, intakes for agricultural and breeding production, post mining drainage), that can importantly influence the groundwater's quantitative status (balance's result, location of the water-bearing level, groundwater flow directions),
5. Impacts on the quantitative status of the groundwater:

Changes in the groundwater's balance and in the available resources to be managed, anthropogenic changes of the precipitation's' infiltration (resources renewing),
Changes of the location of the water-plane,
Changes of flow of the groundwater,

6. Influence of the changes of balance and of the water-plane

Changes of the protected aquatic and continental ecosystems depending on the groundwater (changes within flora and fauna, economical values, landscape's values, etc..),
Changes of the hydrodynamic conditions of the water supply for the population and for the food production,
Changes of the groundwater's flow's directions in the area of contacts of the fresh waters with the naturally saline waters and with the polluted waters (ground- and surface waters).

Evaluation of the chemical status of a homogenous groundwater body:

1. Priority environmental objectives – protected areas established for the aquatic and continental ecosystems having determinate requirements in terms of the chemical status of the groundwater,
2. Priority social and economical objectives - protected areas that constitute the present and the future source of drinking water supply for the population and of the water for the alimentary production, having defined requirements in terms of the groundwater's' chemical status,
3. Hydrogeological conditions of a JCWPd shaping the sensibility of the groundwater on pressures and receptivity of JCWPd in frame of the pollution's dissemination (isolation from the surface of soil, types of formations and of the circulation routes, spatial formation),
4. Pressures

Emission of pollution that can penetrate or that migrate towards the groundwater from the concentration's zones of structures and enterprises that are potentially or actively inconvenient for the groundwater,
Infiltration, ingression or ascension of the saline or polluted water that can penetrate or that penetrate through the zones of anthropologic contacts (artificial hydrogeological window, hydrodynamic constraints):
Between ordinary groundwater in good chemical status and the saline groundwater,
Between the groundwater in a good chemical status and the surface waters in bad status (anthropogenically and neogenically conditioned),

5. Impacts on the chemical status of the groundwater:

Changes in the concentrations of the priority substances in the groundwater,
Changes in the physico-chemical parameters of the groundwater,
Changes in the groundwater quality classes (observed in the monitoring points),

6. Influence of the changes of the chemical status of the groundwater

Changes of status of the protected aquatic and continental ecosystems depending on the groundwater (changes within fauna and flora, of the economical values, etc.),
Changes of the hydrogeochemical conditions of the groundwater abstraction for the water supply of the population and for the alimentary production (increase of the concentration of the water quality indexes requiring to use expensive treatment installations),

One should notice that some elements of the evaluation of the quantitative and chemical status are in causal-consecutive relation and appear jointly, ex. changes of the groundwater's chemism produced under the influence of changes in the hydrodynamics – ascension of the deep saline waters in result of reduction of the hydraulic head in the lower level of the fresh water, infiltration of the polluted river waters within the depression hopper created by the groundwater intakes.
The realisation of the assessment in the experts' mode – accordingly to the rules formulated in the studies mentioned in the introduction – is an analysis of the alternative questions and answers that are either positive or negative or that state a lack of pertinent data necessary to give a positive or negative answer.
The question dealing with the definition of status requires to take into account – as far as possible – the quantitative description of the phenomena. When formulating the definition and in the part containing the guidelines on the status' assessment, the Directive uses different descriptions, such as „important impacts", „significant influence" entrusting the thematic handbooks and the experts responsible for the evaluation of the JCWPd's status with the task of precising the analysed parameters.

STAGE 2 – Analysis of the groundwater status in 2015

The more the input data - that constitute the basis of the evaluation of status - contain the results of the field observations of the parameters that can be compared with the threshold values for the good status of the groundwater and the more the requirements dealing with the hydrodynamic and hydrochemical parameters have been detailed, the more the evaluation of the status of the JCWPd will be a reliable basis for the determination of risk of non achievement of the Directive's objectives by 2015 and for the elaboration of the programmes of measures leading to the realisation of the Directive's objectives.

One should be aware that, as it is also indicated in the Directive, the evaluation of the waters' status has an iterative character – it covers the subsequent cycles of the elaboration of the procedures of the evaluation of risk of non achievement of the objectives that are realised periodically as the base of available and reliable input data gets enriched..
The realisation of an analysis composed of a full cycle of questions and answers leads to a formulation of a definitive - in a given cycle - evaluation of the quantitative and chemical status of the groundwater and to the classification of an homogenous water body as not being at risk or being at risk of failure to meet the objectives.
The general algorithms of such a procedure are presented on the Illustrations 10 and 11.

Important **pressures** (installations and activities that can have an important influence on the hydrodynamics) - status foreseen for 2015	are there important pressures	Important impacts on the hydrodynamics of the groundwater (on the balance, position of the water level, and renewability of resources)	are there important impacts	Important changes of the status of the aquatic and land ecosystems (including those in the protected areas), important changes within the conditions of the water supply for the population	are there important changes	partial evaluation of the groundwater status		Evaluation of risk of non achievement of the				
								Do the changes have a reversible character in the deadline by 2015 with application of the rational measures or cessation of pressures		Partial qualification of risk of non achievement of the WFD obejctives by a JCWPd		
						bad	good	yes	no	nzg	ptzg	ow
Big municipal and industrial groundwater intakes, mining deshydratations , groundwater intakes for the agricultural irrigations	yes	Sum of abstractions of the groundwater more important or close to the volume of available groundwater resources from the usable levels (disposable and/or in perspective)	yes	Drying up and disappearance of marshes (PZM)	yes							
					no			(doesn't concern)				
				Long periods of abasement of the rivers' flows below the reserved one (Q<Qn)	yes							
					no			(doesn't concern)				
				Harmful changes (ZSFF) of natural fauna and flora, disappearance of the	yes							
					no			(doesn't concern)				
				Important reductioon of the productivity of groundwater intakes (ZOWU)	yes							
					no			(doesn't concern)				
			no	(doesn't concern)				(doesn't concern)				
		Visible and permanent abasement of the level of the water table, locally and also below the natural base level of drainage	yes	PZM	yes							
					no			(doesn't concern)				
				Q<Qn	yes							
					no			(doesn't concern)				
				ZSFF	yes							
					no			(doesn't concern)				
				ZOWU	yes							
					no			(doesn't concern)				
			no	(doesn't concern)				(doesn't concern)				
	no	(doesn't concern)		(doesn't concern)				(doesn't concern)				
Surface evacuation of precipitations (areas of urban & industrial agglomerations covered by the precipitation sewage system)	yes	Visible and permanent abasement of the level of the water table, important reduction of rewablility of groundwater resources	yes	PZM	yes							
					no			(doesn't concern)				
				Q<Qn	yes							
					no			(doesn't concern)				
				ZSFF	yes							
					no			(doesn't concern)				
			no	(doesn't concern))				(doesn't concern)				
	no	(doesn't concern)		(doesn't concern)				(doesn't concern)				
wide-spread agricultural and forest melioration connected with the earth water drainage	yes	Visible and permanent abasement of the level of the water table	yes	PZM, Q<Qn	yes							
					no			(doesn't concern)				
				ZSFF	yes							
					no			(doesn't concern)				
			no	(doesn't concern)				(doesn't concern)				
	no	(doesn't concern)		(doesn't concern)				(doesn't concern)				
Pressures as above	yes	Impacts as above	yes	Lack of sufficient monitoring and documentation data for the definition of the scale of changes in the protected areas	experts' decisions			Brak danych do dokonania oceny				
								(doesn't concern)				
			no					Lack of data for the evaluation				
	no	(doesn't concern)		(doesn't concern)				(doesn't concern)				
Pressures as above	yes	Lack of sufficient monitoring and documentation data on the scale of impacts	experts' decisions	(as above)	experts' decisions			Lack of data for the evaluation				
								(doesn't concern)				
								Lack of data for the evaluation				
	no	(doesn't concern)		(doesn't concern)				(doesn't concern)				
Overall evaluation of the foreseen quantitative status of JCWPd and of the risk of non achievement of WFD objectives is the good status condition fulfiled in all the partial evaluations of the status: yes or no					yes			(doesn't concern)				
					no			all yes				
Final qualification of risk depends on the compliance of the partial qualifications . JCMPd: nzg-not at risk, ptzg-potetially at risk, ow-necessary reduction of the requirements									at least one no			

Illustration 10 Scheme of the quantitative status of the chemical status of JCWPd

Important **pressures** (installations and activities that can have an important influence at the chemism) - status foreseen for 2015	are there important pressures	Important impacts of the groundwater's chemism	are there important impacts	Important modifications of the status of the aquatic and land ecosystems (including in the protected areas), important modifications of the conditions of water supply for the population	are there important modifications	partial evaluation of the surface waters' status		Risk of non achievement of the WFD objectives				
								Do the modifications have a reversible character in the deadline by 2015/2021/2027 with the application of rational measures or after the cession of pressures		Partial qualification of risk of non achievement of the WFD objectives for a JCWPd		
						bad	good	yes	no	nzg	ptzg	ow
Important decrease of the hydraulic altitude of usable levels and earth waters in: a) the coast zone of the sea (ingressions), b) the region opf conatct with deep waters (ascensions), c) the zone of contacts with the polluted surface waters (infiltration)	yes	a), b) increase of salinity c) increase of contents of Cl, SO_4, Fe, nitrogen and phosphorus compound, detergens, phenols, heavy metals and other pollutants	yes	Transgression of the acceptable indicators of water quality in the drinking water abstarction points	yes							
					no			(doesn't concern)				
				Transgression of the acceptable indicators of water quality in the main reservoirs of grounwater and zones of protection of intakes	yes							
					no			(doesn't concern)				
				harmful changes of fauna and flora	yes							
					no			(doesn't concern)				
				Risk in further pesrpective (growing trend in terms of pollutants' content)	yes							
					no			(doesn't concern)				
	no		no	(doesn't concern)				(doesn't concern)				
Important rise of the water levels at the area of disappearance of depressions cones after the end or the reduction of the mines' dehydratation (inluding immersion of drifts) and after the end or the reduction of the exploitation of the groundwater intakes	yes		yes	Transgression of the acceptable indicators of water quality in the drinking water intakes	yes							
					no			(doesn't concern)				
				Transgression of the acceptable indicators of water quality in the main reservoirs of grounwater and zones of protection of intakes	yes							
					no			(doesn't concern)				
				Degradation of the quality of surface water, harmful changes of natural fauna and flora	yes							
					no			(doesn't concern)				
				Risk in further pesrpective (growing trend in terms of pollutants' content)	yes							
					no			(doesn't concern)				
			no	(doesn't concern)				(doesn't concern)				
	no	(doesn't concern)		(doesn't concern)				(doesn't concern)				
Punctual, linear and diffuse sources of groundwater pollution : waste reception centers, depots of oppresive substances, roads, gas and dust emissions, fertilisation in agriculture, pesticides, other surface and underground accumulations of pollutants	yes	increase of contents of : Cl, SO_4, Fe,nitrogen and phosphorus compounds, detergents, petrleum derivated compounds, phenols, heavy metals and other pollutants	yes	Transgression of the acceptable indicators of water quality in the drinking water intakes	yes							
					no			(doesn't concern))				
				Transgression of the acceptable indicators of water quality in the main reservoirs of grounwater and zones of protection of intakes	yes							
					no			(doesn't concern)				
				Degradation of the quality of surface water	yes							
					no			(doesn't concern)				
				harmful changes of fauna and flora	yes							
					no			(doesn't concern)				
				Risk in further pesrpective (growing trend in terms of pollutants' content)	yes							
					no			(doesn't concern)				
			no	(doesn't concern)				(doesn't concern)				
	no	(doesn't concern)		(doesn't concern))				(doesn't concern)				
Pressures as above	yes	(impacts as above)	yes	Lack of sufficient monitoring and documentation data for the definition of the scale of changes in the protected areas	experts' opinions			Lack of data for the evaluation				
								(nie dotyczy)				
			no					Lack of data for the evaluation				
	no	(doesn't concern)		(doesn't concern)				(doesn't concern)				
Pressures as above	yes	Lack of sufficient monitoring and documentation data on the scale of impacts	experts' opinions	(as abovej)	experts' opinions			Lack of data for the evaluation				
								(doesn't concern)				
								Lack of data for the evaluation				
	no	(doesn't concern)		no				(doesn't concern)				
Overall evaluation of the foreseen chemical status of JCWPd and of the risk of non achievement of WFD objectives is the good status condition fulfiled in all the partial evaluations of the status: yes or no Final qualification of risk depends on the compliance of the partial qualifications . JCMPd: **nzg**-not at risk, **ptzg**-potetially at risk, **ow**-necessary reduction of the requirements					yes			(doesn't concern)				
					no			all yes				
									at least one no			

Illustration 11 Scheme of the chemical status of the chemical status of JCWPd

The procedure covers a sequence composed of steps going from the departure point which is the evaluation of the JCWPd status done in 2004.(March 2005 Report).
An analysis of the necessary initial information must be done before we start the procedure of the realisation of the 2015 JCWPd's status. Such an analysis covers:

1. Verification if there are new data or information not taken into account in the evaluation of the JCWPd's status done in 2004 that can importantly change the initial evaluation of status,
2. Approval or correction of the status of the JCWPd accordingly to the 2005 Report – definition of the initial JCWPd's status for the elaboration of status' scenario for 2015.,
3. Verification if there is an information on the development of the driving factors and pressures in the period by 2015, necessary to develop the baseline scenarios of status for the JCWPd for the year 2015,
4. Verification if there is an available information on the development of the protected areas in the period till 2015 and the requirements defined for them as concerns the groundwater's status,
5. Verification if there is a necessary information on the hydrogeological conditions of the JCWPd necessary for the realisation of the scenario of impacts on the JCWPd's status for 2015,
6. Summary of the realised analysis of the available information with the definition of the degree of recognition of the necessary input data for the realisation of the scenario and for the decision on:

Proceeding to an simplified qualification of JCWPd into a determined category of risk of non achievement of the WFD's objectives accordingly to the procedure's scheme shown on the Illustration in case of the lack of information that would be sufficient to develop a scenario
Realisation of the scenario of status of the JCWPd for 2015 accordingly to the schemes given on the Schemes 10 and 11.

The procedure proposed on the schemes 10 and 11 consists in evaluating all the recognised types of impacts on the groundwater's status in the particular categories (quantitative and qualitative – chemical) as well as of the changes that they generate in the environment and in the conditions of water supply for the population.
The final assessment of the quantitative status is a sum of partial assessments based on the determination of the scope of impacts on the analysed elements of the groundwater dynamism – balance of withdrawals and resources, renewability of resources and the location of the water-plane as well as the determination of the scope of changes occasioned in the analysed elements of the environment: swamp flooding, low water in rivers, changes within flora and fauna living in the groundwater dependent habitats and changes in the conditions of exploitation of intakes producing the water destined for the human consumption.

STAGE 3 – Indication of the water bodies at risk of non achievement of the environmental objectives

After the realisation of the JCWPd's status assessment accordingly to the chosen procedure we proceed to the qualification of a JCWPd in terms of the evaluation of risk of non achievement of the WFD's objectives.
The evaluation of risk is based on the analysis of the character of changes in the environment and in the conditions of drinking water supply in the JCWPd in bad quantitative status. The result of this analysis is the basis for the realisation of risk of non achievement of the WFD's objectives. The elements of the evaluation of the quantitative status are considered from the point of view of the reversibility of changes that appeared in them..

If no important changes are stated in all the evaluation elements mentioned at the previous stage, then the quantitative status of the groundwater is considered as good and – in consequence – the JCWPd is determined as not being at risk in this domain.

If one or more elements subjected to the analysis doesn't fulfil the conditions of the good status, then the quantitative status of the groundwater is estimated as bad and the JCWPd is considered as being at risk of failure to meet the WFD's objectives.

If the modified elements of the quantitative status of the groundwater and the changes in the environment and in the water supply conditions occasioned by them cannot be brought – in result of the application of technically available and economically justified restoration measures – to the good status, then JCWPd's status is defined as threatening by non failure to meet the WFD's objectives in a degree requiring to lower the requirements (to fix less strict objectives) and to proceed to a pertinent correction of the quantitative criteria for the groundwater. The risk of non achievement of the good quantitative status in such a situation is defined as high. The risk of non achievement of the good quantitative status is the higher, the more reliable were the input data at the basis of the realisation of a forecast concluded with the determination of a bad quantitative status and of the qualification of the produced changes as irreversible. Accordingly to an overall principle of the realisation of the evaluation of status and of the risk degree, the final qualification of a JCWPd depends on the compatibility of the partial qualifications taking into account particular elements of the quantitative status. If at least one of these elements has been determined as irreversibly modified, then the JCWPd is qualified as highly at risk and is designated for the definition for it of less strict objectives mentioned in the Directive..

If the modified elements of the quantitative status can be – in result of the application of the rational restoration measures – brought to the good status in the deadline fixed by the Directive, then the forecasted status is considered as being potentially at risk of non achievement of the Directive's objectives. The risk of non achievement of the good quantitative status for the JCWPd may be described as moderate, authorising the elaboration and the implementation of the programmes of restoration measures.

The deadline fixed by the Directive for the achievement of the objectives is the year 2015 and – in the justified cases – the year 2027 (period covering two subsequent 6-years cycles of development, implementation and correction of the programmes of measures and of the report on the control of the achieved results of such measures).

d Stages of the elaboration of risk assessment for the transition waters

Of all the water types mentioned in the WFD, the transition and coastal waters have not yet seen a complete refinement of the assessment methods. There is a shortage of tools and often a shortage of data that would allow to reliably make such assessments. Thus, the proposals contained in this point should be treated as very preliminary suggestions, which could undergo far-reaching changes and refinements.

Following the WFD definition, transition water is to be defined as the estuary section of a river up to the cross-section, in which the impact of seawater flow disappears.

STAGE 1 – Current Status Assessment

The following is suggested for the assessment of transition waters:

- Physical/chemical and biological assessment criterion as basic criterion,
- Criterion of changes in hydrological regime as second-place criterion,
- Morphological quality criterion as supplementary criterion.

The scope of physical/chemical and biological assessment includes 17 indicators for which the limit values have been specified in "Identification and Assessment of anthropogenical impacts on waters with an indication of water bodies at risk of non achievement of environmental objectives determined legally" study. (Cracow Polytechnics – PK, 2004). Within those indicators, 14 are physical/chemical indicators, and 2 are biological indicators *(chlorophyll 'a', saprobicity index).*

The following rules have been adopted for assessment:
- When the adopted threshold values are met by 90% of the physical/chemical indicators (so, practically 13) and by all of the biological indicators, the status of the given transition water body is good.
- When the adopted threshold values are met by 90% of the physical/chemical indicators, but are not met by even one of the biological indicators, the status of the given transition water body requires further analyses.
- When the adopted threshold values are met by less than 90% of the physical/chemical indicators, the condition of the given transition water body is potentially bad.

The transition water bodies classified as good are then subjected to hydrological regime analysis, and the suggestion is to include only the flow volume and dynamics, the connections with groundwater reservoirs and the flow of fresh waters. For those elements, the indicators used for hydrological assessment of the homogenous surface water bodies can be applied. In the analysis, it is suggested to skip such elements of the assessment of transition water hydrological regime as exposure to waves and the direction of the dominant currents, as natural elements that are not shaped by any programme of measures.
Transition water bodies classified as meeting the requirements are then subjected to an analysis of morphological criteria included in "Identification and Assessment…" (PK, 2004) study – total length of bank protections, number of regulatory structures, height of a single structure. Since the table does not specify threshold values, they are suggested to be adopted as follows:
- In case of linear elements, a threshold of 30% of the length,
- In case of the number of structures, a threshold of 3 units / km,
- In case of height, 2 m,
or use expert assessment each time.

Following the three assessment phases, the water bodies classified as not at risk are subject to further risk assessment.

STAGE 2 – Designation of the water bodies at risk of non achievement of the environmental objectives

The risk assessment, whose the assumptions have been taken from the "Identification and Assessment…" (PK, 2004) study, is based on a comparative analysis between:
- The forecasted status of the transition water bodies achieved as a result of the execution of the programme of measures (P.s.j.cz.w)
- The targeted status of the water bodies, described as good within the realisation of the minimal measures (D.s.j.cz.w)

The forecasted and targeted statuses will be determined for each of the indicators taken into consideration within the analysis of the current status using the appropriate models (if their application or construction is possible and justified in economic terms) or will be assessed using the expert method.

The risk is defined with the following formula:

$$R = 1 - (P.s.j.cz.w./D.s.j.cz.w)$$

where:
P.s.j.cz.w - forecasted status of the transition water bodies achieved as a result of the execution of the programme of measures,
D.s.j.cz.w - targeted status of the water bodies, described as good within the realisation of the minimal measures.

The transition water bodies with R > 0 for at least one of the analysed qualitative, quantitative or morphological indicators are at risk of failure to meet the good status by 2015.

e Stages of the elaboration of risk assessment for the coastal waters

Like the transition waters also the coastal waters have not yet seen a complete refinement of the assessment methods. Also in this case there is a shortage of tools and often a shortage of data that would allow to reliably make such assessments. Thus, the proposals contained in this point should be treated as very preliminary suggestions, which could undergo far-reaching changes and refinements.
The definition contained in the WFD says that the coastal waters are the surface waters on the land side of a line, whose every point is located at a distance of one nautical mile on the sea side from the nearest point of the baseline from which the breadth of territorial waters is measured.

STAGE 1 – Evaluation of the current status

It is suggested to adopt similar criteria for coastal waters as for transition waters, but in a slightly different order:
- Physical/chemical and biological assessment criterion as basic criterion,
- Morphological quality criterion as second-place criterion,
- Criterion of changes in hydrological regime as supplementary criterion,
The scope of the physical/chemical and biological assessment includes 10 indicators for which the limit values have been specified in the "Identification and Assessment…" study. (PK, 2004). Within those indicators, 9 are physical/chemical, and the 'a' chlorophyll, as a biological indicator, should be specified separately for rivers' mouth profiles and separately for open sea profiles, as it is suggested to adopt different values of the limit indicator for those measuring point locations.
Unlike the transition waters, for the coastal waters there were no principles of qualification to the good or to the bad status on the basis on an analysis of the transgressions of threshold values by at percentage of indicators determined in advance. In this matter the decision on such a qualification should belong to the experts' group.

The coastal water bodies classified in an expert manner as meeting the requirements are then subjected to an analysis of morphological criteria included in tab 7.3 of the "Identification and Assessment…" (PK, 2004) study – total length of bank protections, number of regulatory structures, height of a single structure. Since the table does not specify threshold values, they are suggested to be adopted as follows:
- In case of linear components, a threshold of 30% of the length
- In case of the number of structures, a threshold of 3 units / km
- In case of height, 2 m,
- or use expert assessment each time.

The coastal water bodies classified time as meeting the requirements are then subjected to a hydrological regime analysis, and the suggestion is to include only two elements: exposure to

waves and the direction of the dominant currents. As natural elements, they should undergo expert assessment.
Following the three assessment phases, the water bodies classified as good are not subject to any further risk assessment.

Currently, the status of diagnosis of the coastal waters issues does not give any basis to suggest particularly different procedures in further steps of risk assessment for homogenous coastal water bodies. For this reason, the further procedure (stages 2 – 4) suggested in this study is identical to that for transition waters.

STAGE 2 – Designation of water bodies at risk of non achievement of the environmental objectives

The risk assessment, the assumptions of which have been taken from the "Identification and Assessment…" (PK, 2004) study, is based on a comparative analysis between
- The forecasted status of the coastal water bodies achieved as a result of the execution of the programme of measures (P.s.j.cz.w)
- The targeted status of the water bodies, described as good within the realisation of the necessary minimal measures (D.s.j.cz.w)

It is assumed that the forecasted and targeted statuses will be determined for each of the indicators taken into consideration within the analysis of the current status using the appropriate models (as far as their application or construction is possible and justified in economic terms) or will be assessed using the expert method.
The risk is defined with the following formula:

$$R = 1 - (P.s.j.cz.w./D.s.j.cz.w)$$

The coastal water bodies with R > 0 for at least one of the analysed qualitative, morphological or quantitative indicators are at risk of non-achievement of the good status by 2015.

II.3 INITIAL IDENTIFICATION OF THE HEAVILY MODIFIED AND ARTIFICIAL WATER BODIES

II.3.1 Definition of the problem and its place in the planning process

The activities related to the use of water, to the protection against them, as well as stocking of water for the drinking water supply, navigation, production of electricity or irrigation, protection against floods, other important activities of sustainable human development lead to the hydromorphological modifications prejudicial for the achievement of the good status of waters. That's why, in order to conciliate the protection of the aquatic bodies and the human activities -for the water bodies that are being used in a specific way and that present the hydromorphological modifications or have been artificially created by the man - the directive allows to adopt as the aimed water status a status that is less strict than the good ecological status (GES). This status is the "good ecological potential" (GEP). However, in order to adopt as the objective the "achievement of the good ecological potential" – accordingly to the WFD's requirements - it is necessary to designate a given water body as a heavily modified or an artificial one and to give a pertinent justification of such a designation.

The point 4.3 of the article 4 of the Water Framework Directive, dealing with the environmental objectives, says that the Member States can design a surface water body as an artificial or heavily modified one when:

- the modifications of the hydromorphological characteristics of this water body that would have to be realised in order to obtain a good ecological status would have a negative impact on:
  - the environment widely understood;
  - the navigation, included port installations or leisure activities;
  - the activities for which the water is stocked such as drinking water supply, production of electricity or irrigation ;
  - the regulation of waters, the protection against floods and the drainage of soils;
  - other important activities of sustainable development;
- the beneficial objectives served by these artificial or modified characteristics of the water body cannot be – for the reasons of feasibility or the disproportionate costs – reasonably achieved by other means that would constitute a better environmental option.

Accordingly to the article 2, point 8 of the WFD "an artificial water body" (AWB) is a water body that has been created in result of human activity and has been designated in accordance with the regulations of the article 4, point 3 of the WFD. An artificial water body is then a surface water body, that has been created beyond the natural hydrographic network.

Accordingly to the article 2(point 9) of the Directive, a "heavily modified water body" is such a surface water body that meets the three conditions:

- it has been physically altered by the human activities;
- it is substantially modified in its character;
- it has been designed accordingly to the Article 4(point 3).

In result of the interpretation of the disposals of the WFD, we can say that the key aspect that differentiates the artificial water bodies and the heavily modified water bodies is the word "created". That's why we consider that an artificial water body is a surface water created there where previously were no water bodies, ex. a canal that has been built for the needs of navigation. The other water bodies that have been substantially changed in result of the direct physical transformations through regulations, displacements, hydrotechnical

installations etc, are the heavily modified water bodies, ex. a reservoir created in result of the establishment of a dam. The process of the designation of objectives for the heavily modified and artificial water bodies should be compatible with the same general rules that are applied for the natural water bodies.

In the whole process of identification and designation it is necessary to determine the reference conditions and the environmental objectives for the artificial water bodies (AWB) and heavily modified water bodies (HMWB).

As concerns the HMWB and AWB the reference conditions on which the qualification to a given status is realised are called “maximal ecological potential” (MEP). The MEP corresponds to the highest ecological quality, that could be reached by a HMWB or an AWB after the implementation of all the mitigation measures that, at the same time, don’t have any important negative effect on the actual water uses neither on the widely understood environment. MEP is the situation when the biological status is compatible, as much as possible, with the status of the closest comparable surface water body with consideration of the modified features of this water body.
The “good ecological potential” (**GEP**) is defined as a status that allows some slight changes in terms of the values of the relevant biological quality elements respect to the MEP.

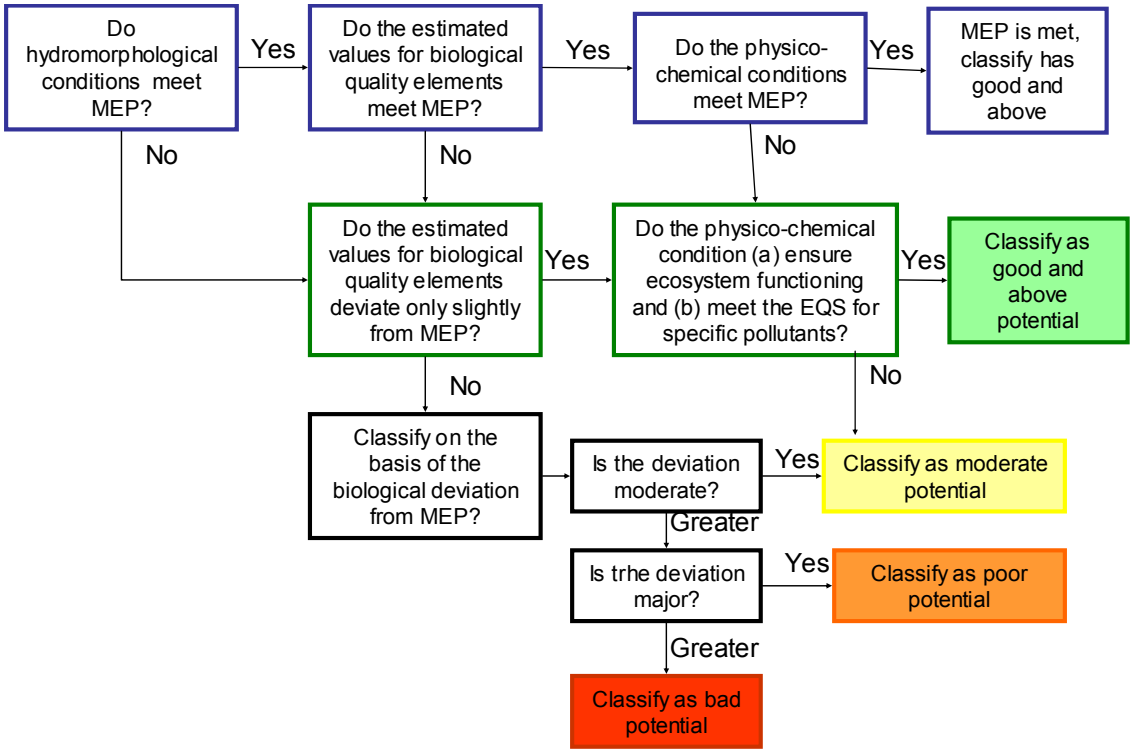


Illustration 12 general algorithm of the evaluation of the ecological potential of AWB and HMWB

GEP is a less strict objective that the GES (“good ecological status”), as it takes into account the ecological effects of the physical transformations necessary to allow a specified water use or the continuation of which is necessary to avoid a negative effect on the environment widely understood.

The designation of a heavily modified water body implies however the respect of a « good potential» which is an equally ambitious objective as the « good status » for other water bodies. One should also note that the requirements concerning the chemical status in both cases are identical. What’s more, the designation doesn’t exclude the necessity to realise the hydromorphological restoration activities in order to increase the ecological potentialities of

the aquatic bodies without calling into question the human uses of the water resources which were the origin of the designation of the water body as a heavily modified one.
The Member States have to prevent the deterioration of the quality class and aim at the achievement of the GEP in the AWB and HMWB by the 22nd of December 2015, unless there is a justified – on the basis of the article 14 – necessity of derogation and of adopting a less strict objective or to postpone the deadline.
The complete process of the designation of the heavily modified and artificial water bodies is composed of the following basic sequences:
- *Initial identification of the AWB and HMWB*
- *Final designation of the AWB and HMWB*
- *Definition of the MEP and GEP*
- *Definition of the restoration measures*

The first one consists in the identification, characterisation and evaluation of the degree of the hydromorphological changes of a water body (the guidelines in this domain are presented in the present point), while the second one implies the tests of the designation determined in the article 4, paragraph 3, letters a and b consisting the realisation of a larger social, economical and environmental analysis.

The below scheme (*Illustration 13*) presents the whole process.

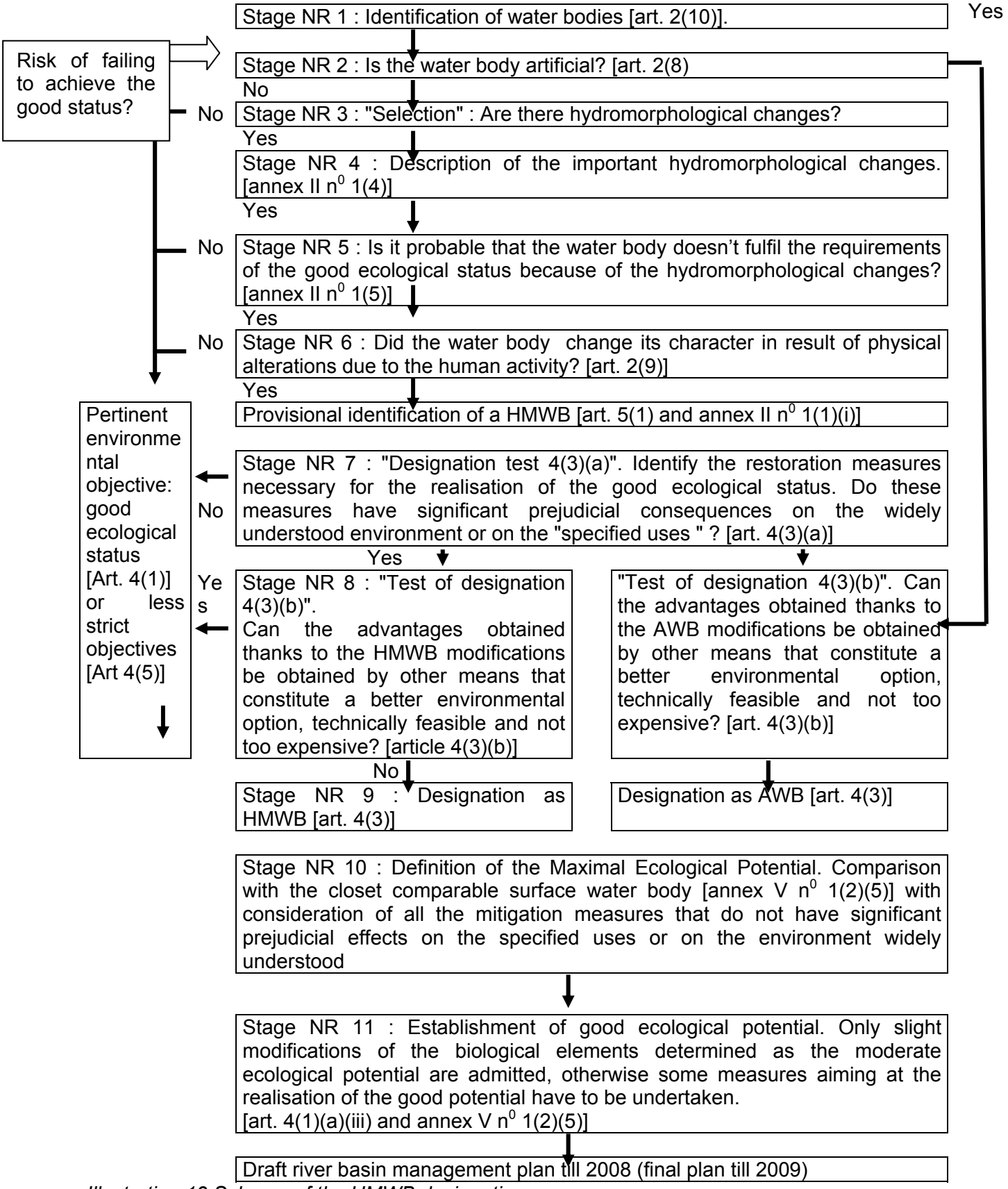


Illustration 13 Scheme of the HMWB designation process

Source: WFD Common Implementation Strategy, Guidance on the identification and designation of the heavily modified and artificial water bodies

II.3.2 Necessary data

To pre-designate the AWB and HMWB it is necessary to prepare the characterisations of the hydromorphological modifications of the water-courses.
The main source of information and data here should be the study « Identification of the important anthropogenic impacts and evaluation of their influence on the status of the surface and groundwater". However if the « Identification... » proves to be an insufficient source of information it is necessary to build a pertinent characterisation and data base containing the information from all the administrators of the water-courses.
This characterisation should contain detailed information on the hydromorphological modifications and the basic indicators describing these modifications, ex.:
- *Changes in flow volume in the perennial periods,*
- *Height and location of shoots,*
- *length of the anti-flood embankments,*
- *surface of areas where the drainage is conducted,*
- *height and capacity of retention structures,*
- *production volume and installed power of the hydroelectric plants,*

Such description should also contain (if it is possible to obtain the data) the information on the expenditures made for the realisation of the water structures that cause the modifications as well as on the costs of their maintenance and exploitation.

II.3.3 Recommended methodology of study

a Short characterisation of the approach

The initial designation of the AWB and HMWB is the result of the identification and evaluation of the hydromorphological modifications within the water body. Therefore the first stage of this procedure is an identification and evaluation of the hydromorphological changes that occurred in a given water body. The designation aims at the indication of these modifications that in a significant way influence the hydromorphology of the water-courses. One should remember that the first qualification of the water bodies to the AWB and HMWB is not a final designation of its character and needs a further analysis.

The first designation of the heavily modified water bodies can be based only on the first approach to the impact of the activities necessary for the restoration of the hydromorphological conditions favourable to the respect of the good status of waters. In fact this first designation has to be realised also if the level of knowledge of the aquatic bodies status is often incomplete and even if the uncertainty on the efficiency of measures implemented to favour the biodiversity and the ecological habitats subsists. The first designation should be realised even if the evaluation of the waters' status is based on a provisional definition of the good status (or good potential), the definitive values of which should be determined at the European level in 2007.

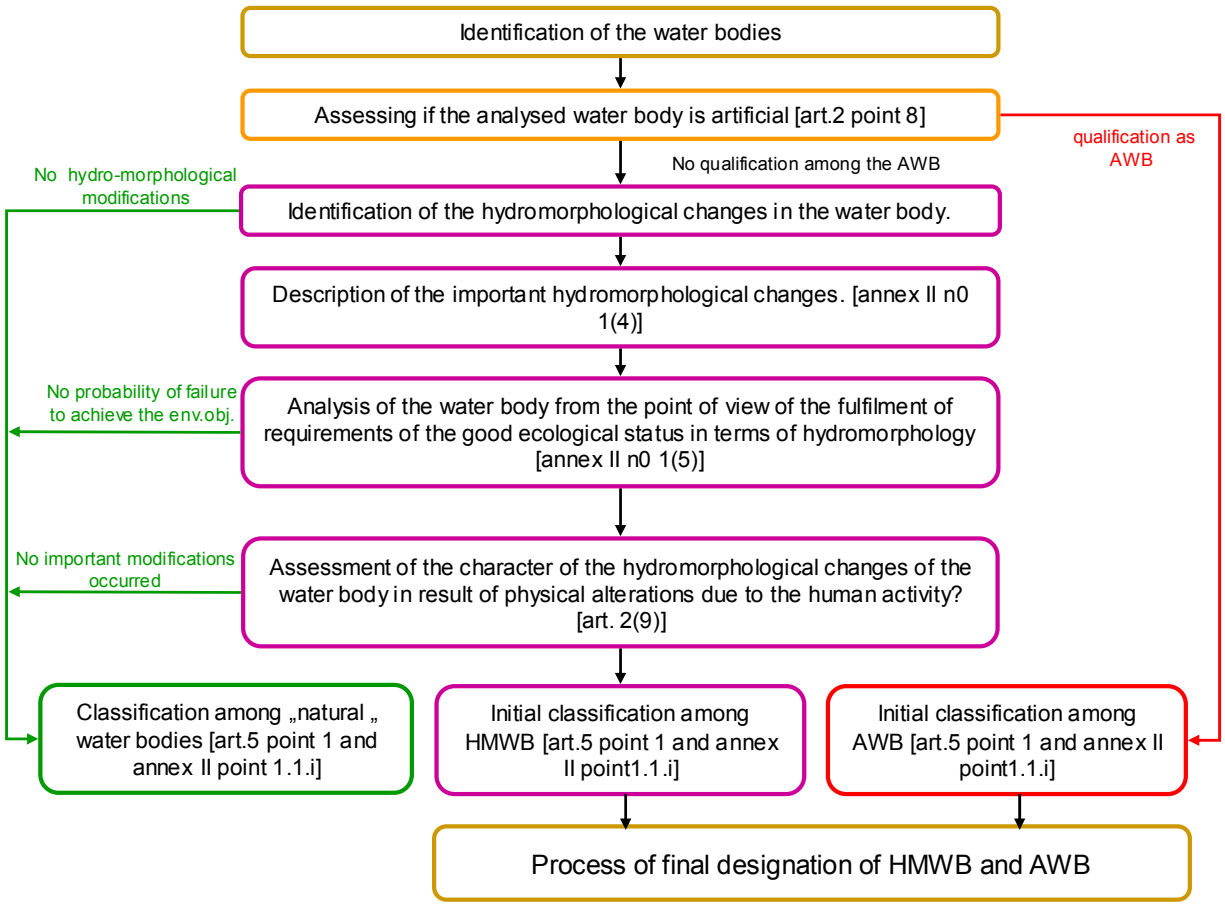


Illustration 14 procedure of the initial designation of AWB and HMWB

2.3.3.2. Conditions that should be fulfilled by the artificial and heavily modified water bodies

Initially designated artificial water bodies (ID AWB)

The decisive element is the analysis of the hydrographic network and of the characterisations of the water bodies. If the analysis shows the considered water body has been created there where previously were no element of the permanent hydrographic network and when its creation isn't related with a direct physical transformation of an existing water body or with a dislocation of limits of an existing water body. We have to do with an AWB.

Among the examples of AWB one can find a channels built for the needs of navigation, irrigation channels, ports, post-mines reservoirs, water reservoirs that don't function on the basis of the hydrographic network.

The Water Framework Directive admits also a possibility to classify - in some circumstances - an artificial water body as a natural water body if it is possible to achieve the good ecological status instead of the good ecological potential for this water body.

If a given water body has been designated as a ID AWB, then – within the subsequent stages – the final designation test should be carried out accordingly to the point 1.6.

Initially designated heavily modified water bodies (ID HMWB)

The rest of the water bodies, that haven't been designated as the ID AWB, should be submitted to the selection process. In the further considerations we should take into account the water bodies that - in result of the physical transformations - probably will not be able to

reach the good ecological status. For the water bodies selected in such manner we proceed to a characterisation that consists in the identification and description of:
- Changes within the hydromorphology (important anthropogenic impacts and their influence on the waters' status),
- Types of uses of the water bodies.
In order to qualify a given water body among the ID HMWB it must meet the following criteria:
- Non achievement of the good status results from the physical modification of the hydromorpgological features of the water body,
- The water body is substantially modified in its character – that is, in accordance with the WATECO guidelines:
- During the field investigation the experts finds that the water body clearly deviates from its natural status,
- This modification of character must be large / have a large scope or an essential importance – this means a serious modification both in terms of hydrology as in terms of morphology in a given water body,
- The modification of the character must be stable and not temporary or provisional,
- The modification must be coherent with the scale of change caused by the activities mentioned in the article 4, paragraph 3, letter a : river inclosed in a channel., river confined for the needs of flood protection, river or lake impounded by a dam or shoot.
- The important change of the character is caused by a determined way of use – it must have been created in result of the uses mentioned in the article 4 paragraph 3 of the WFD or in result of uses that constitute equally important activities for the sustainable human development.

The part of works, that will result in an initial designation of the HMWB will consist in the recognition of the hydromorphological changes and in the realisation of a diagnosis of the scale of these modifications by the use of a system of indicators for the evaluation of the quantitative and morphological status and by the identification of uses at the origin of these changes.

The indicators of the hydromorphological changes are mainly based on the characterisations of the water-courses that constitute the water bodies.

For each water body it is necessary to calculate the indicators according to the definitions and formulas contained in the tables 4 & 5 as well to compare the obtained values with the limit values.

Table nr 4 Indicators for the evaluation of the quantitative status of SJCWP

Nr	Description of the indicator	Indicator's formula	Limit value
1	2	3	4
1.	The total active volume of the retention reservoirs referred to an average annual outflow from the period (1960-1980) in the cross section that closes the sub-basin of the water body.	$i_1 = \Sigma (V_c - V_m)/V_{SSQ}$ mln m^3/(mln m^3/year)	0,03 (3%)
2.	The total sum of non-returnable abstractions of the surface waters referred to the average low flow from the *"pseudonatural"* period (1960-1980) in the cross section that closes the sub-basin of the water body.	$i_2 = \Sigma P_{pow}/SNQ_p$ (m^3/s) / (m^3/s)	* mountain rivers: 0.15 (15%) * highland and transitory rivers: 0,2 (20 %) * lowland rivers: 0,25 (25 %)
3.	Indicator of the perturbation of the hydrological regime due to the important changes in the management of the water body's sub-basin, expressed by an absolute value of the complement to 1 of the relation of SSQ flow from the last period (1981-2000) compared to the SSQ flow from the "pseudonatural" period (1960-1980).	$i_3' = 1-(SSQ/SSQ_p)$ $i_3 = \lvert 1-(SSQ/SSQ_p)\rvert$ (-)	+ - 0,25 (25%) 0,25 (25%)
4.	Indicator of the criterion of the reserved flow's preservation	$i_4 = Q_n / NTQ$ (m^3/s) / (m^3/s)	1,0 (100 %)

Table 5 Indicators for the evaluation of the morphological status of HMWB

Nr	Description of the indicator	Indicator's formula	Limit value
1	2	3	4
1.	Total length of embankments of the important water-courses in the sub-basin of the water body compared to the total length of banks of the important water-courses (double length of the river).	$m_1' = \Sigma L_{embankments} / \Sigma L_{banks}$ (km/km) $m_1 = y * m_1'$	(-) 0,60 (60%)
2.	Total height of listed impoundment structures compared to the sum of gradients of important water-courses in the sub-basin of a water body.	$m_2' = \Sigma H_{structure}/\Sigma(H_{beginning}-H_{end})$ m/m $m_2 = \eta * m_2'$	(-) 0,15 (15%)
3.	Total length of the water course's sections separated by transversal buildings having a gradient of h>0,4 m or 0,7 m compared to the length of all the important water-courses.	$m_3 = \Sigma L_{separated}/\Sigma L_{rivers}$ km/km	0,30 (30%)
4.	Total length of rivers' sections on which regulation works were conducted (longitudinal structures and a documented change of the river's course) compared to the total length of important water-courses	$m_4' = \Sigma L_{regul}/\Sigma L_{rivers}$ km/km $m_4 = \gamma * m_4'$	(-) 0,50 (50%)

The transgression of one indicators isn't yet a basis for the pre-designation of a water body as a HMWB. What is important is the scale of the transgression and the final experts' decision.

The following basic indications are effective within the initial designation:

- The basis of the classification within the list of the initially designated HMWB is an experts' decision taken with help of the indicators of the quantitative and morphological status.
- At the present stage it is recommended to calculate the indicators for which the Regional Offices for Water Management have complete and reliable data. Therefore not all of the indicators presented in the above tables have to be calculated during the process of the first designation of the heavily modified water bodies.
- The elaborated indicators contained in the tables 2 and 3 can be used within the final designation of the heavily modified water bodies, after the obtainment of complete and reliable information on the parameters identifying the quantitative and morphological status. The data bases should be up-dated from the point of view of the complement of the lacking parameters necessary to determine all the indicators.

When determining the indicators describing the quantitative status one should take into account the following detailed conditions:

Indicator: The total active volume of the retention reservoirs referred to an average annual outflow from the period (1960-1980) in the cross section that closes the sub-basin of the water body.

a) In a water body we identify all the retention reservoirs all together with the reservoirs that impound water temporarily (ex. for the agricultural needs). The weirs of the temporary impoundment reservoirs don't have a negative influence of the migration possibilities of spring spawning fishes (if they are impounded only in summer) but the reservoirs themselves induce changes for all the fishes, not only for the migratory ones.
b) In an water body we also take into account the volume of the artificial reservoirs (artificial water bodies – ex. post heading reservoirs) and fish ponds (ponds' complexes) having determined surfaces of flooding depending on the surface of the sub-basin of the supplying water courses.
c) Scope of impact of the discharges of water from the retention reservoirs on the resources of the water bodies situated downstream, considered as heavily modified must be evaluated accordingly to two criteria:
   - if there is a first important tributary downstream the reservoir the cross-section of its confluence constitutes the limit of impact of the discharge,
   - if there are no tributaries downstream the limits of the scope of the discharge's impact must be determined by experts' method using the values of the indicator i3.

Indicator: The total sum of non-returnable abstractions of the surface waters referred to the average low flow from the *"pseudonatural"* period (1960-1980) in the cross section that closes the sub-basin of the water body.

a) The indicator for the punctual water abstractions and wastewater discharges is quite easy to calculate if we have an identification of the non-returnable consumption by users thanks to the direct measurements in water intakes and in the wastewater discharges. The above concerns the users located in the sub-basin of one water body

b) Water transfers – we have a non-returnable abstraction in an aggregated water body, in general measured by the discharge(s) to another water body (bodies).

c) Indicatory calculation of non-returnable uses may be done at the basis of the unitary consumption of water. It should be assumed that about 10% - 20% of water abstracted by

the individual users is consumed in a non-returnable way. A similar consumption level may be admitted for the breeding animals and for the whole farm. The GUS data on the population and on the number of animals allow us to calculate the average values for the surface of the sub-basins of the aggregated water bodies by going from the data at the commune's (poviat's) level using the method of the weighted-average respect to the surface of commune and of the aggregated water body.

d) Non-returnable looses towards carp and salmon fishponds, where an important diversification of water abstractions occurs in different months of the year (filling of the ponds from March to April, coverage of looses for the evaporation from May to September, discharges of water from the ponds from October to November and then supplying of winter breeding reservoirs and stocks). In case of the trout fishponds, that in general have a small surface, the non-returnable looses can be omitted.

e)The non-returnable looses in the other reservoir should be calculated in the same manner, omitting the positive balance in the period X-XI (the looses from September should be adopted for these months).

Indicator: Perturbation of the hydrological regime due to the important changes in the management of the water body's sub-basin, expressed by an absolute value of the complement to 1 of the relation of SSQ flow from the last period (1981-2000) compared to the SSQ flow from the "pseudonatural" period (1960-1980).

The above indicator should characterise the important use of water in the sub-basin of the water bodies of both punctual and diffuse character.

As the indicator, in its present form, doesn't show us if there has been an increase or a decrease of the flow, it has been proposed to calculate it at first without an absolute value, and only after its module.

The present indicator should verify the transgressions of the indicator concerning the retention reservoirs and especially the influence of the discharges from the retention reservoirs on the water resources in the water bodies located downstream and of the indicator describing the non-returnable looses.

Indicator: Preservation of the criterion of the reserved flow

This indicator describes the preservation of the conditions of the hydrobiological reserved flow according to the hydrobiological criterion (Order of the Ministry of the Environment from the 28th of April 2004 on the scope and mode of the elaboration of the water management plans in the river basin districts and on the conditions of use of waters of the hydrographic region).

Way of calculation of the indicator

$$Q_n = k * SNQ_p \ [m^3/s]$$

where: SNQ_p – average low flow from the *„pseudonatural"* period (1960-1980),
k – parameter depending on the hydrological type of the river adopted according to the table 8. This coefficient is determined on the basis of the sub-basin's surface and of the hydrological type of the river resulting from the volume of the unitary downflow q.

$$i_4 = \frac{Q_n}{NTQ}$$

where: Q_n – reserved flow according to the hydrobiological criterion (H. Kostrzewa)
NTQ – the longest lasting flow in the closing cross-section calculated on the basis of the water-gauge's data from the period 1981-2000

In case of lack of the water-gauge's data necessary to determine the longest lasting flow, NTQ is adopted according to the formula:

$$NTQ = 0,7x\ \nu_2\ x\ SSQ_{1981\text{-}2000}$$

where: ν_2 – variable coefficient called « retention coefficient »
SSQ – average flow from the period 1981-2000

The above converges with the Iszkowski's formula modified by Byczkowski (Byczkowski 1979) concerning the calculation of a characteristic Q_2,

A water body should be considered as a heavily modified one if we assist to:
– total exploitation of water by users in some sections,
– exploitation of water downstream the intake, lower than the reserved flow defined on the basis of the hydrobiological criterion.

When determining the indicators describing the morphological status one should take into account the following detailed conditions:

Indicator:Total length of embankments of the important water-courses in the sub-basin of the water body compared to the total length of banks of the important water-courses (double length of the river).
This indicator takes into account both one side as two side embankments. The levees are separated by ecological corridors as well in case of one side as of two sides embankments. However what is important is the distance between the top of levee and the bank of the main river bed (table 9). Also for lakes a correction coefficient has been adopted. It depends on the distance between the embankment and the shore line of the like with the normal water level (table 10). The length of embankments around the lakes should be referred to the length of the shore line at the map 1 : 50 000.

At the stage of the initial designation of the heavily water bodies it is proposed – if we don't have the pertinent reliable data – to omit the distance between the top of the levee and the shore line of a river or lake and to adopt in the calculations the indicator of the full participation of the existing embankments.

Indicator: Total height of listed impoundment structures compared to the sum of gradients of important water-courses in the sub-basin of a water body.

All the structures should be taken into account, whatever their height is. The transversal weirs with efficient installations for fish migration should be treated as *„biologically friendly".* In order to evaluate their functioning a correction coefficient depending on the evaluation of their functioning should be introduced (Bojarski and others, 2005).
A special attention should be paid to the systematic buildings (even if this indicator is not transgressed).If there are important lateral confluents between two shoots (impoundments) in systemtical building, then we treat such a status as *„biologically friendly"* (with favourable habitat conditions and spawning possibilities).
If the distance between the transversal weirs is less than 300 m, it is assumed that there is a perturbation of the habitat conditions of the possibilities of fishes migration. In case when the distance between weirs is longer or equal 300 m we assume that we have to do with a *„biologically friendly"* ecosystems. In case of lack of a reliable data base the available map underlays should be used.
The *« biologically friendly »* conditions allow to define a correction coefficient (η) the coefficient concerning the total height of listed impoundment structures referred to the sum of gradients of the important water-courses in the sub-basin of a water body (m_2').

ATTENTION: The coefficient η defining the „*biologically friendly*" status is used only if, we consider a river that is important for the double milieu fishes.

Indicator: Total length of the water course's sections separated by transversal buildings having a gradient of h>0,4 m or 0,7 m compared to the length of all the important water-courses

The limit value of the gradient h = 0,7m corresponds to the mountain streams and highland trout rivers. For the other rivers the gradient's limit value of h = 0,4 m is adopted.

The gradient should be counted from the height of the water level from the down part during the average low waters to the edge of the water structure. For the shoots, in case of lack of information dealing with the deepness of the hearth basin and the level of down water, the gradient should be considered as 90% of height of the impoundment structure. For the big retention reservoirs the gradient is defined as the difference between the normal impoundment level and the ordinate of down water.

For the water structures equipped with the installations for the fish migration one should use the correction coefficient presented in the table 11. The above should be applied in case of detailed inventory control of the technical efficiency of the fish passes. If there is no control or if the assessment is partial, we treat the weirs as unfriendly for the fish migration.

Indicator: Total length of rivers' sections on which regulation works were conducted (longitudinal structures and a documented change of the river's course) compared to the total length of important water-courses

It is proposed to adopt the pertinent values of the correction coefficient for different types of the regulatory structures. The values of the correction coefficient in the below table take into account not only the type but also the time of the realisation of the regulation and the assimilation with the aquatic environment and the related ecosystems.

In case of lack of information on the time of the realisation of the regulation one should adopt the worse values of the correction coefficient.

Additional criteria conditioning the initial designation of the heavily modified water bodies

Impact of the water discharges from the retention reservoirs

The impact of the water discharges from the retention reservoirs should be referred to the changes of the water status in the water bodies located downstream. The discharges themselves are not harmful. What is harmful is their deviation respect to the natural regime of flow volumes. The above conditions should be considered in two aspects:

short term changes of flow volume – daily fluctuances of the water status related most often to the work of power plant should be assessed depending on the type of river (annex 2). If there are doubts on the accuracy of the designation of the river type, we can use the lists NB-1 (rivers suitable for salmonids...) and NB-2 (rivers suitable for cyprinids...). We don't assess the short time changes of the flow volume in the rivers close to estuaries that are influenced by the saline waters.

seasonal changes of flow volume – reduction of spring freshets, increase of the water level during the spawning period of the reophile cyprinid fishes (V-VI).

Impact of punctual discharges of water and wastewater

The impact of the punctual evacuations of water and wastewater should be treated in a similar way as the discharges of water from the retention reservoirs. Their impact concerns therefore the fluctuations of the water level with the existing flows in the water body downstream the discharge and in the water bodies situated beneath.

Impact of the water-power plants

The water power engineering in course of development during the recent years and based on the small water-power plants (less than 5 MW) also provokes important perturbations of the hydrological regime and of the morphology of the river-beds. For this reason it is necessary to identify all the existing water-power plants in every aggregated water body and to assess – using the experts' method – their influence on the aquatic environment.

II.4 MAIN ISSUES OF WATER MANAGEMENT

II.4.1 Definition of the problematic and its place in the planning process

The main issues (MI) of water management are mentioned only in the Article 14 concerning the public information and consultation. It is necessary to organise three stages (6 months each one) of the public consultation:

- First consultation dealing with the schedule and programme of works related to the establishment of the water management plan – by the end of June 2007.

- Second consultation dealing with an interim overview of the main issues of water management defined in a river basin – by the end of June 2008.

- The third consultation dealing with the first version of the river basin management plan – by the end of June 2009.

The above deadlines are definitive and determine the deadline of the end of the consultation.

The Directive doesn't give any definition of the main issues of water management. The information on this subject is contained in the methodological guidance on the public participation. We can admit that the main issues are the most important factors that impede the achievement of the environmental objectives defined by WFD.

The definition of the main issues of water management is the key stage between the initial characteristics, the risk assessment and the creation of the programme of measures: main issues are the main questions to be solved through the implementation of a pertinent programme of measures in order to achieve the environmental objectives from the article 4 of WFD.

It is recommended that the important issues concern also all the other objectives of water management (ex. protection against floods, protection of wetlands, resources of drinking water, etc.), in order to take into account – according to the principles of integrated water management – all its aspects at the level of the river basin or a sub-basin.

II.4.2 Necessary data

All the data stipulated within the realisation of the analysis at the previous stages of the planning process are necessary to determine the main issues of the water management. These are in particular:

1. Characterisation (art.5 WFD) developed for the needs of the report to the EC in 2004;
2. Refined identification of important anthropogenic impacts and evaluation of their influence on the status of the homogenous surface and groundwater bodies;

3.Baseline scenario ;

4. Assessment of risk of non achievement of the WFD objectives;
5. First designation of the AWB and HMWB.

II.4.3 Recommended methodology of study

a Short characterisation of the approach

The present part of the guidance focuses on the principles of creation of the studies dealing with the main issues of water management, it doesn't cover however a detailed description neither of the realisation nor of the consultation on main issues with the public. The process of creation of the documents can be divided in four stages. At the fist stage we indicate and list the main issues of water management for the analysed area using the help of local experts. Then we elaborate a report aiming at the indication of reasons and of potential measures that are to prevent the results of the anthropogenic pressures. A useful thing in the context of the realisation of the consultation will be also the integration of the pertinent characterisations of the water bodies and the location of the main issues on the demonstration maps. The purpose of the elaboration of the report is to support the consultation process in the situation when the interested parties ask for detailed information on the chosen topics. The object of the consultation should be however the „Overview of main issues of water management", developed on the basis of the above mentioned report and summarising this problematic.

b Stages of the elaboration of the main issues

STAGE 1 – First definition of the list of main issues

When proceeding to the first stage of works it is necessary to analyse all the available information, as well for the surface waters as for the groundwater, dealing with the quality and quantity of waters, pressures, economical analysis, protected areas, etc. All this information should be contained in the first characterisation of the river basin district, in the risk assessment of failure to meet the WFD objectives or in the baseline scenario.
After the analysis of these materials it is recommended to organise a meeting with experts on the surface and groundwater in aspect of their quality and quantity. The experts should point out where, in their opinion, the main issues are located (in frame of a brainstorming, with participation of all of them or in small groups). The result of such meeting should be a list of main issues and a first definition of their spatial scope. Such list will constitute a basis for the definition of the dimension (description with the quantification of the phenomena) and of the scale of their appearance (spatial attribution).
It is also possible to invite on such meetings at the regional or local level the members of RGWRW (councils for water management of the water regions) and of the Commission of the Public Participation. Depending on the knowledge of the particular participants, some other institutions (WIOŚ, WZMIUW, PIG, SANEPID, biologists,...) that don't have their representatives in any of the two above mentioned organisations can be also invited to the meeting.
This type of meetings can be organised at the regional or local level what would insure a full involvement of the local partners. Such meetings will contribute to deepen the co-operation between various institutions dealing with different questions of the water management and should result in future in a better exchange of information.
WFD doesn't limit the number of the considered issues of water management, however as these should be the main issues, the list shouldn't be too long (it is proposed to distinguish about 10 main issues). The effective rule implies to focus on priority problems. The list can start with the most important issue and end up with the less important one. One can also decide not to arrange the issues in the hierarchic order.

STAGE 2 – Elaboration of a report on the main issues

The presented approach supposes the elaboration of a report on the main issues composed of two main parts. The first one contains the characterisation of the present status while the second one describes the main issues of the water management and the measures planned in order to reduce the influence of the impact, and in the same time to improve the status of waters. For each main issue proposed it is important to have detailed information that will allow to answer why it is an important issues: it is necessary to prove, on the basis of the collected data and the experts' opinions, that this is effectively a key problem impeding the achievement of the good status. It should be also justified that this problem can be solved with a pertinent programme of measures.
Accordingly to the above remark it is proposed that the elaborated document is composed of two main parts:
- *Characterisation of the area (chapter containing the summary of the characterisation, of the assessment of risk and of the realised or planned activities in frame of the implementation of other directives).*
- *Refining of the main issues of water management (chapter containing – for each of the particular issues: a qualitative description, description of the localisation of the water bodies concerned by the problem and a graphic illustration of the problem).*
The document should also integrate information on the way of defining the main issues, i.e. a description of procedures and of the eventual problems met within their formulation.

STAGE 3 – Overview of the important issues

The overview of the important issues is a document destined for the consultation with the public widely understood. When adapting the structure and the content of the overview to the potential target, one should remember that such a document should be legible, transparent and comprehensible for the people that don't know the WFD thematic. The overview should contain only a list of the main issues with a short description of the problematic. It will be useful to use an demonstration map indicating the scope of appearance of the particular main issues. The overview can have various forms but it has to be « user friendly ».

STAGE 4 – Public consultation on the overview of the important issues

The consultation of the document „Important issues of water management" will have different forms in different water regions. The Regional Offices for Water Management developed some guidelines in this aspect. A very important element of the consultation is to give an exhaustive information to the interested parties, that's why it is so important to establish a close co-operation of the persons involved in the creation of the documents and of the communication specialists.
In order to ensure the transparency required by the WFD it is proposed to create a data base containing the formulated opinions and answers.
More information on the public consultation can be found in the point 4.9 dealing with the recommendations on the public participation in frame of the WFD's implementation.

II.5 FINAL DESIGNATION OF THE HEAVILY MODIFIED AND ARTIFICIAL WATER BODIES

II.5.1 Definition of the problem and its place in the planning process

When defining the problem we can write that this is a refinement of the analysis in order to decide if the given water body is artificial or heavily modified.

However the substance itself of this analysis combines the initial analysis in this field with the measures that an contribute to a different qualification of a water bodies initially described as artificial or heavily modified.

Therefore the place of this procedure in the planning process is the same as in the case of the initial analysis but the information necessary to realise it is much larger.

The definition of the AWB and HMWB has been given in the point 1.4.1, here however it is necessary to pay attention to a close interdependence of the first and final designation of the AWB and HMWB and the programme of measures.

II.5.2 Necessary data

To characterise every pre-designated AWB or HMWB in detail – for the needs of the final designation – it is necessary to gather 4 types of information concerning:

® the characteristics of the hydromorphological modifications (first designation of the AWB and HMWB),

® the socio-economical characteristics of the main uses at the origin of the hydromorphological modifications,

® the socio-economical characteristics of other uses established in result of the hydromorphological modifications,

® the characteristics of environmental modifications.

The socio-economical characteristics of the other uses at the origin of the hydromorphological modifications.

The characterisation concerning the main uses should include the descriptive and information and the information on the indicators related to the use at the origin of hydromorphological modifications in a given water body, for example:

- number of inhabitants protected by the anti-flood protections,
- number of people using the water intakes,
- dimension and type of cultures for which it is necessary to proceed to the drainage,
- production volume and power of a hydro-electric installation.

The socio-economical characteristics of the other uses created in result of the hydromorphological modifications.

The characteristics concerning the other water uses should contain – similarly as above – the descriptive information and indicators for uses, that appeared in a given water body thanks to its hydromorphological modifications, for example:

- list of leisure activities related to the impoundment structure for the production of the hydro-electricity,
- volume of changes in tourism

number of fishermen fishing in the water body

The characteristics of the environmental modifications

Such characteristics should contain a description of impact of the hydromorphological modifications on the widely understood environment as concerns both the obtained and the lost values. It is necessary to remember here that these changes can have as well negative as positive character, for example a creation of a retention reservoir had contributed to the development of the natural forms, that have been covered by the protection of nature (ex. establishment of a Natura 2000 site). If possible the environmental modifications should be presented via indicators, for example:

® surface of a Natura 2000 site, to the creation of which the hydromorphological modification has contributed

® surface of precious – from the point of view of nature – wetlands created in result of hydromorphological modifications,

® fish species, the migration and correct development of which is impossible because of the lack of continuum

Attention:
All these characteristics can be – at later stages - used in the discussions on the disproportionate costs during the phase of analysis of the possible restoration measures and of analysis of the functional alternatives.
Art. 4, paragraph 3 refers to the “widely understood environment”. That’s why it is considered that the environment covers the natural environment, the social environment, the landscapes, historical and cultural patrimony, geomorphology etc.

II.5.3 Recommended methodology of study

a Short characteristics

If a water body has been initially designated as AWB or HMWB it is then qualified to a further analysis called the final designation. It should be remembered that such a final designation refers only to the present planning cycle and it is an evaluation valid for the subsequent planning cycle. The stages of the final designation of the AWB and HMWB are composed of the identification of the restoration measures with their characterisation, the analysis of the functional alternatives and the justification of the designation. In case of water bodies pre-designated as HMWB the procedure is more complex and time consuming compared to the designation of the AWB. It results from the genesis of creation of these waters. However the designation of the HMWB – due to the series of possibilities of restoring the good ecological status of these waters – requires often to proceed to refined analysis and to focus on these elements of the evaluation. The present guidance document – in order to guarantee the transparency of the conducted analysis – proposes the description sheets for each important question of the final designation’s process.

b Stages of works for the final designation of AWB

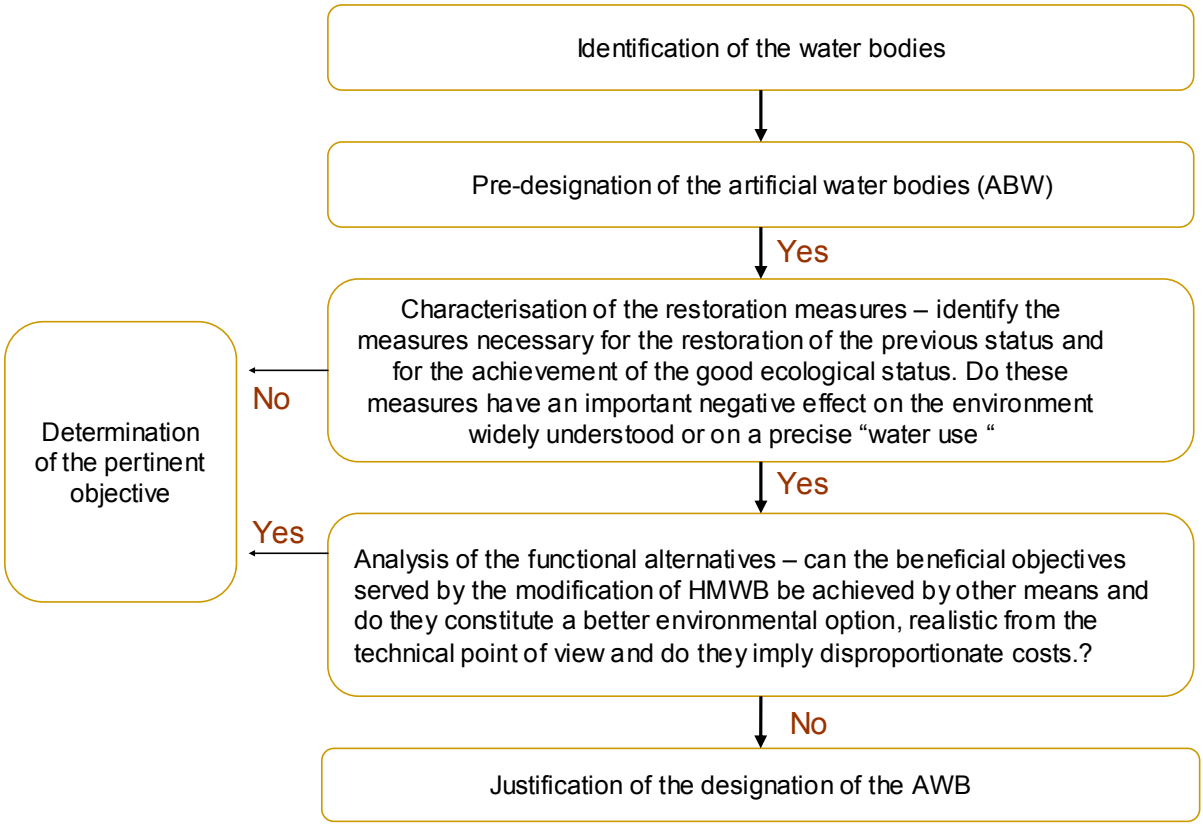


Illustration 15 Process of designation of AWB

STAGE 1 – Identification of the restoration measures

Accordingly to the WFD and to the guidance on the European level, it is admitted that, after the pre-designation of a water body as an artificial one, the restoration measures necessary for the achievement of the GES (art.4, point 3a, WFD) should be identified.
Accordingly to the disposals of the WFD the designation test is applied for the AWB in the same way as for the HMWB. However, as concerns the pre-identified AWB, the identification of the restoration measures is difficult. We should however remember that the restoration measures resulting from the application of the designation process shouldn't have important negative effects for a specified use or the environment widely understood.

STAGE 2 – Analysis of the functional alternatives

Similarly as in the previous step, accordingly to the disposals of the Directive, this test is applied in the same way for the AWB and the HMWB.
The analysis of the functional alternatives is easier for interpretation in case of the majority of the AWB. One should check if there are any "other means" allowing to achieve the benefits of AWB.

The attention should be also paid to the fact that the purpose of this step is to analyse if the proposed alternative measures effectively constitute a better environmental option and if one problem isn't replaced by another one through a displacement of the negative impact on another water body or on another environmental component (ex. CO2 emission).

The purpose of the designation test is to check check if there are “other means” of achieving a much better environmental option, resulting for example in the amelioration of the water body’s status.

STAGE 3 – Justification of the AWB designation

At the subsequent stage, for the water bodies finally designated as the artificial ones, a final justification of the designation should be prepared. The designation should contain:
hydromorphological characteristics of the water bodies,
socio-economic characteristics of all uses of the water bodies,
characteristics of the environmental modifications.
The supporting tool within the above procedure will be the documentation of the whole process in a standard sheet.

c Stages of works for the final qualification of the heavily modified water body

Depending on the complexity of cases, it is possible to use more or less detailed analysis (see Illustration 17):
In the simplest cases (ex : abandon or major change of an activity), a simple qualitative analysis can be sufficient (ex : absence of protection for the population against floods if the dikes get removed). It’s the « first level of analysis » aiming to define the most evident cases;
In the less evident cases, the evaluations could be based on the indicatory values (technical feasibility, environmental balance, costs) - this is the « second level of analysis» ;
Only in more complex cases more detailed studies will have to be realised at the local level to identify precisely some local issues and to analyse in detail the technical feasibility as well as the costs and effects - “ third level of analysis”.

The answer sheets present the possible levels of analysis and needs depending on the level of detail of the conducted analysis.

Illustration 16 Algorithm of realisation of the analysis within the identification of the restoration measures and the study of the functional alternatives

Qualitative analysis
The objective is to check if the designation of HMWB isn’t obvious and economically justified.

The European guide proposes to realise such a qualitative evaluation when the impacts seem to be extremely strong or extremely weak and when all the interested parties agree that they are significant or not.

At this level, we should gather the available indicators to assess the impact but not necessarily to calculate the monetary values.

Indicatory analysis (using the reference values)
One should proceed to this type of analysis only if the qualitative assessment realised during the previous stage isn’t convincing enough and / or when the classification as a HMWB isn’t the object of the consensus between different water actors.
The second level of the analysis consists in answering the questions if a water body is a heavily modified one using the standard values (reference values) considered « representative » by the socio-professionals and scientists, whether for the quantification of

the losses endured by the concerned activities whether for the quantification of the environmental impacts.

The costs used at the second level of the analysis don't therefore refer to the production costs of the activity at the concerned site. So it is not possible to judge the economical sustainability of the activity in its local context (status of installations, technical, economical environment, …) on the basis of these data.

It is then necessary to determine:
- the benefits (including the environmental benefits) related with the classification as a "natural water body" and, consequently, with the necessity of realisation of the good status objective;
- costs and benefits related to the restoration measures necessary for the realisation of the good status;
- the possible alternatives and assess their environmental costs;
- the costs of the implementation of an alternative to check if they are disproportionate respect to the environmental benefits related to the realisation of the good status objective of a water body and realise the first assessment of measures necessary to reach the good status.

Detailed analysis

If the elements gathered at the previous level are not convincing enough it is necessary to complete – by the local studies – the knowledge of the activities, costs and environmental benefits related to the realisation of the good status in a given water body.
The purpose here is to get a better knowledge of all the economical costs related to all the activities and interests in a precisely defined HMWB.
Considering the importance of such work and the resources that it requires it is recommended that the studies don't represent more than 10 % of cases.

Scheme of answering
The illustration 17 presents a scheme of procedure within the collection of information for the needs of the above analysis. The subsequent part describes – in form of questions – the way of proceeding compliant with the scheme presented at the illustration 18.

Question nr: Content of the question
Explanation: Here should be given a definition of the activities to be conducted to answer the question, as well as a description – easy to understand – of some examples.
Type of data accordingly to the levels of analysis: As it has been already explained in the previous part of the document, the answer to a question requires a certain refinement of the needed data, depending on the obviousness of answers and the complexity of cases. This part tries to illustrate the type of data that should be obtained on each of the three levels. I Qualitative analysis (indication of the potential scopes of data – I level of analysis) II Indicatory analysis (guiding values) (indication of the potential scopes of data – II level of analysis (data for the I + II levels of analysis) III Detailed local analysis: (indication of the potential scopes of data – III level of analysis (data for the I + II + III levels of analysis)
Potential sources of data: If the sources of data have been identified, they are mentioned in this field.
Expertise required: Indication of the institutions the involvement of which could help to find an answer to this question.

Illustration 17 Structure of needs in terms of data and information for the questions asked during the analysis

2.5.3.4. Process of the final designation of the HMWB

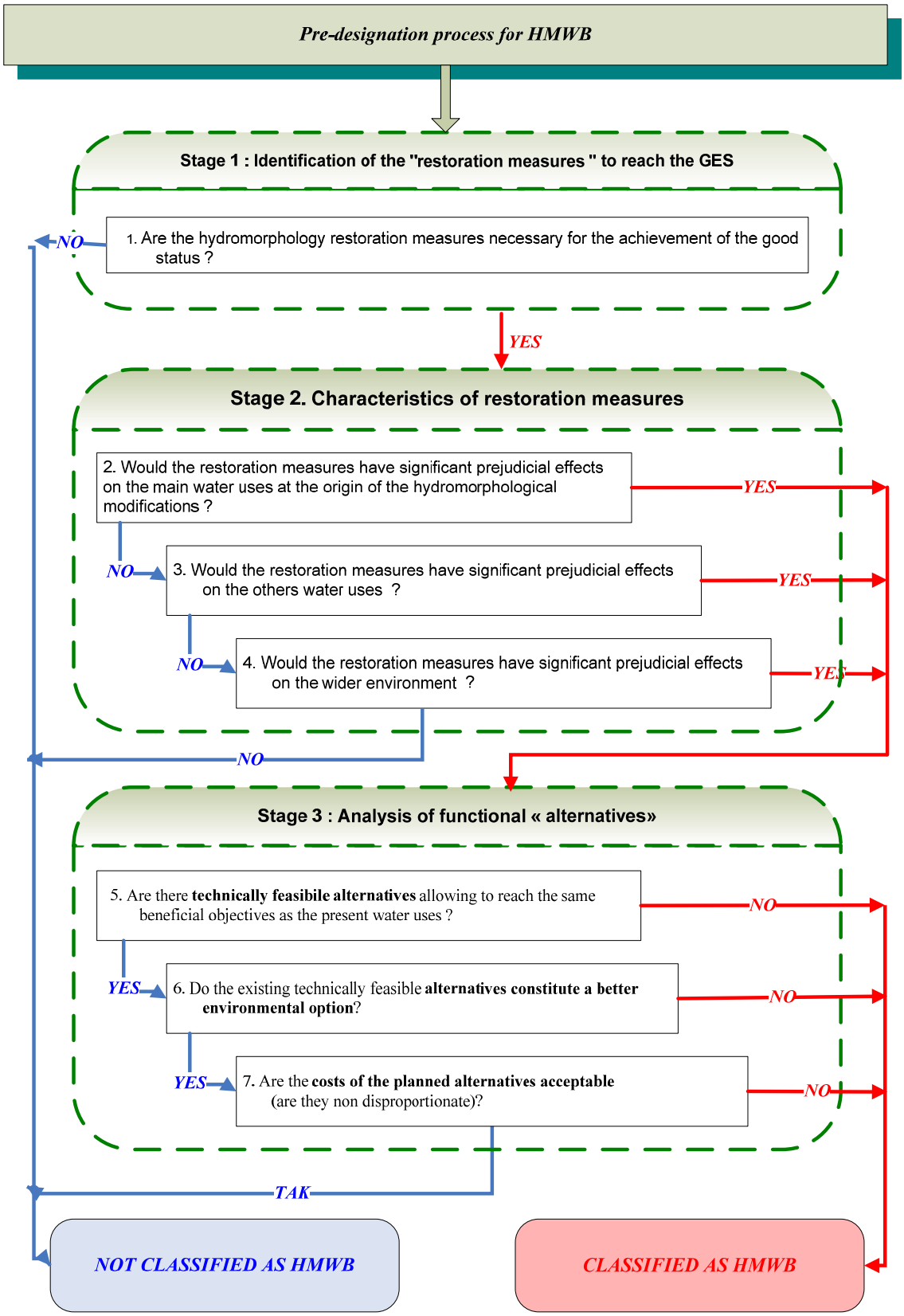


Illustration 18 Process of the final designation of the HMWB

STAGE 1 – Identification of restoration measures

Question 1: Is it necessary to introduce hydromorphology restoration measures in order to achieve the good status of a given water body ?
Explanation : The dimension of the hydromorphology restoration measures necessary to achieve the good status of the environment should be elaborated in a way to show the whole range of measures, from the ones aiming at the reduction of the environmental impacts of a given transformation (ex. Increase of the biological flows or construction of fish passes) to the measures leading to a total suppression of this transformation. The measures can directly concern a physical transformation (i.e. change of the transformation) or improve the general ecological conditions (ex. Creation of habitats). One should also forecast how a particular measure will contribute to the pursuance to achieve the good ecological status and analyse if the whole package of the proposed measures for the restoration of the previous status can result in the achievement of the good ecological status. These measures should be well identified (ex. a precise percentage of flow) and should also cover the evaluation of the possibility of achievement (total or partial) of the good ecological status. At this step it is important not to eliminate “a priori” possible measures because of technical feasibility or high costs.
Type of data accordingly to the levels of analysis: o *Qualitative analysis:* List of selected measures for restoration of hydro morphological functionalities. Technical design of measures (ex: km of concrete embankments removed, km of vegetal protection installed …) o *Indicatory analysis:* Effect of measures (surface of spawning area reachable by migratory fish, change in the flow regime ($m^3.s^{-1}$),) o *Detailed analysis :* Costs of planned measures (if requested…)
Possible sources of data: Database on costs of measures Bibliographical studies on renaturation experiences…. Summary sheets after Art.5 report (pressures, impacts, morphological information….) Basic information collected in frame of works on the PoM
Expertise required : Technical and hydromorphological experts, Interested parties at the local level (local meetings), Sharing experiences at national level could also be useful.

STAGE 2 – Characterisation of restoration measures

Question 2 : Do the planned restoration measures limit the water uses in a significant way?
Explanation : It is necessary to evaluate if the activities for the "restoration of the previous status" necessary for the achievement of the good ecological status will have significant negative effects for the present water uses. The activities mentioned in the article 4.3. of the directive are: protection against floods, regularisation of flows and drainage of soils ; navigation, port zones; leisures; activities for which the water is stocked such as drinking water supply, production of electricity or irrigation; activities of the sustainable human development. It should be reminded that it is possible to have a few main users on a single water body (ex : drinking water supply + protection against floods + irrigation) The purpose here is the quantification (but not necessarily through the economic values) of losses in terms of the activity but also of the potential economical effects for each user. It is important to conduct the evaluation at the right scale. The negative effects can be determined at the level of water body, of region, river basin district or even country. The pertinent scale of analysis depends on the modalities of use or on the sector, as well as on the key spatial characterisation of the negative effects. In some cases it may be justified to analyse the negative effects in more that only one scale in order to ensure the best evaluation.
Type of data accordingly to the levels of analysis: *o Qualitative analysis:* Use of non-monetary indicators, describing economic potential linked with use, for example: - Number of inhabitants under flood risk or surfaces concerned – simple assessment done together with users. - Population with no more potable water supply *o Indicatory analysis:* National level or statistical values allowing to evaluate the potential adverse impact: Quantification of reduction of the activity (loss of volume produced due to the measures: KW/H for loss of hydro electricity, surface of cultures requiring irrigation). Economic valuation of reduction of the activity (loss of turnover of the water users) *o Detailed analysis :* This level of analysis is used most often when the entire use isn't removed. One can use here a detailed modelisation of the effects of the modification (ex. link between the production of energy and the volume of flow)
Possible data sources: Data collected with the characterisation of uses (etat des lieux) Simplified evaluation for the impact of measures elaborated in co-operation with users When assessing the potential looses it may be helpful to elaborate a simplified evaluation in order to quantify the impact of activities, ex : evaluation of efficiency of power plant depending on its type (river hydro-plant, pumped storage power plant, … .).
Expertise required : Hydromorphologist, hydrologist, users Experts from economic sectors related to the uses

Question 3: Do the planned restoration measures have a significant adverse impact on the other existing uses?
Explanation : With time, the other activities and other interests could have developed beside the principal activity at the origin of the hydromorphological modifications of a water body. This is for instance and most often the case of recreational activities related with the existence of a dam.... The objective is then to evaluate the possible effect of the measures on additional activities that could lead to reduce (or sometimes increase) those kind of additional uses. Such analysis should be conducted in a similar way as within the search of answer for the previous question.
Type of data accordingly to the levels of analysis: *o Qualitative analysis:* Most of the time in simple case, it won't be necessary to analyse the impact of measures on secondary users. However at this step it is necessary to take into account at least an inventory of users concerned by a restoration measure. *o Indicatory analysis:* The goal is to quantify the present level of these uses in frame of the other forms created by the hydromorphological modifications and to estimate their possible evolution due to the restoration measures. The data for such analysis will need to be gathered only if both the weight of the activities and the impact of measures on these activities seem to be important. The examples of such data can be : - Number of tourists, daily or yearly, using the created recreational area (assessment of at present frequentation with available data, and then the assessment of future frequentation- main trends, even rough estimation) - Loss of activity (economic valuation) *o Detailed analysis :* Detailed analysis of local market, assessment of loss of activities, impacts on gross product at the regional level – analysis of the present status and of the forecasted changes. One can use here the detailed models or specific surveys for the users.
Possible data sources: National or regional statistics, Tourism chambers, voivodships
Expertise required : Experts from economic sectors related to the uses Local experts

Question 4 : Do the planned restoration measures have a significant adverse impact on wider environment ?
Explanation : The purpose of the present step is to guarantee that the restoration measures necessary to achieve the good ecological status don't lead to an improvement of a given water body and cause - at the same time - environmental problems in another site or in terms of other aspects of the wider environment. The environment widely understood should include as well the natural environment as the human environment (archaeology, patrimony, landscapes, greenhouse effect, …). It means that: we don't limit ourselves to the effects on the aquatic bodies; these indirect effects on the environment are to be considered at the local scale on one hand but also at the larger scale if necessary. The purpose of such an assessment is to check the coherence of measures with other UE directives (ex. directive concerning birds, habitats, renewable energy). In frame of the analysis conducted here it will be in particular necessary to identify the areas of special conservation and the areas of special protection from the Natura 2000 net impacted by the restoration of the good status. If the proposed measures are not compatible with the protection of the environment, it will be necessary to examine if there are other means to assure the same environmental service to compensate the induced damages.
Type of data accordingly to the levels of analysis: o *Qualitative analysis:* Inventory of European and national protected areas existing on the water body or on the water bodies which might be impacted by the measures Protected sites of cultural, historical, spiritual heritage o *Indicatory analysis:* National level information on environmental benefice values Loss of environmental use o *Detailed analysis* Same information as previous levels but at local scale
Possible data sources: Environmental costs database Data on the protection areas
Expertise required : Meeting with protected areas stakeholders Environmental experts Economists (in the case of detailed local study)

STAGE 3 – Analysis of the functional alternatives

Question 5 : Are there possible alternatives technically feasible allowing to obtain the same benefits from the water use as the present ones?
Explanation : The alternative technical solutions correspond to the replacement of a part (or all) of presently realised activities that cannot be maintained if we take into the consideration the hydro morphological modifications necessary for the realisation of the good status objective. The alternatives include a displacement of the present use to another water body where it would cause less environmental damages or the replacement of the present use by another alternative that compensates the present benefits resulting from the water use (example : replacing hydropower by windpower or replacement of waterway transportation by railway transportation).
Type of data accordingly to the levels of analysis: Whatever the level of the analysis (qualitative assessment, use of guiding value, detailed local studies), this stage requires a fine characterisation of the uses which need to be replaced.
Possible data sources: Characterisation of uses and identifications of alternatives will require the knowledge of the users. This knowledge can exist at different level : National (or even European) level when the alternative can be at a national scale , for example the different ways to produce electricity Local level , when the alternatives are at a local level (for example to replace a water supply by underground water, or interconnection) and to identify the real economic potential of the use which needs to be replaced,
Expertise required : Experts from the economical sectors related to the given water uses (ex. experts in water-power engineering). Users

Question 6 : Are the existing technically feasible alternatives better environmental options?
Explanation : The objective is to check whether one environmental problem is not replaced by another one. This step is therefore similar to the research of an answer for the 4th question. The analysis will be realised on the basis of the evaluation of the environmental impacts admitted by the concerned professionals (water, air, biodiversity …). Additionally, the purpose of such an assessment is also to check the coherence of the alternative with other UE directives.
Type of data accordingly to the levels of analysis: *Qualitative analysis:* Inventory of European and national protected areas existing on the water body or on the water bodies which might be impacted by the measures Protected sites of cultural, historical, spiritual heritage Characterisation of the restoration measures' impact on the environment (inventory of other directives) Quantification of the activity to be replaced *Indicatory analysis :* Information of the values of the environmental benefits at the national level. Losses as concerns the uses of the environment The indicators can include, for example: Volume of the CO2 emissions that appeared after the replacement of the production of the hydro-energy by the production in coal power plants (European studies) Volume of the CO2 emissions that appeared after the replacement of the water transport by the road and railway transport (European studies) Environmental costs related to the CO2 emissions (European studies) *Detailed analysis* The same information as for the previous levels but at the local scale, ex. analysis of use of another sources for water supply
Possible data sources: Bibliographical research, Dedicated studies (ex: External costs of transports, INFRA, 2004, external costs of alternatives means to product electricity : base EXTERNE)
Expertise required : Meeting with the concerned professionals who will be able to link up alternatives with impacts on environment (water, air, biodiversity…).

Question 7: Are the possible alternative not disproportionately costly?
Explanation : This step concerns the assessment of the financial costs of the WFD implementation. The alternative solutions can be moved apart if theirs costs are disproportionate compared to the effects. It is important that this assessment takes into account the possible or the planned expenses related to a given current water use – in some cases it should cover the expenses planned by 2015, by 2021 and by 2027. It is particularly useful (and important) in the situations where a given current use implies the engineering installations at a large scale requiring a regular maintenance, exchange or modernisation. The assessment of the alternative options should be based at the costs-benefits analysis taking into account: the costs of the implementation of an alternative solution, the environmental, economical and social losses / benefits in the present situation for the alternative solutions.
Type of data accordingly to the levels of analysis: *Qualitative analysis:* A Rough estimation can be lead by comparison of information gathered in the previous stages : - the ecological interest of the water body : description of the regulatory zonings widely understood that would allow to underline the proved ecological interest. *Indicatory analysis:* - Costs of alternatives (investment, operation and maintenance), - Environmental costs of alternatives : (ex : cost of producing electricity from different sources, costs of transporting goods through different transport means) - Cost of destruction of infrastructure - Environmental benefits obtained from improving water status (link with environmental costs above) *Detailed analysis* As at the previous level but in reference to the real costs of solutions proposed at the local level
Possible data sources: Sources used for the previous questions French database on environmental benefits
Expertise required : Economists; Experts from economic sectors related to the uses ;

STAGE 4 – Justification of designation of HMWB

For the water bodies that have been finally designated as heavily modified, a final justification of the designation should be drafted. The justification should cover – in form of description or indicators – in particular the following elements:

- key elements resulting from four main characterisations realised in the phase of the preparatory works :
  - hydro-morphological modifications,
  - socio-economic justification of the main water uses at the origin at the hydro-morphological modifications,
  - socio-economic justification of the other water uses at the origin at the hydro-morphological modifications,
  - environmental changes.
- results of the analysis realised during the phase of analytical works based at the answers to the particular attached questions;
- results of the debates in frame of the public consultation accompanying the designation.

Be alert!
After the completion of the heavily modified or artificial water bodies designation process, we should proceed to the construction of the programmes of measures. The water bodies that - despite the implementation of the basic and complementary measures will not achieve the fixed objective in 2015 (achievement of the good potential) – will be subject to the procedures of justification of derogation (postponement of the achievement of the objectives of 6 or 12 years or adoption of less strict objectives). The directive demands to review the list of heavily modified water bodies every six years during every updating of the management plan. The designation of the artificial and heavily modified water bodies can be therefore up-dated in frame of every actualisation of the water management plans depending of the modifications occurring within the environmental, social and economical balance widely understood. Such balance can change depending on the development of new technologies or economical changes.

2.5.3.5. Helpful tools:

Before proceeding to the previously mentioned confirmation stage it is useful to lean on two types of tools:

- a catalogue of restoration measures necessary to reach the good status;
- a sheet of the designation of heavily modified water bodies.

Catalogue of restoration measures necessary for the achievement of the good status of waters
One of the results obtained in the Upper Vistula pilot river basin is notably the realisation of a catalogue of measures *"Economical database in the context of the Upper Vistula pilot project"*[1]. This catalogue lists a series of potential basic or complementary measures aiming at the achievement of the good ecological status. In this catalogue we can also find the unitary costs that can supply the elements necessary for the quantification of the costs of actions necessary to undertake in order to restore the good status as well as the information on the expected results of measures. This information is usable during different stages of the confirmation of the HMWB.

[1] Enterprise Format, Kazimierz Szewczyk, 2005, Project PL2003/IB/EN/02

The sheet of the designation of the HMWB

A supporting tool allowing an effective realisation of works during all the phases of HMWB and AWB designation will be a standard sheet. It will allow to construct the justifications for all the water bodies that would be coherent, clear and would adopt similar standards.

II.6 ELABORATION OF THE PROGRAMMES OF MEASURES

II.6.1 Definition of the problem and its place in the planning process

The Water Framework Directive asks for the characterisation of river basins in terms of water uses and water management problems in order to define, with public participation, a program of measures that will allow waters to reach the good status in 2015. The Water Framework Directive, in its article 11, says that the programme of measures should include the basic measures and, there where it is necessary, complementary measures.

The basic measures cover:

1. measures required for the application of the European legislation dealing with the protection of waters, including the measures required on the basis of the legislation determined in the article 10 and in the part A of the Annex VI, which means that these are measures required by the following directives:
   - o Bathing Water Quality Directive 76/160/CEE
   - o Directive on the Conservation of Wild Birds 70/409/EEC
   - o Directive on the quality of water intended for human consumption 80/778/EEC modified by the Directive 98/83/EC
   - o Directive on the control of major-accident hazards involving dangerous substances (Seveso) 96/82/CE
   - o Directive on the assessment of the effects of certain public and private projects on the environment 85/337/CEE
   - o Sewage Sludge Directive 86/278/EEC
   - o Urban waste water treatment Directive 91/271/EEC
   - o Plant Protection Products Directive 91/414/EEC
   - o Nitrates Directive 91/676/EEC
   - o Habitats Directive 92/43/EC
   - o Directive concerning integrated pollution prevention and control 96/61/EC
2. measures considered as pertinent in relation with the objectives dealing with the water services cost recovery principle,
3. measures aiming at the promotion of the efficient and sustainable water use in order not to impede the realisation of the environmental objectives,
4. measures allowing to meet the requirements for the water destined for consumption, including the means assuring the quality of waters in order to reduce the level of treatment required for the production of the drinking water;
5. measures related to the control of the abstractions of fresh surface and groundwater and of the impoundment of fresh surface waters, including such activities as register of the water abstractions and permits for the abstraction or impoundment of waters;
6. measures aiming at the reduction of pollution, including the requirement of a previous obtainment of permit for recharging and completing the groundwater body;
7. as concerns the discharges from the point sources that can contribute to the pollution, the requirement to obtain a previous regulation establishing the measures for the reduction of emissions of the given pollutants;
8. as concerns the discharges from the diffuse sources that can contribute to the pollution, activities aiming at the prevention or reduction of the introduction of the pollutants;
9. as concerns every other type of prejudicial impacts on the water status, in particular those that have to contribute to the obtainment of the good ecological status or the good ecological potential in case of the water bodies classified as artificial or heavily modified;
10. the proscription of the direct discharges of the pollution into the groundwater (taking into account the exceptions determined in the WFD);

11. accordingly to the activity launched on the basis of the article 16, the measures aiming at the suppression of the pollution of the surface waters by the substances determined in the list of the priority substances and at the progressive reduction of pollution by other substances that, without those measures, could impede the achievement - by the Member States - of the objectives fixed for the surface water bodies;
12. all other measures for the prevention of large scale damages from the technical installations and aiming at the prevention and / or reduction of the influence of the accidental pollution, for example in result of a flood, including the use of the direct systems of detection and prevention of such cases, with all the pertinent measures that serve the reduction of pollution of the aquatic ecosystems in case of sudden failures that couldn't have been reasonably foreseen.

The supplementary measures are the measures elaborated and implemented as a complement of the basic measures (an open list of such measures is contained in the part B of the annex VI). These are:

1. legal and administrative instruments;
2. economical and fiscal instruments;
3. the negotiated agreements concerning the environment;
4. measures for the reduction of emissions;
5. codes of good practices;
6. reconstruction and rehabilitation of wetlands;
7. measures aiming at the control of water intakes;
8. measures in frame of the demand management, among others the promotion of the adapted agricultural production, such as culture of plants having a reduced water needs at the areas exposed to droughts;
9. measures that serve an effective water use and its reuse, among others promotion of the technologies consisting in an effective water use in industry and water saving irrigation techniques;
10. investment activities, including for example the desalination plants;
11. environment restoration's projects;
12. artificial recharge of aquifers;
13. projects related to education, research, development and demonstration.

The article 113 a of the Water Act says the water and environment project for the country determines the basic and supplementary measures aiming at the improvement or maintenance of the good status of waters in particular river basin districts.
Accordingly to its disposals, the basic measures are oriented at the fulfilment of the minimal requirements and cover:
1. the measures allowing to implement the disposals of the European Union legislation dealing with the protection of waters;
2. the measures that serve the implementation of the costs recovery principle;
3. the measures the serve the promotion of an effective and sustainable water use in order to prevent the risk of non achievement of the environmental objectives;
4. measures aiming at the satisfaction of present and future water needs in terms of the drinking water supply for the population;
5. preventive, protective and control measures related to the protection of waters against the pollution from the point and diffuse sources;
6. measures for the optimisation of the principles of the water resources formation and of the use conditions, such as measures for the intakes' control.

The supplementary measures are oriented in particular at the achievement of the environmental objectives and can indicate:
1. legal, administrative, economic means necessary to ensure an optimal implementation of the adopted measures;

2. negotiated agreements concerning the use of the environment;
3. measures for the reduction of emissions;
4. principles of good practice;
5. construction of wetlands;
6. measures that serve an effective water use and its reuse, among others promotion of the technologies consisting in an effective water use in industry and water saving irrigation techniques;
7. projects related to education, research, development and demonstration.

Because of frequent difficulties consisting in a clear and evident distinction of the basic and the supplementary measures, the present guidance document proposes – for the needs of the elaboration of the programmes of measures – to adopt a division of types of measures into three categories:

A. Basic measures resulting from the national legislation, for example:
- sector's programmes, for example the National Programme of the Urban Wastewater Treatment, adopted at the national level,
- solutions, financial and investment programmes adopted at the regional level, for example measures defined and quantified from the technical and financial point of view in the local development strategies, in the financial and investment plans, in the programmes for the protection of the environment decided by the councils of communes, poviats or voivodships,
- the adopted plans of the modernisation of the industrial plants.

Those measures are all the measures that have already been decided by the national or local authorities. Such measures should already be identified at the stage of the elaboration of the baseline scenario till 2015 and the assessment of risk of non achievement of the environmental objectives.

B. Other basic measures, for example:
- required for the implementation of the UE legislation in the domain of the protection of waters (protection of bathing water, of the endangered birds' species and their habitats, protection of water destined for the consumption, protection against the municipal pollution and against the pollution of the agricultural origin, etc.)
- measures serving the implementation of the costs recovery principle,
- controls (of the pollution discharges, of the water intakes),
- *technical measures (reduction of the treatment level necessary within the drinking water production, proscription of introducing certain pollutants into waters, prevention and control of the diffuse pollution, etc.).*

The other basic measures are those basic measures that, accordingly to the WFD, are to be implemented but the way and the schedule of their implementation haven't been decided yet (probably these measures will not result directly from the previously elaborated baseline scenario).

C. Supplementary measures:
- legal and administrative instruments,
- economic and fiscal instruments,
- special measures: promotion of the good practices' codes (while designing the technical installations, in agriculture, etc.), restoration and rehabilitation of wetlands, education, research, development projects, etc.

In general the supplementary measures are all types of measures that are to be implemented as a complement of the basic measures in these water bodies for which there is a risk of non achievement of the environmental objectives by the 2015.

The way of proceeding introduced by the Directive implies to define the basic measures resulting form various directives, to evaluate the result of the application of those measures respect the objective that is a good status of the resource and to define the supplementary measures for each water body susceptible to fail to reach the good status.

To build such a program, it is necessary to integrate from the start – meaning from the elaboration of the characterisation process that will contain the description of water bodies' status and water management issues – the current dynamics of the water system to ensure that the assessment of water bodies' risk to fail in reaching WFD environmental objectives can be effective in supporting water management planning. Indeed, an assessment of water bodies likelihood to fail in reaching WFD environmental objective based on present water status and pressures would not be sufficient to define a program of measures because some water status alterations currently observed might not be in the future. Such alterations can get reduced or increased as a result of the implementation of mitigation measures, of the economical development and changes of the current politics, etc.

The programmes of measures have to be established at latest by 2009 and implemented by 2012. They will be reviewed and, if necessary, updated at latest by 2015, and then every six years (in 2021 and 2027). Each new or updated measure decided on the basis of the updated programme has to be implemented within three years from the date of its definition.

The elaboration of the programme of measures is a crucial step, following all activities on initial characterisation and identification of main issues. The programme of measures has to be integrated in the Management plan and is the key element in the water management planning.

We should notice that the programme of measures may concern also some issues out of the WFD. For instance some measures aiming to meet the quality objectives will allow to reduce the intensity of freshets and droughts such as for example increase of retention, creation of natural wetlands.

II.6.2 Necessary data

The following studies related with the implementation of the WFD should be the basis for the development of the programmes of measures:

1. Refined identification of the anthropogenic impacts and evaluation of their influence on the status of surface waters and groundwater;
2. Initial designation of the heavily modified and artificial water bodies ;
3. 2015 baseline scenario for the aggregated homogenous water bodies;
4. overview of main issues of water management;
5. Assessment of risk of failure to meet the environmental objectives by 2015,

As concerns the documents elaborated by the local authorities the following studies should be used:

6. development strategies and operational programmes (for the voivodships, poviats, communes),
7. sectors' programmes (at the national, voivodship's, poviat's and commune's level),
8. spatial management plans (for the voivodships, poviats and communes),
9. studies of conditions and orientations of the spatial management (for the communes),
10. programmes for the protection of the environment (for the voivodships, poviats and communes).

II.6.3 Recommended methodology of study

a Short characterisation of the approach

All the presented previously activities realised in frame of the water management planning process will contribute to a correct definition of the scope of basic and supplementary measures that constitute the departure point within the elaboration of the programme of measures compliant with the WFD requirements.
The first stage of the elaboration of the PoM is the preparation of the basis of works through a verification of the existing informational resources on the water bodies coming form the previous implementation stages. It is proposed to create synthetic information, a characterisation for each water body, for example in form of tables. The elaboration of the first programme of measures planned in the second stage will cover a combination of basic measures for the water bodies that are not at risk of non achievement of the WFD's objectives, additionally a combination of the supplementary measures for the water bodies at risk, and in both cases - a physical characteristics of the proposed measures. This stage of works should end up with an evaluation of the effectiveness of the combinations of measures in terms of water body's status which concerns the achievement of the final objective through the restoration measures and not only the reduction of the anthropogenic pressures. The costs effectiveness analysis is conducted at the third stage of the proposed methodology. This stage consists in the evaluation of the proposed measures, in the comparison of these costs and the previously estimated effectiveness of measures, in the formulation of conclusions and in a decision on the choice of measures. The evaluation and justification of the derogation is the last element of the programmes of measures elaboration process. One should remember that it is possible to postulate for exemption respect to the objectives or deadlines required by WFD only in terms of supplementary measures.

The proposed methodology is based on the experiences obtained during the implementation of WFd in France and in Poland – on the territory of the Upper Vistula pilot river basin.

On the basis of the realised tests it has been determined that, in order to prepare an effective programme of measures, and then to realise it in an efficient way, one should be guided by the following main principles:

1. ***Principle of delimitation of the areas in accordance with the limits of the aggregated homogenous water bodies (SJCW)*** – the unit area for the elaboration of the programme of measures should an area designated through the limits of a SJCW (covering the pertinent surface and groundwater and the protected areas).
2. ***Principle of integrated approach to the water bodies*** – the programme of measures should constitute a coherent combination of measures necessary to apply at a given area in frame of all the components distinguished in the WFD, that is the surface waters, the groundwater and the protected areas (art. 4, paragraph 1 WFD).
3. ***The principle of application of the strictest objective*** – programme of measures must be elaborated in such way that, in result of the realisation of the elementary tasks determined in it, it would be possible to achieve even the most strictly formulated environmental measures for each component.

At every stage it has been shown in a schematic way (coloured window) which type of the water bodies' status is concerned.

b Preparation of the basis of works

WB(not at risk)	WB(at risk)

The design of programme of measures should start with checking and taking stock of existing information resources on the water bodies, either from the previous stages of the WFD, or from other additional sources. This will be needed to assess the applied procedures and methodologies, and to check possible lacks in previous WFD steps.

STAGE 1 – Analysis of data sources

WB(not at risk)	WB(at risk)

The first step in the process of the elaboration of the programme of measures for the water bodies consists in gathering the data and information on each water body situated on the area designated accordingly to the delimitation principle and to conduct – on such basis – an analysis of the management, use and status of waters. That's why it is necessary to analyse the available data and the information gathered for the needs of the elaboration of the diagnostic and planning documents concerning the study area.

The analysis of the source data within the elaboration of the programme of measures will lead to gather, check, verify and, in result, to approve the data and information produced for article 5. These materials should be considered as a main source of information and as a mean of reporting to groups involved in WFD implementation process. Here below is presented the scope of data elaborated for the needs of the Article 5 characterisation that will be most useful within the designation of PoM:

Table 5 Scope of data necessary for the elaboration of the programme of measures

Data source	Usefulness for PoM	Remarks
Impacts and pressures	Dimensioning of measures from the programme will be based on knowledge about anthropogenic influences and impacts: what pressures should be reduced, by what extent (ex. volumes of discharge to be reduced, necessity to reduce the water abstractions, to assure a free migration of fishes).	In most cases the analysis of influences and impacts from the characterisation (art. 5) lacks the quantification necessary for the PoM. That's why on the stage of the elaboration of the PoM it will be necessary to precise them and to detail the quantification.
Baseline scenario	Quantification of "basic measures" should come from BLS: it provides data on expected implementation of existing regulations, and quantifies this implementation. Evaluation of "gaps" between WFD objectives and expected situation in 2015 should be based on BLS results.	It happens that the BLS is not fully understood by participating experts and stakeholders. It can be confused with a general informative study, whereas, conversely, it is an essential piece for technical assessment of needed measures in PoM. It can be necessary to refine and precise the BLS prior to starting the PoM.
Risk analysis	The risk assessment, elaborated on the basis of the analysis of	For PoM designing, the risk analysis provides the most important source

Data source	Usefulness for PoM	Remarks
	pressures and impacts and of the baseline scenario, sets priorities and indicates the issues to be integrated in the PoM.	for evaluating efficiency of measures: a measure is efficient according to the extent to which it reduces the risk of failing in meeting the WFD objectives.
Economic analysis of water uses	Measures considered for the PoM can product significant impacts on existing economic or social activities. It is therefore necessary to assess properly potential impacts (positive and negative) of measures. Also, derogations will be based on social and economic costs, compared to present situation. Derogation justification will be based then primarily on social and economic data on water uses that were produced for Article 5.	If and when Article 5 characterisation was carried out according to CIS recommendations, they should provide sufficient information. However these aspects are often under-estimated by Member-States, because their usefulness is not fully understood at first. Hence precision and refining of the economical analysis can be necessary for use in PoM.

STAGE 2 – Checking and validating the baseline scenario and the assessment of risk of failing to meet the 2015 objectives - evaluation of « basic measures »

WB(not at risk)	WB(at risk)

The design of programme of measures starts with taking stock of previously prepared documents, and adapting them to the specific scale and purpose of programme building. As the design of input assumptions for the baseline scenario and the risk assessment should be done through an iterative process of proposing and revising the hypothesis and proposals, at this stage of works it is needed to verify the adopted assumptions and to accept a “version” that will be further used within the elaboration of the programmes of measures. In such process of the verification and approval of the documents should take part the WFD implementation organs and other stakeholders, for instance as concerns:

- Identification of measures that will probably be taken in the near future by administrations and private stakeholders in result of the existing legal regulations;
- assessment of measures from the point of view of social-economical impacts;
- Assessment of likely impacts of influences of the anthropogenic activities and of the abatement measures.

These assumptions should be fully used within the elaboration of a prognosis on the likelihood to fail in meeting the WFD objectives in 2015 re-assessing and improving implementation of existing directives

BLS is intended to provide data necessary for the correct risk assessment by taking in account likely measures to be taken by various stakeholders in the near future in result of existing regulations. But, for ensuring a good risk assessment, it was recommended that BLS is built on a “realism” basis: measures that are to be realised and that result from the legal regulations are not necessarily effectively and timely realised.
On the basis of this information it is necessary to analyse the risk of non achievement of the environmental objectives and to think of a possible solutions to this problem. This method generates repetitions, it reduces however the risk of omission and is acceptable for all the actors of the planning process.

STAGE 3 – Characterisation of water bodies for the needs of the programme of measures

WB(not at risk)	WB(at risk)

Based on the already existing documents – for each aggregated homogenous water body – it is necessary to make a synthesis of information on the character of use, on the existing risks and on the development trends. In order to guarantee the uniformity of the characterisations for the particular water bodies and heavily modified water bodies, it is suggested to adopt the scheme presented in the table 7.

Table 6 Characterisation of the water body nr…. In the water region ….

Name of the aggregated homogenous water body			
Identificator – assigned within the aggregation			
Water bodies that constitute the study area (nr of surface, ground, lake coastal or transitional homogenous water bodies)			
NR	Analysed documents	Conclusions	Re-marks
A.	Refined analysis of the anthropogenic pressures and impacts	- identification of main pressures and impacts with the quantification - general evaluation of the present status	
B.	First designation of the heavily modified and artificial water bodies	indication of reasons of the designation (if applicable)	
C.	Main issues of water management	- indication of the identified problems	
D.	Baseline scenario till 2015	- description of the adopted assumptions - list of the basic measures planned for the realisation	
E.	Assessment of risk of non achievement of environmental objectives	- result of the analysis with an estimation of risk's level accordingly to particular indicators (if possible)	

Such characterisation of a given SJWC will indicate the priorities and orientations within the elaboration of the list of basic and complementary measures.

c Designing of the initial programme of measures

The elaboration of this programme refers to the achievement of the environmental objectives in a given type of water bodies (natural, AWB or HMWB).

STAGE 4 – Basic measures combinations

WB(not at risk)	WB(at risk)

The programme of measures deals first with basic measures.

However it should be underlined that in most cases there is some room for manoeuvre in applying the existing regulations. This comes from 3 essential reasons:

- Technical options for implementing directives; e.g. implementing the WWT directive can be done through different technical options. For example, wastewater can be treated by use of one centralised treatment plant for several towns, or de-centralised treatment policy. More precisely, techniques used for waste water treatment can lead to consider multiple alternative spatial solutions.
- Some directives do not specify the means of their implementation but only the objectives that are to be met, as for drinking water directive, lead directive, etc. In those cases it will be necessary to make important choices as concerns the means of achievement of the fixed objective or the spatial and technical solutions.
- In addition some measures may be planned by the various stakeholders. However their objective will not necessarily be the implementation of the regulations, but other reasons resulting for instance from the adopted development strategies or social and economical policies (e.g. improving standards in tourism, change of the character of the local economy, etc.). If such measures are already quantified and regulated by the local provisions, they should be included into the "existing measures".

That's why for each SJCW it is necessary to:
- make a list of directives to be respected,
- determine specific obligations resulting from WFD (non deterioration, dangerous substances, priority substances, register of protected areas...),
- and then refine the basic measures that should be implemented by the year 2015.

It can however appear, as it has been mentioned above, that it is necessary to complement the measures resulting from the baseline scenario. In such case it will be useful to assess and designate all "missing" measures: regulation enforcements that are not optimised up to now: poorly implemented mechanisms, loose controls, etc. The first kind of useful measures in the programme can then be designated as "better implementation of existing regulations" in the field, which is in line with the definition of "basic measures" in the WFD.

That's why for each water body it is necessary:
- to make a list of directives to be respected,
- to determine the specific obligations resulting from the WFD (non-deterioration, dangerous substances, priority substances, register of the protected areas...)
- and then to refine the basic measures that should be implemented by 2015.

Therefore it is necessary to combine the basic measures for each water body in two groups:
A. Basic measures resulting from the national legislation– tasks resulting from the planning decisions delivered by the national, regional or local authorities and concerning the modalities of solving the problems in water management or in other domains influencing the water management widely understood. Such decisions are (or should be) identified at the stage of the elaboration of the baseline scenario till 2015 and of the assessment of risk of failure to meet the environmental objectives.
B. Other basic measures not covered by decisions – the realisation of these tasks hasn't been decided yet (as concerns the location, time of realisation, way of realisation, etc.) but – accordingly to WFD – they have to be identified and implemented. The elaboration and the implementation of the programme of such measures aims at the fulfilment of the minimal requirements of the UE and national legislation , in particular dealing with :

- measures considered as pertinent in relation with the objectives dealing with the water services cost recovery principle,

Protection of waters against pollution,
Sustainable water use taking into account the drinking water supply for the population and realisation of the environmental objectives,
Optimisation of the water resources' management,
Controls of abstraction and implementation of the water services costs recovery principle.

As well as concerns the basic measures as the supplementary measures the use of the catalogue of measures contained in the study ECONOMIC DATABASE IN THE CONTEXT OF THE UPPER VISTULA PILOT PROJECT will simplify the works. This data base is based on a typology of measures that had served to establish a catalogue of measures, a set of tools to be used to reach the different directives' objectives as well as to deal with the main issues in the river basin.

STAGE 5 – Combinations of supplementary measures

WB(not at risk)	WB(at risk)

Supplementary measures are relevant for the homogenous aggregated water bodies at risk of non achievement of the environmental objectives only where the basic measures will not be sufficient for the realisation of the environmental objectives.

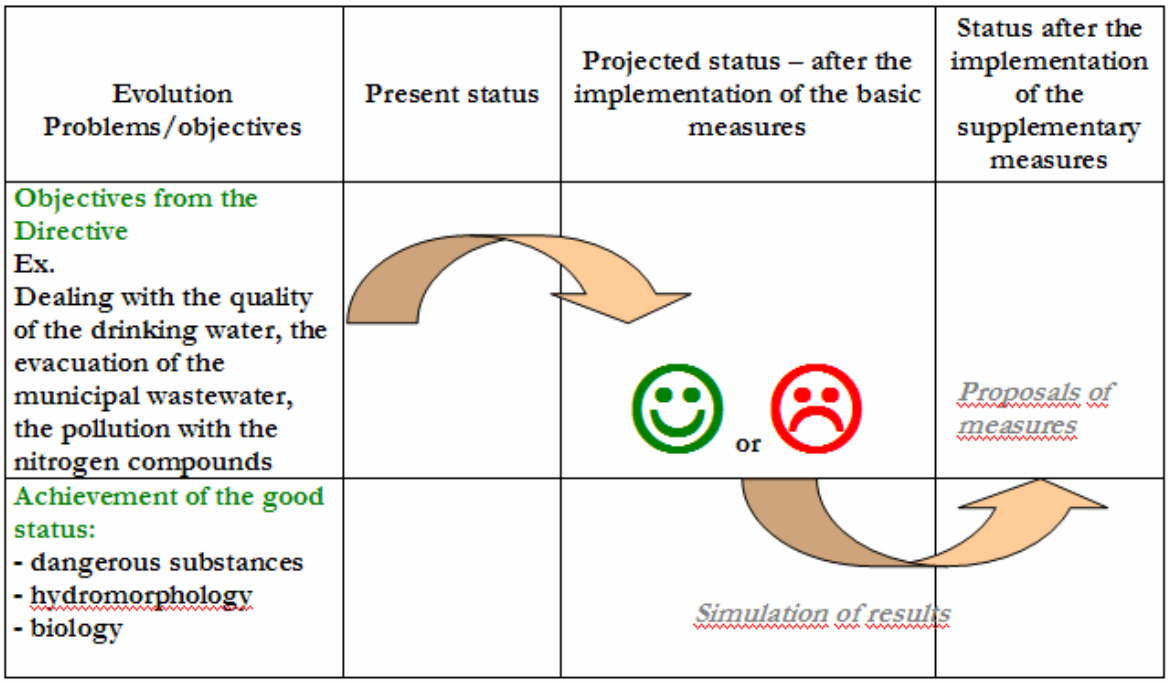
When basic measures are evaluated and assessed, then the question of assessing the remaining "gaps" is addressed. This part of the work needs putting forward a technical and scientific appraisal of what actions should be taken, in order to change from a – hypothetical – future "baseline" result to a – not yet precisely defined – good status/potential. It means of course assessing how should the environment react to the supplementary measures. It needs also defining what kind of techniques should be employed in order to address the issues at risk.
That's why for the water bodies at risk it is necessary to determine the following supplementary:
C. Supplementary measures, a necessary support for the basic measures that have to be realised in the water bodies at risk of failure to meet the 2015 environmental objectives. The measures for the achievement of the environmental objectives can cover in particular:
- pointing out of the legal, administrative and economic means necessary to ensure the optimal implementation of the adopted programmes of basic measures,
- technical activities for the reduction of the pollutants' emissions and for the effective use of water in the industry and in the agricultural irrigations,
- implementation of the good practices' principles (ex. good agricultural practices in terms of use of the nitrogenous fertilisers),
- reconstruction of wetlands,
- restitution of the groundwater's quality
- research, development, demonstration and educational activities.
At this stage it is required to proceed to a kind of simulation of the environment's behaviour in reaction to determined activities and politics. If the digital models are available, they will be very useful at this stage. It is recommended to try to elaborate the pertinent models, even very simple ones – that would help the experts during the discussions and debates.
One of the possible methods of work on the combinations of supplementary measures consist in organising the local working meetings with the participation local and regional experts.

« Optional » STAGE – Local working meetings
Examples of topics to be discussed on the meetings:
➢ the remaining gap from baseline scenario result and GES (what parameters problematic, where, because of what pressures / lack in policy)?
➢ the possible technical and policy options to reduce the gap (list of possible measures to reduce / suppress the gap)
➢ Check of general consistency of measures, and evaluation of upstream-downstream effects of measures.
Needed material for meeting preparation:

➢ Baseline scenario description: assumptions, results, lacks in analysis (ex. list of not analysed parameters) or in knowledge (e.g. missing data replaced by experts assumptions). Results in terms of expected quality after fulfilled implementation of existing regulations, and in terms of deadlines: when should existing regulations be applied and fully implemented, and when should effects from these actions be visible in terms of ecological status, and then how many years will be left before 2015?
➢ General characterisation if needed: data on activities and pressures, data on monitoring and current quality, etc.
➢ Catalogue of measures and cost database ready for use.

Often the similar measures are proposed in frame of the implementation of different directives, however the awaited results are different (e.g. measures for Nitrates directive can be identical to measures for Potable Water directive and for shellfish directive, etc.).
To facilitate the analysis of the types of supplementary measures for each water body, one can use the synthetic table presented below. In order to fulfil it a quick analysis of every measure has to be done: to which issues it corresponds, what is its space of implementation, its nature, authority responsible for its application, the concerned sector, who pays, which indicator is analysed. The table distinguishes the examined issues (notably related to the European directives) vertically and the « trajectory » of the water resources (present status, foreseen status, status after the implementation of the basic measures and after the complementary measures) horizontally. This table allows to examine – for each water body - the conformity with eleven directives mentioned in the WFD, taking into account the deadlines of their realisation (present conformity, projection 2015 with the optimal application of the existing tools – basic measures of the WFD, projection 2015 considering the implementation of the complementary measures, demands of derogations 2021 or 2027).
The purpose is to organise work so as to end up with a tentative combination of supplementary measures for water bodies under consideration.

Table 7 Analysis for the water bodies at risk of non achievement of the environmental objectives in 2015



Whenever we identify a complementary measure, it gets integrated into the catalogue of measures. The juxtaposition of basic measures and complementary measures for a given water body constitutes a draft programme of measures leading to the achievement of the

good status that should be submitted for debate with the collectivities or the representatives of users.

Co-ordination with heavily modified Water Bodies analysis
For HMWB, "supplementary" measures are measures intended to recover the morphological status that will enable good ecological status. It is recommended to designate a combination of such measures within the process of designation of the HMWB.

STAGE 6 – Preliminary screening of the effectiveness and of the realism of the measures

WB(not at risk)	WB(at risk)

At this stage a first and provisional evaluation of feasibility and effectiveness can be done.
Both criteria (feasibility and effectiveness) are scored from 1 to 5 and the consensus between the experts should be sought within the determination of the score. The aim here is not to replace the cost-effectiveness analysis itself but to proceed to a first overview in order to eliminate the less pertinent and the less probable measures(within the experts' assessment the measures having the lowest score for the both criteria should be eliminated).
Although effectiveness will receive specific attention and detailed evaluation later in the process (step 3-2), realism will not be devoted a specific step of the approach. It is recommended that realism is kept in mind in the beginning and / or in the end of each step: when quantifying, check that obviously unrealistic solutions are not given heavy attention. Based on the results of the cost-effectiveness analysis (if possible, during a consultation with the stakeholders), one should proceed to a final revision of assumptions concerning the realisation of measures planned for the water body.

STAGE 7 – Dimensioning the selected combination(s) of measures (physical quantification

WB(not at risk)	WB(at risk)

The works realised within the previous stages should end up with a list of measures aiming at the implementation of the existing directives and / or at the reduction of the existing gaps as well as the elimination or at least a decrease of risk for each water body. The final designation of the programme of measures, that we will describe within this step is based on answering to the 2 following questions:
- how important must be the implementation of these measures, in order to fulfil the objectives?
- by what unitary costs should these dimensions by multiplied to produce a total cost estimate of a combination of measures?
Example
For the water bodies with no risk:
- In the basic measures list, building new sewage and treatment capacities is considered. In order to meet the WWTP directive, what are the capacities to be installed (lengths of network, Habitants equivalents treatment capacities)?
- In order to meet the drinking water directive, implementation of protection areas has been considered in the measures list. What are the locations of such protection areas, and what are their necessary surface?
For the water bodies at risk:

- An additional capacity in Phosphorus has been put forward for meeting the good ecological status objectives in terms of biology (reducing eutrophication). Where should this additional capacity be implemented, and what capacities should be built?
- The list includes the rivers restoration and spawning areas implementation needed to favour fish life. Then their surface and location must be assessed.

The costing of combinations of measures will be based on choices and quantification elaborated during the previous step.
Moreover, the specific database (*Format* /M. Szewczyk) is also produced for that purpose, and must be used, criticised and refined at that step. It presents unitary costs, based on experts knowledge and national estimates, for most of current elementary water related measures. These estimates will need refinement and precision for local application (e.g. in large urban areas, price of civil works can be significantly higher than in other areas, then increasing the mean unitary cost of sewage building).

STAGE 8 – Evaluating effectiveness of combinations of measures

WB(not at risk)	WB(at risk)

In the context of WFD and its annex III, effectiveness refers to the impact of a given combination of measures on the water status. It addresses then the final aim of the "reparation" measures, and not only the reduction of pressures.
For example, when implementing measures related to the construction of the sewage networks and the improvement of the treatment capacity, expressed in terms of volume of reduction of BOD discharges, effectiveness should be the result in terms of the WFD objectives: lengths of rivers that have reached the good potential in this example in result of the measure's realisation. In short, effectiveness of a measure is its impacts in terms on water quality.
Ideally, effectiveness of a combination of measures should be expressed through a single efficiency unit. In practice, 3 cases are possible:
- Situations in which the transgression of only one parameter prevents from meeting the WFD objectives or the objective is expressed with a single parameter.
- Situation in which the quality is easily expressed through a combination of parameters, such as invertebrate index, which expresses a combination of morphological criteria, or more generally for biological criteria, that depend on a series of compensating parameters, such as BOD5, phosphorus, oxygen, morphology, etc., and in which a "weighting" is possible.
- Situation in which the achievement of objectives is conditioned by a parallel obtainment of pertinent results for a couple of exceeded parameters. Then the good status will be reached by being "good" on each of them, with no possible weighting nor compensation between parameters.

For the first 2 situations - as much as possible, for the purpose of the cost-effectiveness evaluation - the effectiveness of measures should be assessed based on the general evaluation of likelihood to fail in meeting the WFD objectives (= « reduced risk assessment »). And, if possible, the reduced risk assessment will be summarised as a multi-criteria analysis, and will be expressed with "scores" and "weights".
One of the ways of presenting the evaluation of the reduced risk is a realisation of a table as below (the table contains fictitious values) :4

Table 8.Proposal of estimation of volume of the reduced risk

Quality Parame-ter	Present status as concerns the	Trend / possible evolution during	Baseline future status / possible status as concerns	Quality standard for the good	Gap between the standard and the possible	Score of the importance of the gap (scale	Score of the importance of the parameter in the risk (weight in total risk for this	Volume of total reduced risk

	water quality / quantity	the period covered by the programme	the water quality / quantity	status (standard of the parameter)	future status	1-5)	WB)	
Nitrates	50mg/l	+ 1mg/l/rok	65mg/l	50mg/l	15mg/l	3	33%	1
	2µg/l	+0,5 µg/l	5,5 µg/l	<1µg/l	4,5 µg/l	4	33%	1,3
	5 ng/l	possibly +1ng/l	possibly 20 ng/l	<10	10	4	33%	1,3
								3,6 /5

The evaluation of the efficiency in the above table is nothing more than evaluating by what extent does the considered combination of measures reduce the total "risk score".
Alternative combinations can then be ranked according to their ability to address the most weighted issues, in other words to focus on the most important parameters for the risk. Benefits from this methodology are:

- it uses only existing work and data, by basing work on previously characterised risk assessment.
- it corresponds to the general idea of improving the water policy efficiency and reducing waste of time and money with choices that are not well-suited to the local needed priorities.
- it allows testing different results according to experts opinions - especially, it allows assessing if the ranking of measures combination is sensitive to a specific and detailed scoring of one parameter (in that case more in-depth analysis can be asked for securing the appraisal). It is indeed possible and suggested to discuss the relative values of scores and weights of the evaluation method.

Cost effectiveness analysis

WB(not at risk)	WB(at risk)

Based on previous analysis and data gathering, this step addresses the issue of evaluating the cost of the combination, of comparing that cost to the effectiveness as assessed previously, and of making appropriate judgement and decision upon the selection of the measures combination.

According to the WFD and to the European guidances, it is needed – within the elaboration of the programmes of measures for the water bodies - to design a series of alternative options and to compare them in terms of economic efficiency. The underlying principle is avoiding measures that could be usefully replaced by cheaper solutions unseen by technicians. As regards the derogations, it is also preventing Member States to reduce their objectives by means of economic justification based on inefficient programmes. The set of measures to be assessed as "disproportionately expensive" has to meet the criteria of the most effective solution.

In cases where the production of alternative options is not possible, programming will lead to assessing only one combination at first. Then, as there is no comparison of options to be made, no cost-effectiveness evaluation will be relevant and possible for the water body.

However cost and effectiveness evaluations are highly dependent on the scale of the evaluation on the one hand and on the calculation methods used in estimates on the other

hand. For that reason, it will prove inevitable to organise a specific final step, devoted to harmonise calculations for the different water bodies. A comparison of results obtained in the various aggregated homogenous water bodies, whether for one or several combinations of measures, and / or for derogation advocating, will be organised. This will lead and allow to "consolidate" evaluations at large region, river basin and even country scale. Indeed there is a risk of over-estimating the payment capacity of the management plan by simply "adding" the estimated programme of measures for all separate aggregated homogenous water bodies. Each of them can appear fairly "demanding", in the perspective of asking for local exceptional increase of efforts, whereas this increase cannot necessarily be repeated and added to national corresponding efforts. Besides, if a single combination of measures is designed and leads to "disproportionate" costs, this will mean then that alternative scenarios will have to be designed: aiming at some objectives for 2021, and / or 2027, and / or reducing the objectives. In that case and perspective, a plurality of policies is likely to emerge: for dealing with adopted objectives, and with many different quality parameters, then most often a choice will be necessary: should we base our priorities on environment restoration policies, or on basic domestic pollution, or on groundwater issues, etc. As long as objectives are to be defined again and don't strictly correspond to the good status objective anymore, a plurality of options can appear again. In that case, economic evaluation of cost-effectiveness of options appear as necessary and will be carried out at this stage.

In an ideal situation, the effectiveness should be expressed in one and only one unit (cubic metres, hectares, index). Then the cost-effectiveness analysis is producing a Money-per-result unit ratio: PLN / cubic meter, or / ha, etc. But when effectiveness was not easily summarised through a unit but rather with a series of unequivalent parameters, effectiveness will need a qualitative discussion and judgement, and the case is more complex.
Here below are presented 10 different cases likely to appear within the cost effectiveness analysis. They have been summarised, described and illustrated with an example. 8 will really need assessment at this stage of the process.

It must now be acknowledged that the cost-effectiveness comparison hasn't the same meaning according to the type of water body considered, and according to the fact that several combinations are considered for choice or that one combination was designed by technicians. The cost effectiveness analysis depends also on the fact if effectiveness is expressed straightforwardly through a single unit or conversely – a multiple parameters analysis is needed.

Table 9 Possible cases in the cost effectiveness analysis

Water body at risk?	Several basic measures combinations (options in implementing GES from BLS)?	Several additional/supplementary combinations (options in reaching GES from BLS)?	Effectiveness easily expressed through one unit?	Number of Type, summary, nickname	Example of the type,	methodological remarks
1	2	3	4	5	6	7
Yes	Yes	Yes	Yes	1. Water body at risk. Several basic and supplementary measures combinations, efficiency easily expressed **"Economist dream"**	Situation dominated by water scarcity issues: different measures possible within the volume management (supply-demand), efficiency of water uses	Here attention will be paid to the combination of measures and of technical options. Considering that judgement will appear easy and straightforward, technical precision of estimates will be important. Quality of evaluation should then be focused on technical aspects and on effectiveness evaluation.
			No	2. Water body at risk. Several basic and supplementary measures combinations, many parameters transgressed and complex efficiency **"Policy-making case"** "	Situation with different problems at the same time (ex. priority substances, ecological quality, pesticides – in parallel).	Evaluation methodology will be more qualitative: compare costs of options to priority options in terms of quality, put to wide policy-making discussion. Here transparency of results will be important, more than purely technical elements. Qualitative assessment of measures impact will need efficient displaying and clear discussion.
Yes	Yes	No	Yes	3. Water body at risk. Many combinations of basic measures, only one supplementary measures combination, straightforward effectiveness **"Technicians dream"**	Situation with intensive activities and delays in implementing directives, leading to technical choices to make, and ecological status limited only by one classical gap in terms of water quality or morphology. The GES well expressed by biological indexes. Cost-effectiveness will then address mostly ways of implementing existing directives.	As in "economist dream", the cost effectiveness analysis will concern above all the possibilities of implementation of different technical measures.

Water body at risk?	Several basic measures combinations (options in implementing GES)	Several additional/supplementary combinations (options in reaching GES from BLS)?	Effectiveness easily expressed through one unit?	Number of Type, summary, nickname	Example of the type,	methodological remarks
1	2	3	4	5	6	7
			No	4.Water body at risk. Many combinations of basic measures, only one supplementary measures combination, complex effectiveness "puzzles of European directives"	Situation with intensive activities and delays in implementing directives, related to many different parameters (ex. shellfish, drinking water, birds, habitats, etc.).	As in "economist dream", the cost effectiveness analysis will concern above all the possibilities of implementation of different technical measures.
	No		Indifferent	5. water body at risk. One basic and supplementary measures combination, straightforward or complex efficiency **"No option case"**	Situation in which an aggregated homogenous water body is dominated by one water quality issue (ex. in terms of quality) and one parameter (such as nitrates). In such case the fulfilment of the requirements of the Nitrates and other directives will not suffice to reach good chemical status, for which only one kind of measure is known efficient. Costing will still be useful for next steps (derogations justification).	No need of cost-effectiveness comparison, as there are no options to compare. Costing will still be useful and important for derogations justification. When the combination of measures will be assessed as disproportionately costly, then new alternative options will have to be designed for adapting to revised and lowered objectives (refer to further stages).

Water body at risk?	Several basic measures combinations (options in implementing GES from BLS)?	Several additional/supplementary combinations (options in reaching GES from BLS)?	Effectiveness easily expressed through one unit?	Number of Type, summary, nickname	Example of the type,	methodological remarks
1	2	3	4	5	6	7
Yes	No	Yes	Yes	6. water body at risk. One basic measures combination, several supplementary options, straightforward effectiveness **"WFD archetype"**	Situation dominated by one issue (e.g. quality issues – location of the pollution sources along the water courses) and in which directives implementation is only at a start, or where existing directives impose only final results but do not impose means (e.g. bathing waters directive) thus leaving open many technical options, ex. in terms of land planning.	Here cost-effectiveness analysis will have a powerful meaning, in helping to choose between alternative water policy options for a given water body.
			No	7. water body at risk. One basic measures combination, several supplementary options, complex effectiveness **"Ecological puzzle**"	Situation where existing directives are being implemented and not far from finalisation, but in which many parameters needed for ecology are yet not correct	Here choosing between options will need qualitative judgement between ecological priorities, inasmuch as GES objectives will not be met equally by all possible combinations. Environmental and especially ecological priorities will dominate the debates.
No	Yes	Irrelevant (no need of supplementary measures)	Yes	8. water body with no or low risk, however with options to decide upon in implementing existing directives, and straightforward effectiveness **"cost optimisation case**	Situations where water quality issues can be well addressed by the implementation of the directives such as WWTD, but for which options are still open.	Here cost-effectiveness is a very classical case, in which the best effectiveness ratio is sought through technical options to be compared. Realism of technical options, correct design of options and precision in costing will probably be the most important necessary assessment's quality.

Water body at risk?	measures combinations (options in implementing	Several additional/supplementary combinations (options in reaching GES from BLS)?	Effectiveness easily expressed through one unit?	Number of Type, summary, nickname	Example of the type,	methodological remarks
1	2	3	4	5	6	7
			No	9. water body with no or low risk, options to be chosen in implementing directives, complex effectiveness **"Technicians nightmare"**	Situations where many directives are still to be implemented and are not mandatory in terms of means to implement, and where technical options will lead to different results in terms of quality parameters improved.	This case is one of the most complicated ones, where technical options will lead to many different ecological effects, among which priorities will have to be decided. Both technical issues will need attention, and environmental objectives will need wide decision-making. These cases will rely mostly on policy-making debates and public participation.
	No		Indifferent	10. water body with no or low risk, no options to decide upon, effectiveness simple of complex "No option case"	As for other no option cases	

All the selection process addressed in this step is intended to end up with only one preferred combination of measures, which represents a tentative programme for the given water body. This tentative programme has still to be adapted through lowering or postponing some objectives through the derogation process. It is indeed important that derogation will not be justified based on the cost of poorly cost-effective solution. Articulation of these possibilities in the context of the evaluation approach is expressed in the below scheme.

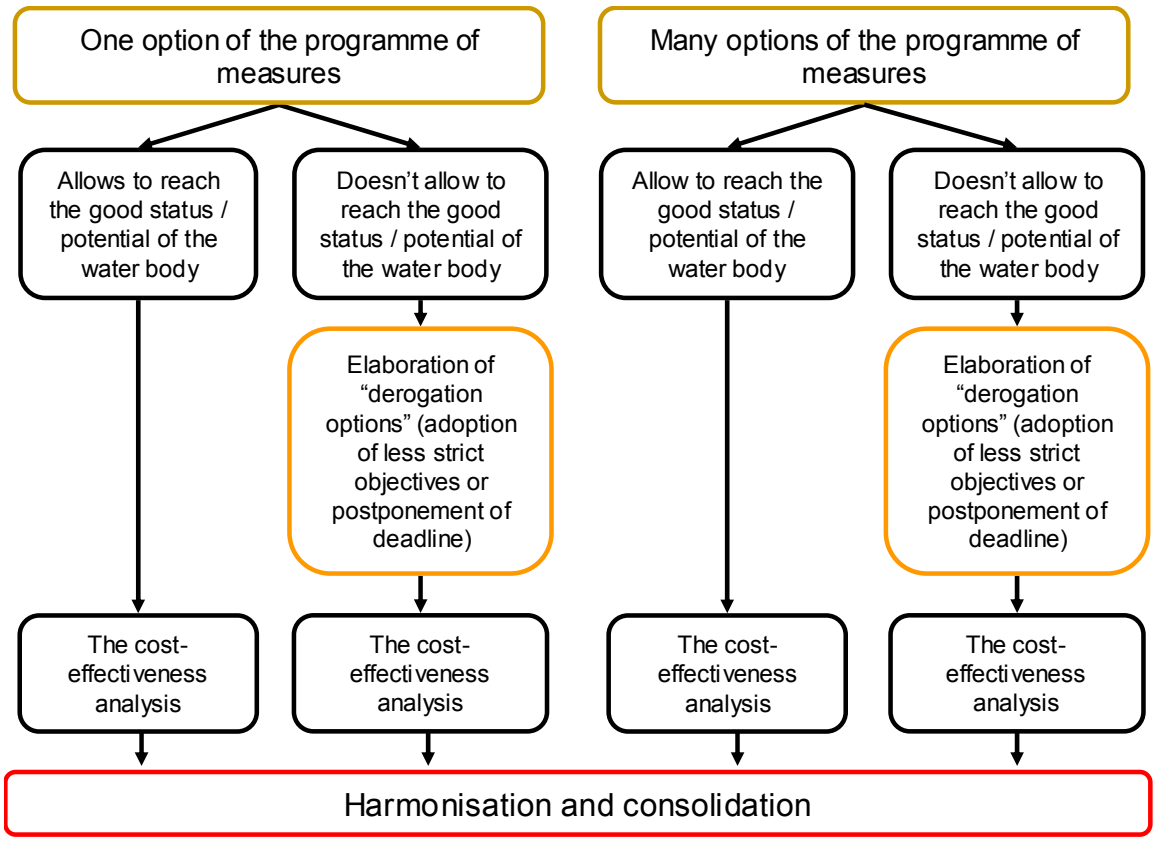


Illustration 19 Algoyithm of choice of the initial programme of measures

STAGE 9 – Cost evaluation (costing combination of measures)

WB(not at risk)	WB(at risk)

All costs from measures are to be considered and quantified here if possible:

- *Direct investment and operational expenses. In the cases where investments will grow progressively over a long period, 2 accounting methods can be used: Depreciation (actualisation) from now on: dividing all future values by interest rates (representing the cost of lost opportunities within public spending). In the second case, taking only the total investment costs, in the end of the growing period, and considering annual mean cost. Besides, attention will be paid to keep track of the estimated annual value of new investments: whereas cost-benefit consider only the 2 above approaches, local policy discussion, and advocating derogations, can also be based on comparing present rhythm of investment with potential rhythm from programme of measures. Especially, arguing for postponing measures will uneasily be done based on amortisation evaluation or on net present value, as those results are not affected much be postponement of investments.*
- *Social costs and inconvenience produced by the measure: losses in terms of activities (such as reduction of hydropower when not compensated by other energy sources; reduction of leisure activities, losses in farming productivity, losses in industrial revenue due to*

constraints,
etc.).
o Social benefits, better named, from here, as "negative costs" of the measure. Those negative costs are all positive aspects that are produced by the measure, without yet consideration of its environmental effects (which will be considered later in cost-benefits analysis). For example if restoring frequent floods in a river a floodplain is recommended as a measure for restoring ecological quality, it may have positive aspects for protection of inhabitants from flooding, thanks to the storage capacity it offers and the lowering of flood peaks it produces. Note here that those negative costs are considered as such because they are not derived from the environmental objectives of the measure, but from side effects. Those negative costs should not be assimilated to economic positive aspects of the public spending needed for the investment. It can appear that it is useful to take into account the employment produced and maintained thanks to the considered measures .

The total direct costs, plus indirect costs, minus the negative costs produce a total net cost of the measures combination.

Correspondence with heavily modified water bodies

Costing in HMWB will address all measures deemed to recover good status, including morphological restoration, reduction or even suppression of activities due to this restoration, operating expenditure; it will address also measures necessary for good potential and more generally a good chemical water quality.

ETAP 10 – Cost-effectiveness analysis

WB(not at risk)	WB(at risk)

Basically, cost-effectiveness analysis is dividing effectiveness units by its costs and choosing the smallest ratio. This analysis will be based on effectiveness estimates as described above, and on costing as described above.
The cost-effectiveness ratio can however prove more delicate.
In the simplest situation, for a given Water Body or group of homogeneous WB, each combination of measures will be appraised according to the extent to which it reduces the risk assessment score for a given price, when effectiveness is correctly assessed through the weighted risk score:

Combination	Reduction of risk (number of "risk points" reduced) [A]	Total net cost of combination (PLN/year) [B]	Ratio A / B

In more complex situations, it will be needed to assess the extent to which the combination will obtain the objectives on all parameters needed (and not on a weighted set) for a given water body: for example this combination produces good results for all parameters because it doesn't leave untouched any important sine qua non parameter, and then, when applied in the water body, it will produce a good ecological status for a given surface of basin (or length of river, or surface of groundwater table).
While summarising it can be said that even in more complicated cases, the efficiency analysis will have to be conducted simply on the qualitative approach basis. The ideal solution is the use a table describing the measure and its contribution to the achievement of the objective (here below is presented an example of such a table).

Table 10 Example of cost effectiveness analysis on the basis at the qualitative approach

Measures	Easiness of implementation	Cost	Contribution to the objective	Final classification
Reinforcement of dephosphatation City centre	++++	2 mln PLN	30%	1
Reinforcement of dephosphatation All cities with more than 1000 inhabitants	++++	4 mln PLN	20%	4
Interdiction of P in the washing powders	National reglamentation	/	15%	1
Limitation of liquid manure spreading; redefinition of the spreading plans	+	0,5 mln PLN	25%	3

The previous table, although partly qualitative, allows deciding upon the most cost-effective solution. If the information included proves to be insufficient, it could be useful to complete the table with the elements concerning the impacts on pressures: what reduction of pressures (in physical units) are obtained by the combination.
Of course, bear in mind that these approaches are mostly valid when the case includes comparing different alternative and contrasted options. It does not apply to cases where only one combination has be agreed as possible. In that case, the analysis will only present both costs and expected effectiveness, but will not use such information for calculating a ratio as there is no option to decide upon.

ETAP 11 – Prepare for Harmonisation and consolidation

WB(not at risk)	WB(at risk)

As mentioned above, it is suggested here to adopt a “bottom-up” approach for the elaboration of the programme of measures, where measures combinations are built up at local level (for a given group of water bodies). Despite many advantages and the precision of the approach, this can lead to an inconsistency between the different evaluations that will be made throughout a given river basin, and also (although the WFD doesn’t take it in account) throughout the whole country. Discrepancies between estimates can origin from many causes:

- Errors, important differences in the evaluation of costs and effects of the programmes of measures;
- Lack of general economic view of the WFD programme of measures at large river basin level and even at Polish scale (it is needed to check that the sum of detailed and local measures, which can appear realistic when seen locally, do not produce unrealistic results at national scale, such as supposing multiplying current water expenses by 10, etc.).

This harmonisation and further consolidation will need to keep track of economic and technical assessment and to organise a database, in order to enable different kinds of aggregations (geographical, by topics, etc.) and to share information and refine assumptions between various organisations involved in the WFD PoM process.

d Assessment and justification of derogations

STAGE 12 – Derogations for technical impossibility

WB(not at risk)	WB(at risk)

Derogations can be based on technical impossibility of reaching the WFD objectives and deadlines. Use of such arguments should be used without considering economic costs of techniques, so as to be differentiated from economic justification (i.e. when a technical possibility exists but is too costly, then the case is not a technical impossibility, but a "disproportionate cost", see below). Such technical impossibilities can arise for example due to geographical contexts, as when stopping all kinds of pollution from now on a given groundwater body will not allow reaching a good chemical status by 2015, due to the migration of past pollutions in the underground. This common case is indeed a technical argument because even radical actions would not allow meeting the objectives. If such radical actions are possible and not totally absurd (on the basis of a consensus from different stakeholders, including environment and protection stakeholders), then they are to be potentially put away on the basis of economic argumentation of disproportionate costs.

To summarise, the derogations because of the lack of technical possibilities of the implementation of measures allowing to achieve the WFD objectives resulting from the adopted programme of measures can be applied in the cases where there are no other technical possibilities that would allow to reach the good status for the "natural" aggregated homogenous water bodies or the good potential for the HMWB. In such case it is necessary to find out whether the present "lack of technical possibilities" results from:

- the time for the technical realisation of measures – then it is possible to apply the deadline derogation and postpone the date of achievement of the WFD objectives
- insufficient development of the technical and scientific knowledge – then it is possible to apply a derogation that consists in a determination of less strict objectives for a given water body.

In such cases the justification should be based only on the analysis of the feasibility from the technical point of view without considering economic costs of the implementation of the programme.

ETAP 13 – Derogations for the disproportionate cost

WB(not at risk)	WB(at risk)

Disproportionate costs will be the most common basis of objectives and deadline derogations. This means that this justification will play an important policy-making role, by enabling Member-States to adjust their efforts to economic feasibility, but this raises crucial issues of intra-European fairness and competition. This means that economic justification will have to be based on sound reasoning and evaluation, in order to avoid contestation and conflicts within the European institutions. On the other hand, in many cases the disproportionality of costs should not lead to many complex and heavy economic analysis just to demonstrate what is obvious and to put away highly absurd considerations. However, the European guidance does not provide a precise way of addressing that issue, the Member-States having explicitly avoided to tackle this issue in order to keep some political room for manoeuvre.
It is then necessary to propose a way of focusing economic evaluation to the most useful cases, though avoiding to being condemned for having used poor economic arguments to avoid legitimate environmental protection. In line with the recent French experience, the derogation process will distinguish 2 types of context and 2 stages.
To summarise, such a derogation can be applied in those cases when the costs of the realisation of measures that would allow to reach the good status for the "natural" aggregated

homogenous water bodies or the good potential for the HMWB are disproportionate. In such case it is necessary to find out whether the disproportionate character of costs results from:

- the necessity of spending excessive amount of money by 2015 – if yes, then it is possible to apply the deadline derogation,
- the necessity of spending excessive amounts during all the planning periods of the WFD (that is by 2028) – if so, then it is possible to apply a derogation that consists in a determination of less strict objectives for a given water body.

In these cases the costs will be the basis of the derogation which means that a justification will play an important role within the adaptation of "efforts" to the economical feasibility.

Assessing proportionality to current expenses

Proportionality of costs will be assessed first based on the current level of expenses, as a "realism" principle. It will be considered for example that under a given proportion of additional measures to current expenses, the case will not lead to consider "disproportionate" costs and the proposed decision will be not to adopt derogation objectives. This means that the cost of the programme of measures, (average annual costs) will be compared to the mean annual expenses in water policy in the same water bodies. If possible this will be done by accounting current expenses done by communities, farmers, industries, etc. If this accounting proves too difficult to achieve, rough estimates and short-cuts can be used, such as considering mean water costs per capita and multiplying by the number of WB inhabitants, etc.
No precise or given reference was provided by the CIS so as to judge what is not or could be disproportionate. According to the precision of methodology and of estimation possibilities, it is suggested to consider that 20 % could be a good threshold: when supplementary measures do not exceed 20 % of current expenses in the given water bodies, it will be proposed to stakeholders not to seek derogation objectives.
When supplementary measures exceed this given percentage, then disproportion will be assessed out of cost-benefit analysis.

Justifying derogations with cost-benefit analysis

When the tentative programme of measures would lead to a cost that exceeds the current expenses by a significant proportion, derogation will be adopted and justified if and only if it can be shown that those costs are not significantly balanced by social benefits derived from environmental improvement.
Costs to be considered are the net total costs calculated for step 4.
Benefits are all kind of social consequences derived from reaching the good status. Many information sheets have been produced by the European guidances on that matter (environmental and resources costs, where benefits are mostly reduction of environmental costs).

Market benefits.

- Benefits of this kind are all of advantages for human activities that use the environment as a resource:

tourism and leisure activities benefiting from a better quality of bathing directive, from an increase of frequentation.
Drinking water treatment benefiting from a better quality resource and reducing the treatment needs
Flood protection benefiting from floodplains restoration

Protection of rivers quality due to better functioning of ecological system and auto-purification of environment, leading to lower needs in terms of waste water treatment or in terms of fertilisation reduction
Better sustaining of low waters during summer period due to better condition of wetlands, thus avoiding building specific equipment

Non-market benefits

Benefits of this kind are related to a better quality of the environment as such, with no specific reference to a precise use of the environment, either for "keeping the option" for potential use in the future (option value) or for bequesting the environment to the future generations (bequest value) or for pure and simple existence of a better environment. Such values are not measured exactly, they can however be approached by means of survey, resembling opinion polls ("contingent valuations"). It is rarely possible to carry out such surveys on the water bodies at stake for the programme of measures in the basin. However it is recommended to try to transfer existing values, using already made surveys and results, and transferring them to the situation under consideration. Ideally, such transfer is done with econometrical data (i.e. precise characteristics of the population), rather than by multiplying an average to a global population.

By all means, economists and technicians will not take decisions on the basis of cost-benefit analysis, but will put these results in local stakeholders discussion, and to public participation. The results of the debate between the local actors and technicians will contribute to the decision-making, which will be additionally complemented with the information coming from the economical analysis.

If and when such decision-making will lead to adopt derogation objectives due to "disproportionate costs" evaluated as above, there is still to adopt a new combination of measures.
However this new combination has to meet new objectives, with a certain room for manoeuvre (what parameters to be priority? What delays to fulfil, 2021 or 2027? Should the programme aim at lower objectives sooner or higher objectives later?
This should lead to considering several options (however only options that respect a constraint of not-disproportionality) and comparing them with cost-effective methodology as described above. A new decision-making could be necessary for some cases, when derogation objectives can be met by significantly different technical options.

II.7 RECOMMENDATIONS IN TERMS OF THE ANALYSIS OF THE COST RECOVERY, INCLUDING THE ENVIRONMENTAL AND RESOURCE COSTS

II.7.1 Purpose and characteristics of the analysis and its place in the planning process

- The purpose of the economic analysis required by the WFD is the identification of the key water management issues (and their economic dimension) through the analysis of:

- water uses and its social and economic importance,
- baseline scenario: forecasts till 2015 on economic activities, pressures on water resources and impact of current measures or policies from now to 2015,
- current cost-recovery level for water services,
- environmental costs of water services.

a Water uses and its social and economic importance

The demand here is to identify pressures as well as the economic activities generating these pressures.
For surface water, the WFD required to assess point source and diffuse pollution paying a specific attention to the substances originated by the main economic sectors (households, industry, agriculture and forestry) with special consideration of the priority substances. Some other activities such as recreational activities should be also analysed for the water bodies where the pressures from these activities are considered important. For groundwater, the WFD required to identify the diffuse pollution sources and the water intakes.
The costs recovery analysis should take into consideration the water resources destined for the drinking water intakes. However the reservoirs with recreational purpose only should not be included in the cost recovery analysis.
This step should provide an identification of the constraints created by these pressures and its consequences for the different uses (these costs for the uses should be assessed and integrated in the cost-recovery analysis).
Finally a localisation of the different uses within the river basin should be done as well as the economic sectors (i.e. Households, Industry, Agriculture). What is at stake is the identification of the different water uses and the social and economic weight of these uses.

b Definition of the 2015 scenario for a river basin district: baseline scenario

In order to develop a programme of measures, the economic analysis of the present situation is not sufficient. The assessment of trends for the main economic activities is crucial in order to cross the dynamic of both economic and water issues of the river basin.
This step leads to the risk assessment (i.e. potential gaps between ecological status expected in 2015 and the objectives set by the Directive) but will also help to identify potential measures in order to fill these gaps and then build a cost-effective programme of measures.

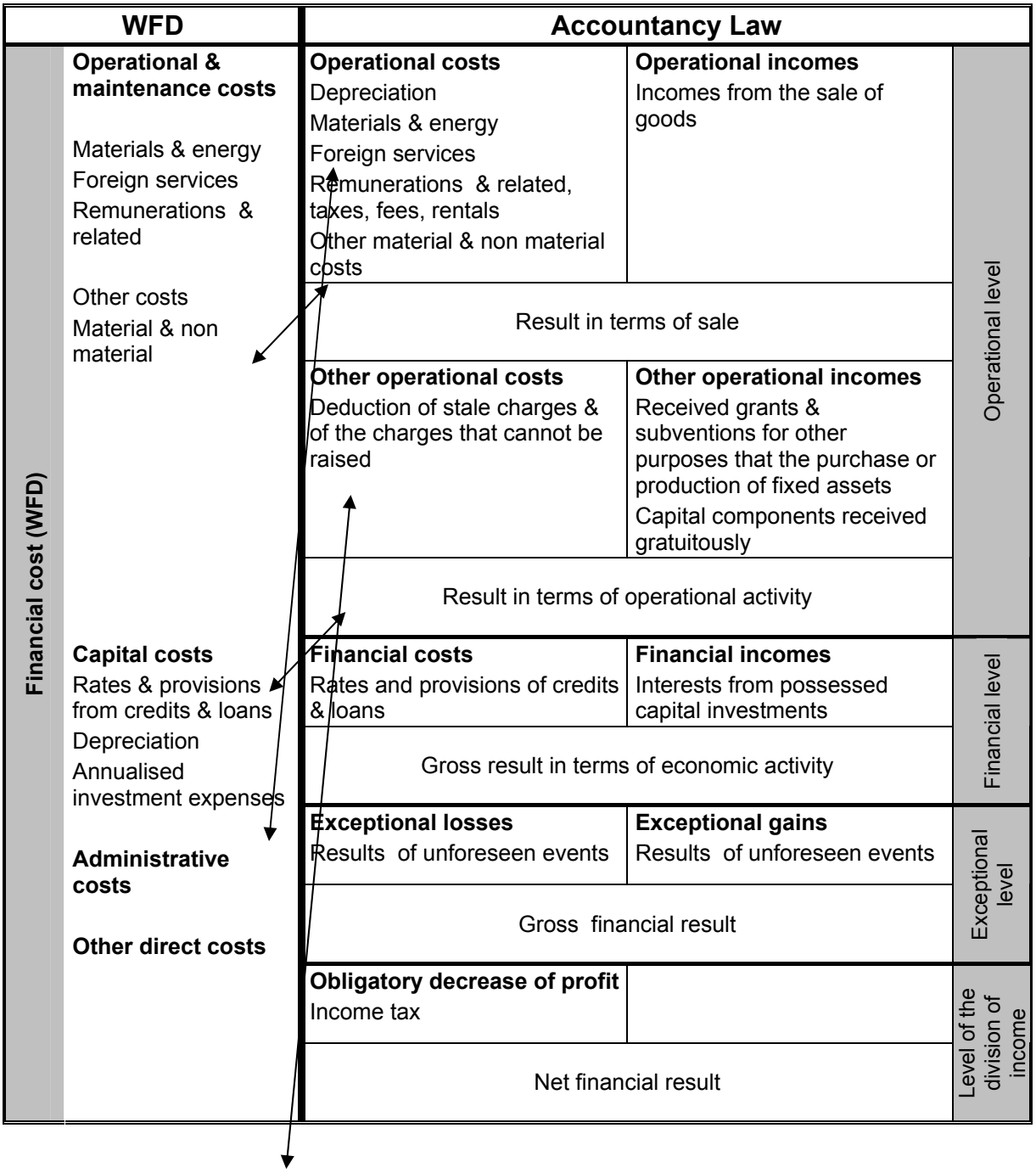
c Assess the current level of cost recovery for the water services

The economic analysis requires also to describe the financial scheme of the water services and how the different economic sectors (at least Households, Industry and Agriculture) contribute to this scheme. The cost recovery analysis is therefore one of the elements of the economical analysis.
So cost-recovery assessment leads to identify and assess the costs (i.e. investment, operating costs but also resource and environmental costs) of the water services and how these costs are dispatched through the main economic sectors.

d Assess the environmental costs due to water services or impacting water services

Further than the financial scheme, the WFD requires to assess externalities (environmental costs and the resource costs due to water services or impacting them), so as to have a complete image of what the full cost of water is for each category of water services. Assessing environmental costs also gives a rough estimate of how much would represent a full internalisation of the externalities of water services.
Due to the fact that the terminology used in the WFD methodological guidance documents, and more accurately speaking the direct translation of some terms into Polish, doesn't correspond directly to the Polish terms from the Law on Accountancy, some misunderstandings as well in essential matters as from the vocabulary point of view may appear. The dualism of terms is unavoidable because it is difficult to move apart the WFD's programmatic materials but, on the other hand, the source of many information are Polish accountants from the particular operators for whom the Law on Accountancy is the obligatory canon, with no possibility of any exemption from it (for example the WFD's financial cost is a completely different category than the financial cost in the understanding of the Law on Accountancy, the same thing with the operational cost). When making the tasks operational and when proceeding to the concrete calculations one should be therefore able to pass from one terminological category to another one.
As the sum of all the categories in both systems (WFD and Accountancy Law) is not identical, the main divergences are presented here below in a schematic way.

Table 11 Comparison of the basic categories of costs
Source: As concerns the Accountancy Law: Sierpińska M., Wędzki D., *Managing the financial fluidity of an enterprise* p. 28



The specification of the constituent elements of the financial costs isn't the strongest point of the WFD methodological materials. The elements proposed In the *Guidance Economic and Environment* … are not the same as in *Information Sheet on Assessment of the Recovery of Costs*… The source of troubles is the aspiration of the authors to classify the investment expenditures among the costs. However the investment expenditure isn't a cost for an accountant– the cost is the depreciation of fixed assets that are the result of an investment activity. The comparison of the notion of the financial costs (WFD) prepared on the basis o *Guidance…* to the disaggregation of costs according to the Polish Accountancy Law shows in fact only one but serious divergence: „annual equivalent cost" – AEC. The „annualisation"

method allows to distribute a single investment expenditure (I) on a series of identical payments taking into account the expected rate of profit from the capital (r) and the effective life time of the investment's effects (t) according to the formula: $AEC = I*r/(1-(1+r)^{-t})$
The incoherence of the method from the *Guidance* can be seen when counting the recovery level– on one hand the derivative of the investment expenditure is distributed in cost on a series of years, and on the other hand – the incomes are reduced by the deduction of investment grants and subsidies distributed in time. In case of big investments the recovery level can be therefore negative. The authors of this conception don't mention the necessity of taking into account the investment expenditures from the previous years neither they say why to do in case of repetition of the calculation one year after the end of investment. The built fixed assets will influence the amount of the investment allowance and the consideration of this allowance in form of AEC will lead to the double costs' counting!

Another problem appears after the analysis of the material *Information Sheet…,* whose authors removed (in comparison to the *Guidance…*) the *annual equivalent costs* from the „capital costs" column but they added the *payments of credit rates* as well as taxes and subsidies. Due to the fact that we talk about the subsidies granted to the operators, their classification among the costs is wrong. However, even if the taxes and subsidies get removed in the further calculations, the problem persists with the payment of rates – they are not costs in the accountants' understanding.
It must be remembered that not every environmental or resource cost is an external cost – at least because in Poland there are fees for the use of the environment (for the abstraction of waters and for the discharge of pollutants' loads), that at least partially internalise (at least some of them) the appearing environmental and resource costs. In practice the accountancy of particular water services' operators classifies the fees for the use of the environment among the operational costs. Using the formal language we can say that the sets of environmental/resource costs and of the operational costs are disjoint. That's why the correct aggregation of costs, taking into account the described phenomena, has a form presented at the below table. It should be underlined that this division is compliant with the basic essential document *Guidance Economic and Environment* (page 117, Box 1)

Table 12 Systematisation of costs

<table>
<tr><td>External environmental costs</td><td rowspan="2"></td><td rowspan="5">Economical costs</td></tr>
<tr><td>External costs of lost opportunities = external resource costs</td></tr>
<tr><td>Administrative costs, eventually other direct costs</td><td rowspan="3">Financial costs</td></tr>
<tr><td>Capital costs</td></tr>
<tr><td>Operational costs, including internalised resource and environmental costs</td></tr>
</table>

Economical costs (sometimes called total costs) is defined as a sum of external environmental costs, of the external costs of lost opportunities (i.e. resource costs), capital costs and operational costs including the internalised or private environmental and resource costs.
Cost of lost opportunities (resource cost) can be defined as a lost opportunity that could have been achieved with the best alternative water use.
Environmental cost is a value of damages caused in the (water) environment by users. These damages are related to the decrease of utility of the aquatic environment in result of the degradation of its quality.
The present recommendations concern the method of calculation of the environmental costs related to the municipal sector and of the resource costs for particular sectors.
Summarising, the table 13 presents the place of measures related with the economical analysis in the planning process.

Table 13 Role and place of the economical analysis in the WFD implementation process

State of advancement in frame of the elaboration of the water management plan	Role of the economical analysis	Reference in WFD
Characterisation	▪ Assessment of social and economical importance of water uses ▪ Scenario of trends in water offer & demand in the context of the general 2015 baseline scenario ▪ Scenario of investments related to the water services and the protection of waters ▪ **Assessment of the present level of the water services cost recovery with the description of the financial contribution of each sector** ▪ Definition of the protected areas related with the aquatic species important from the economical point of view ▪ 1st identification of the HMWB after an assessment taking into account the economical analysis	▪ art. 5, annex III ▪ annex III ▪ annex III ▪ art. 9, annex III ▪ art. 6, annex IV ▪ art. 4.(3)
Choice of cost effective measures	▪ definition of a cost effective programme of measures for each river basin ▪ assessment of role the incentive pricing policy can play in the programme of measures ▪ assessment of necessities in terms of derogation (postponement of deadline or less strict objective) through an costs benefits analysis or the assessment of the financial possibilities of the economic sectors (i.e. the influence of the water invoice paid by users)	▪ art. 11, annex III ▪ art. 11, art. 9 ▪ art. 4.(4) i 4.(5) ▪ art. 4.(7) ▪ art. 16

II.7.2 Necessary data

The elaboration of the analysis of the cost recovery level requires to collect the data dealing with:

- Costs and incomes of water services
- The contribution of the economic sectors to these costs and incomes
- The links between the costs and the pressures
- The social and economic impacts linked with cost-recovery and pricing policy

The phase of data collection is an important task; however important difficulties were identified at this step. Some of the data seems to be available in institutions but within the legal framework, there is no obligation for those institutions to deliver it freely to the RZGWs in order to pursue the economical analysis. For example, one should note that if the Water law does include in the missions of the RZGW the realisation of economical analysis related to water uses (Art. 92), it doesn't provide any obligations to institutions not directly covered by this law.

The main sources of data for the realisation of the economic analysis will be:

- ↑The particular water supply and wastewater treatment operators
- ↑Administrators of the water-courses and other water users
- ↑The trade chamber of water operators
- ↑Environmental funds
- ↑ The National Statistical Office, including the Bank of the Regional Data and the statistical offices of voivodships

Operators of the water supply and sewage collection systems

The experiences from the surveys realised by the RZGWs show that – for the municipal sector - the surveys constitute the best source of information. Before the next surveys it is however necessary to agree on a common questionnaire, and especially on the instruction how to fill it in. A special attention should be paid to the questions of the state of ownership of the used property and on the related depreciation deductions, rentals and immovable property taxes. Another question worth a detailed analysis is the issue of tax deductions dealing with VAT and of supplements to the operational activity.
It is also necessary to pay attention to the representativeness of the collected data. The notion of the representativeness concerns not only the percentage of the services rendered but also the structure of the operators according to their dimension (measures by the value or quantity of sales).

Administrators of water-courses and other users

The collection of data on other water related services (agriculture, industry) can also pass through the pertinent questionnaires. However as it can be realised only thanks to the good will of the respondents and not on the basis of legal obligations, there may appear major difficulties within the collection of such information and the obtainment of the representativeness of data.

Economic Chamber of Water Services Operators

The Economic Chamber gathers a great number of operators from the water supply and sewage collection branch, including the municipal, public and private ones (in 2005: 435 enterprises that is 85% of the drinking water market in Poland). Thanks to the co-operation with the Chamber useful data can be gathered:
- costs and incomes of water supply and sewage collection operators
- prices of the water related services
- information on the realised infrastructure investments (water supply and sewage collection network, WWTPs,..)
The data delivered by the Chamber on a voluntary basis, even if they are relatively complete, don't solve the problem of the analysis. The obstacle are the questions of the representativeness of the sample. Even if it is possible to prove that they are reliable at the national scale, this information dispatched on different water regions isn't reliable any more (too small sample). This information is however a precious source for the evaluation of trends appearing in the whole branch.

Environmental Protection Funds

In Poland the systems of funds plays an important role in supporting the water protection investments. The utility of data on the dimension of the granted support is however quite limited and requires each time to realise the analysis on the list of particular measures. This

results from the fact that there are no publications dealing with the amount of the support in the aggregation according to the water regions.
Therefore the estimation of the contribution of funds may be obtained by research within the lists of projects supported by particular funds or from the survey studies. Another issue is the utility of collection of data on the investment support at this stage of studies. Such information doesn't enter in scope of the cost recovery calculation but in the scope of the economical analysis.
It should be underlined that the system of funds is not a good source of information on the fees for the use of the environment and for the introduced changes. These fees are paid on the account of the marshal's offices and the pertinent data in this domain should be sought just there.

Central Statistical Office (GUS) and statistical offices of voivodships

GUS publishes the data describing the incomes of households, the indicators of the prices' changes, the volume of water abstraction and consumption, the investment expenditures. Only some selected data dealing with the water abstraction are published in aggregation at the water regions' scale. The basic source of information are:
-Bank of Regional Data (BDR) – an Internet data base on the site of GUS
-Budgets of households in 200 – publication (periodical, published every year),*
-Municipal infrastructure in 200 – publication (periodical, published every year),*
-Protection of the Environment 200 – publication (periodical, published every year),*
-Year-books of particular voivodships

II.7.3 Recommended approach

a Short characterisation of the approach

Analysis of cost recovery for water services
The directive does not require the full recovery of cost but to take into account this principle. Nor does it prohibit the financing of preventive or corrective measures, but it does require transparency and data publishing about financial scheme of the water services.

Cost recovery analysis is required for characterisation of the district and human activity (annex III cross-references art. 9) and for setting environmental objectives and programme of measures. Applying cost-recovery (including environmental cost) is both an element of the characterisation that will help to identify main water management issues and a measure (through incentive pricing) to be part of the programme of measures.

The assessment of cost recovery shall be updated twice during each 6 years cycle of the WFD:
i) firstly, for the updating of the characterisation ;
ii) during the definition of programme of measures; and a summary of the analysis should be published in the river basin management plan. It is important to define methods and data standardisation to be able to compare the development.

Cost recovery analysis is a tool for decision making:

i) on the one hand, cost recovery analysis will identify and detail who paid and for what :

- What are the contributions of each economic sector to the costs of services compared to their water uses (i.e. build the financial scheme of the water services)?
- What is the implementation of the Polluter Pays Principle? Is the taxation of activities which have a significant impact on the status of water bodies (i.e. "water uses") adequate compared with the expenses backed by the water services caused by pollution or scarcity and compared to the environmental costs generated by water services ?
- Are there any crossed subsidies between economic sectors for financing water services? Is the implementation of the programme of measures related to an increase of crossed-subsidies rates?
- Does water pay for water, and sanitation for sanitation? Are there any subsidies coming from tax payers which finance water and sanitation services?
- What is the assessed in frame of the externalities (The external costs cover many different flows of disadvantages. In practice only a part of them is being identified while a smaller part may be quantified and a still smaller one is subjected to a monetary valuation. It is important to be aware in this process how many components have been omitted and if they are significative respect to the obtained result..)

ii) on the other hand, cost recovery analysis shall provide information on sustainability of the water service:
What is the total income of the water service?
Does it cover maintenance and operating costs and fixed asset consumption (i.e. is the depreciation of the assets sufficiently taken account in the price)?

The economic characterisation of activities and the cost recovery analysis are to be carried out at a district level or for the national part of the international district.
This analysis may be refined for a sub-basin or for an aquifer based on an identification of services and economic sectors involved in the degradation of the status of water bodies. These additional analyses will have to be implemented as part of the identification of possible measures to be taken in order to reach the environmental objectives in the sub-basin or the aquifer concerned.

The cost recovery ratio is calculated through a division of the total incomes by the total costs. This apparently simple act is quite complicated in practice. First of all it is necessary to distinguish at least two recovery rates:
Financial cost recovery rate
Economic cost recovery rate
and then define the notions of costs and incomes.

The financial cost recovery rate refers to the relation of the total costs to the financial costs in the WFD understanding (operational, capital costs, …), while the economic cost recovery rate concerns the relation of total incomes to the total economic costs (the financial ones and the external environmental and resource costs).
Guidance Economics and the Environment… distinguishes the *financial, environmental and total recovery rate*. The interpretation of the first category is identical, the *total rate* is the same as the *economic* one, however the interpretation of the notion of the environmental recovery rate meets some difficulties. This results from the fact of distinction of the environmental and resource costs in the same and other programmatic materials. It can be only admitted by presumption that the "environmental recovery rate" concerns both the environmental and resource costs. In spite of the specified imperfections, the *Guidance* provides many precious indications on the calculation of the cost recovery rate. One should however remember to distinguish the subventions to the investment and operational activity. The abandonment of the distinction (and a simple addition) can lead to the calculation of the cost recovery ratio at the level of, for example, 500%, which is an evident nonsense. A similar but slightly less clamant case may be encountered in another information document:

Information Sheet… pages 16 & 17, tables, line concerning Kongsberg indicates the cost recovery level of 134% for the water supply and 142% for the wastewater treatment.
As these indicators may be with some error identified with the net income of the operator, the operator (in Kongsberg) obtains 34-42% which is a truly stunning recovery ratio. In the analysed branch of water supply and wastewater treatment it is improbable and such result is an effect of the methodological deviations described in the mentioned document on the page 12. The scheme on the mentioned page contains a frequently encountered error of confusing the notions of expenditures and costs. Not every expenditure is a cost in the accountancy's understanding. This remark concerns in particular the investment expenditures – they are not a cost for an operator. The cost appears only at the moment of the effect of the investment – the creation of fixed assets, and more accurately speaking, when counting the depreciation allowance. Due to the fact that the financial analysis is conducted from the point of view of an operator, the distinction of terms and the essential correctness are necessary and will facilitate the process of collection of data coming directly from the operators' accountancies.

Financial cost recovery ratio
On the background of the specified difficulties even a relatively simple calculation of the financial cost recovery rate is not obvious. It can be defined as relation of incomes (including the incomes from the sell of water related services) and financial costs (in the sense of WFD) of the operator. The general practice is the calculation of the financial recovery rate in two options – taking into account and omitting the subsidies (*subsidies for the operational activity* because the other ones don't appear at all in the loss-benefit study). The recommendation of eliminating the subsidies is clear (*Guidance Economic and Environment.. page 135*) but in practice they often don't get identified and quantified. In Poland the grants, aids and subventions for other purposes than the creation of fixed assets appear in the loss-benefit study at the position: *other operational incomes.*
As the financial analysis is done from the operator's point of view, it is justified to take into account the internalised external costs, i.e. the fees paid for the use of the environment.

Table 14: Financial recovery rate; B/A

A= Costs	B = Incomes
External environmental costs	
External costs of lost opportunities = ressources costs	
Administrative costs,event other direct	
Capital costs	Total incomes, including those from the sell of of water services
Operational costs, including internalised env.&res.	Subsidies

Another controversial question is the evaluation of the investment activity only. In the programmatic documents (Information *Sheet*.. pages 10 & 11) appears an indicator of *recovery rate of the investment expenditures* never met before. The name itself, as the methodology of calculation provoke many reserves. The following remarks have been formulated:
- The relation of proper assets of the investor and of the total investment expenditure cannot be called a recovery rate of the investment expenditures, but the share of proper assets
- The methodology which consists in dividing the proper assets of the operator by the total investment expenditure loses an important distinction - in the Polish context - between the public means supporting the investments into: grants, loft loans, etc. The correct calculation

of the share of the proper assets should be based on a more accurate analysis taking into account the equivalent of net grants in case of the soft loans.
- All the time such an indicator doesn't have anything in common with the indicator of the recovery of investment expenditure (in finances this term is reserved for a dynamic method of evaluation of the investment projects. It takes into account the changes of money value in time and is based on the analysis of the discounted financial flows).
Considering the above remarks and taking into account the fact that the basic programmatic document (*Guidance.. Economic and the Environment…*) doesn't mention the necessity of such calculations it is proposed to abandon the requirement of calculation of this indicator for the Polish conditions. This recommendation doesn't solve definitely the problem of the investment expenditure. Having in mind the regulations of the Accountancy Law they shouldn't be integrated in the "costs" category. It is therefore proposed to omit these values in the calculation of the recovery rate which doesn't mean ignoring them in the economic analysis – an activity much larger than the calculation of the cost recovery level. Analogically this recommendation concerns the grants and investment subsidies, they have to be tracked as they enter in the financial flows – however there is no place for them at the „incomes' position of the loss-benefit study, they won't be either taken into consideration within the calculation of the cost recovery level.

Economical cost recovery level
The passage from the calculation of the financial recovery level to the economical one is composed of the following steps:
- Adoption of the financial costs previously assessed
- Elimination of transfers (of all subsidies and taxes – the fees for the use of the environment should however remain)
- Taking into account the external environmental and resource costs
In practice the financial costs should be increased by the values of not internalised environmental and resource costs, while the incomes should be corrected by the deduction of subventions.

Table 15: Economical recovery level; B/A

A= Costs	B = Incomes
External environmental costs	
External costs of lost opportunities = ressources costs	
Administrative costs,event other direct	
Capital costs	Total incomes, including those from the sell of of water services
Operational costs, including internalised env.&res.	~~Subsidies~~

Analysis of tariffs
As concerns the cost recovery the pricing politics is the main activity contributing to the achievement of the environmental objectives of WFD. WFD precises that the pricing policy can take into account the social aspects (among others the possibility of water purchase by the low income households).
WFD requires to evaluate if the pricing politics contributes to the achievement of the environmental objectives, it doesn't however exclude the measures of a social character (ex. subventions), but requires transparency, i.e. a clear information on the amount of the grant, on the target group, i.e. on the beneficiaries and donors. WFD doesn't specify the actors to be covered by the analysis. The basic criterion of the qualification is the pressures criterion, and more accurately speaking the importance of impact of the given pressure on the aquatic

environment, i.e. it may be justified to omit the small users whose scale of impact can be contained within the limit of error of the impact's measurement.

b Necessary activities

ANALYSIS OF WATER SERVICES COST RECOVERY

Cost recovery principle states that each water & sanitation user should pay for all the costs they generate. European districts should tend to implement this principle (though it is not compulsory) and at the first stage gain knowledge on their cost recovery rate.

Therefore, cost recovery analysis appears to be an exercise on financial transparency. It is also a tool, among others (such as incentive pricing, for instance), to ensure a better (efficient) and fair funding of program of measures.

The WFD states that cost recovery analysis should take into account the three following water user categories: households, industries, agriculture.
But in practical terms, we have to identify and take into account other categories such as:
- Public sector widely understood (potential donor of subventions and receiver of taxes),
- Other (than households) users served by the municipal operators.

The list isn't closed and it is possible to define other categories depending on the specificity of water management in each country. When the list of the categories of water users to be taken into account will be defined, the next stage will consist in describing the relations between them.
The basic and essential element of the economic analysis is the identification of the key (from the point of view of the pressures on the environment) water services. The most evident ones are the water supply and the wastewater treatment services.
The list isn't closed and may be developed with the other important services identified (water transport, leisures, etc). That's why at the 1st stage of works it is necessary to identify the sectors of economy and the types of services that influence the status of waters and determine the costs and incomes for these categories. The basic template for the collection of the pertinent information is presented at the table 16.

Table 16 Calculation scheme for the financial cost recovery level in the municipal sector

Type of services	Financial categories	Households	Other municipal users	…
Water supply	Financial costs (accordingly to WFD)			
	Incomes, including those from tariffs			
	Subventions, including those for the operational activity			
	Indicator of cost recovery			
Collection & treatment of wastewater	Financial costs (accordingly to WFD)			
	Incomes, including those from tariffs			
	Subventions, including those for the operational activity			
	Indicator of cost recovery			

Source: proper study

A quite modest division of the municipal users – into households and other users exclusively – needs some commentaries. In some cases this division can be deepened and the group of industrial users using the municipal network can be distinguished among the "other users". However if the analysis is done for bigger areas it will be often impossible because the operators use very different divisions of the groups of clients. The only common feature is the fact of distinguishing the households. The other category contains other users, and in case where there is no price differentiation – the value from the household's column is repeated. Another issue is the placement of the joint value covering the investment support in the subventions column. This seem to be a curtsey towards the requirements from *Guidance* rather than a methodological step. The amounts of the investment grants aren't taken into account neither in the study of costs nor in the study of profits, they cannot be therefore deducted.
The calculation scheme for industries using their own intakes is much more simple. As the financial recovery level doesn't take into account the not internalised externalities, the entrepreneur who abstracts water at his own expenses must pay them himself. So in case of the actors that withdraw the water at their own expenses the financial cost recovery equals 100%. As there is no possibility of granting the operational activity of the enterprises, a further analysis of the financial recovery level isn't required.
The calculation scheme for agriculture (more accurately of the water used for the irrigations) isn't that evident anymore. In few cases when the water is abstracted from the proper intakes and distributed at the proper expenses, the reasoning is analogical as in case of the industry. However when there is a free of charge use of the land melioration system maintained by the public funds (ex. offices of land meliorations and of water installations of voivodships) the recovery level equals 0%. At the level of the calculation of the recovery rate it is a concrete result, however if we try to draw a scheme of the financial flows, the volumes of public resources destined on this purpose are very difficult to estimate. Analogically the extension of the analysis from the financial one to the economic recovery level requires to operate on the absolute financial values what will be difficult both in case of the industries as agriculture.

STAGE 1- Definition of water services and of the sectors of economy

The CIS Drafting Group ECO1 document on cost-recovery gives the following guidelines :
Water services are defined in Article 2 of the WFD as: " (a) abstraction, impoundment, storage, treatment and distribution of surface water or groundwater; (b) waste water collection and treatment facilities which subsequently discharge into surface water." Water services are seen as intermediaries between the natural environment and actual water use. Neither the Directive nor WATECO provides a categorical specification of what should be included for the characterisation. The key point is to link the water services included in the assessment with the findings of the pressures and impacts study. In other words, the appropriate water services to include in the assessment are those that are identified in the pressures and impacts study as having a significant impact on the status of water bodies.

The Directive doesn't specify if the services to include are public or private and if they include or exclude self supply services. The key point is the link with the pressures and the impacts study. However the WATECO guidance document (page 4, Annex II.III) states that: "*To achieve maximum transparency, to ensure equitable and effective treatment regarding the internalisation of environmental and resource costs, and to preserve competition between economic sectors, water services should, where necessary, include both services provided by third parties and self-services*."

So, as a minimum it is recommended that public water and wastewater services should be included. These services might be provided by a public institution (e.g. water board, water authority, municipality) or a privatised (or part-privatised) company appointed and regulated

by the state or municipality, e.g. through a concession agreement. Member States can consider further water services in conjunction with the pressures and impacts study. Where other water services are highlighted as having a significant impact on water status then Member States will need to consider their inclusion in the cost-recovery assessment.

What are the users to be considered?

Water use is defined in Article 2 as: “water services together with any other activity identified under Article 5 and Annex II having a significant impact on the status of water. This concept applies for the purposes of Article 1 and of the economic analysis carried out according to Article 5 and Annex III, point (b).” Article 9 of the Directive specifies that the water uses should include at least households, agriculture and industry. In this moment a certain divergence between the municipal sector and households stands out. The municipal operators provide services also for other actors than the households. In consequence the financial results of the water operators cannot be identified with the category of households this distinction is important because in the Polish conditions sometimes crosses subsidies between various groups of receivers appear. Even if WFD doesn’t explicitly mention the necessity of disaggregation of the municipal clients, a reliable analysis adapted to the Polish context contains such a requirement.
It may be necessary to include other water uses in the cost recovery analysis. The relevance of other uses will stem from the river basin characterisation, which will identify activities having a significant impact on water status and assess the related pressures and impacts.
What is the geographical scale of the cost-recovery assessment ?
The Directive specifies that the assessment of cost recovery and incentive pricing is required at the **river basin district scale** for each category of water services that have been identified.
However, in order to benefit, both from current organisation of water management in Poland and from activities carried out up to now, the RZGW river basin level could be an efficient scale of works for elementary diagnosis and calculations. A summary of the analysis must then be included in the river basin management plan. Carrying the calculations and activities at RZGW scale will also ensure an integrated approach for the use of results within the activities of Programme of measures (incentive pricing) or even definitions of derogations (disproportionate costs).

Which reference year to be considered ?

In order to have a coherent cost-recovery assessment, all the data collected should be theoretically from the same year. In practice, it might be difficult to always keep on this principle. In some cases the specific year chosen will be unavailable and then it will be necessary to take the data for the previous or older year. The transgression of the principle of the basic year should be always mentioned in the report. Also the fact of determination of realistic deadlines for calculations isn’t without importance. It is necessary to take here into account the specificity of collection of the statistical data and of the financial data in the annual cycles. The full financial reports from the operators are available about 6 months after the end of the calendar year and the GUS data – in December (initial data in June). In such context fixing the deadline of the end of calculations for March for example implies the necessity of using the two years old data.

Which level of cost-recovery to target ?

The WFD does not require the Member States to implement full cost recovery. The WFD requires to take into account this principle. It means that it is necessary to make an analysis and a transparent report on the current status of cost-recovery in order to identify in which ways the current level could be improved regarding the issues raised through cost-recovery : sustainability of water services, equity of the contribution of the economic sectors

(households, industry, agriculture), polluter pays principle implementation (i.e. Environmental and resource costs assessment).
If the data has been collected through the surveys it should be examined if all the sent questionnaires contain the full data or if the data has been verified positively as concerns their substance. That's why the reliability of the sample should be assessed on the basis of the number of questionnaires that can be used for the full analysis, i.e. the so called model sample.

The correct surveys require an evaluation of the representativeness of the sample in reference to the entire community of actors. It can be done accordingly to the scheme proposed in the table 17.

Table 17 Comparison of samples of all operating operators and of the sample used within the survey (data for 2002)
Source: Analysis of the cost recovery level … opus cit. p6

Feature	Unit	All operators	Model sample	Model sample as a % of the whole
I – water supply				
Number of operators	-	436	212	49,0%
Volume of water supplied	mln m^3/rok	219,3	165,9	75,6%
Average (weighted) cost of the supplied water	zł/m^3	2,02	2,05	różnica 1,5%
Average price of the sold water (for households)	zł/m^3	2,08	1,97	różnica 5%
Property structure (1)	%	17/68/16	22/67/11	-
II – collection and treatment of wastewater				
Nr of operators	-	343	162	47%
Volume of collected / treated wastewater	mln m^3/rok	173,6	139,1	80%
Average (weighted) cost of collection and treatment	zł/m^3	2,26	2,18 (3,24 – aritmetical mean .)	różnica 3,5%
Average price of the service (for households)	zł/m^3	2,32	2,24	różnica 3,4%
Property structure (1)	%	20/79/1	27/70/03	

(1) Limited responsibility societies and action societies / of communes + of State / other including water societies

Stage 2 – Description of water services

It concerns a given area that should be properly divided (averaged) into water bodies concerned by these services. This description covers:

- an overview and juxtaposition of types and volumes of services,
- an overview and juxtaposition of unitary prices of the above services.

Stage 3 – Evaluation of influence of water related services

At this stage some simulations of the hypothetical incomes of water services should be done. Despite the reserves in terms of differences between the incomes calculated as a product of prices / volumes and the effective incomes, such simulations have a certain sense if they are performed correctly. They allow to verify the survey data – at least as concerns the order of magnitude (with the big survey samples some errors related to the displacement of the decimal point or with the omitment of one cipher, etc, occur). The calculations presented below contain however a serious error which impedes in practice the verification of the survey data. The incomes are counted on the basis of gross instead of net prices. In the loss-profit study of Polish enterprises the net incomes are shown!

In order to distinguish the effective incomes and their simulation a notion of „hypothetical" appears in the descriptions which indicates the simulation origin of the value. They can be presented in form of table, as in the example in the table 18.

Table18 Hypothetical assessment of incomes obtained by the operators for the water supply services

Operator	Households			Industry			Other users		
	Quantity of supplied water	price	Hypothetical estimation of incomes In quantity x price	Quantity of supplied water	price	Hypothetical estimation of incomes In quantity x price	Quantity of supplied water	price	Hypothetical estimation of incomes In quantity x price

Table 19 Hypothetical structure of incomes of the analysed sample

Specification of groups of users	Share in the incomes in %
Households	
Industrial users	
Other municipal users	
All users	100,00%

Table 20 Hypothetical assessment of incomes obtained by the operators for the sewage services

Operator	Households			Industry			Other users		
	Volume of collected wastewater	Price	Hypothetical estimation of incomes In quantity x price	Volume of collected wastewater	Price	Hypothetical estimation of incomes In quantity x price	Volume of collected wastewater	Price	Hypothetical estimation of incomes In quantity x price
1 (name)									
2 (name)									

Table 21 Hypothetical structure of incomes of the analysed sample

Specification of groups of users	Share in the incomes in %
Households	
Industrial users	
Other municipal users	
All users	100,00%

Table 22 Comparison of the hypothetical and of the declared incomes

Operator	Incomes from the sale of water supply services		Incomes from the sale of wastewater collection and treatment services	
	Hypothetical value	Declared value	Hypothetical value	Declared value
1 (name)				
2 (name)				

Table 23 Incomes related to the water supply

Operator	Operational level				Financial level	Exceptional level	Level of the division of result	Level of the division of result
	Incomes from sales	Other operational incomes	Including		Financial incomes	Exceptional profits	Gross financial result	Net financial result
			Received grants and subvention for other purposes than acquisition or production of fixed assets	Components of property received for free				

and an identical table "Incomes related to the wastewater collection and treatment services"

Stage 4: assessment of costs of the water services

The table 24 presents the proposed scheme of collection of information on incomes and costs of services: water supply and wastewater treatment. An identical table can be used for wastewater with the title: "Costs related to the wastewater collection and treatment services".

Table 1 Costs related with the water supply services

Operator	Operational level								Financial level	Exceptional level	Level of the division of result
	Operational costs	including						Other operational costs	Financial costs	Exceptional losses	Obligatory reduction of profit
		Materials & energy	Remunerations & related	Depreciation	the use of the environm	Taxes					
1 (name)											
2 (name)											
...											

After the comparison of costs and incomes of the operators an analysis of the crossed subsidies should be done. An example of such an analysis has been realised in RZGW Cracow (at the sample of 212 operators). The results are presented in the table 25.

Table 25 Overview of cross subsidies in the water supply process RZGW Kraków
Source: Analysis of water services cost recovery level

Net price for households > unitary cost	Net price for households < unitary cost of 69% operators, 76 % of sold water		
Both the operators applying the homogenous and differentiated prices	Operators applying cross subsidies through the differentiation of prices for the particular groups of users		Operators applying the homogenous prices
31 % of operators,, 24 % of sold water	Cross subsidies are sufficient to balance the costs at the scale of the plant	Despite the cross subsidies the unitary costs are higher than the average weighted price of water	37% of operators, 25% of sold water
	20% of operators, 6% of supplied water, average level of cross subsidies. 0,43 zł/m3 . minimum 5 gr, max 2,81 zł/m3	12% of operators, 45% of supplied water, average level of cross subsidies 0,26 zł/m3 . minimum 1 gr, max 2,10 zł/m3	
Cost recovery		Partial cost recovery	

With respect of the user pays principle	With partial transgression of the user pays principle		With respect of the user pays principle
Identified financial transfers (grants) for the activity of operators; 16% actors, 8% sold water			
Appear	Appear	Appear	Appear

Stage 5: calculation of the cost recovery level

The final stage is the calculation of the financial cost recovery level for the analysed sample of operators. In this purpose, taking as a base the data from the previous stages, it is necessary to bring together the incomes and costs after the deduction of grants for operational activity (if such appeared).

Table 26 Financial cost recovery level for the analysed sample of municipal operators

	WATER	WASTE-WATER	Total
Total incomes (from the survey data)			
Total costs			
Financial cost recovery level			

Attention: The handbook *Guidance Economic and Environment* – requires also to deduct the investment grants. In the loss-benefit study for Polish enterprises (from whom come the data on the incomes) the investment grants aren't taken into account – that's why there is no necessity of deducting them.

Stage 6 – Assessment of social impacts

Assessment of average invoice for water supply and wastewater treatment paid by households. Assessment of weight of this invoice in comparison with the disposable income

The assessment of average invoice for water supply and wastewater treatment should be done using the data gathered through the surveys and GUS data. The basic problem within the calculations in the hydrological units is a lack of adaptation of the statistical data describing the population's situation in terms of incomes. The data on the average consumption of water and on the average volume of produced wastewater as well as the average weighted prices for these services can be calculated at the basis of the survey data in frame of proper activities of particular RZGWs. However there is no such possibility in the case of the estimations of the disposable incomes.
The lowest level of disaggregation on which the data on the disposable incomes are published are the voivodships. The data for the particular voivodships are published in the statistical year-books of particular voivodships (the national publications such as *Statistical Year-book* or the *Budgets of households* don't contain so detailed information). It should be noticed that in Poland there is no technical possibility of disaggregation of the income data accordingly to the water regions using the key of appurtenance to the particular RZGWs (Even such a key isn't perfect because some communes belong to more than one RZGW). It isn't possible because the statistical form for the analysis of budgets (The BR-01 form, Book of household's budget) doesn't contain a field that would describe the commune– but only a voivodship. Therefore this time the problem doesn't consist exclusively in the lack of co-operation of the public institutions but in the lack of possibility of realisation of such recommendation.
The approximate determination of the average disposable income in the water regions is possible through taking into account the distribution of the population according to the voivodships belonging to the particular regions. A fragment of such conversion template is presented in the table 27.

Table 27 Template for the conversion of the disposable income from the data at the voivodships level to the data at the water regions
Source: Population – Statistical year-book GUS 2004, population in voivodships in the RZGW Kraków – data of RZGW Kraków.

Voivodships	population	RZGW, population belonging to particular voivodships in mln						
	mln	Szczecin	Poznań	Wrocław	Gliwice	Gdańsk	Warszawa	Kraków
Dolnośląskie	2,898							0
Kujawsko-pomorskie	2,068							0
Lubelskie	2,191							0,163
Lubuskie	1,008							0
Łódzkie	2,597							0
Małopolskie	3,253							3,068
Mazowieckie	5,136							0
Opolskie	1,056							0
Podkarpackie	2,097							2,102
Podlaskie	1,205							0
Pomorskie	2,189							0
Śląskie	4,715							0,195
Świętokrzyskie	1,292							0,796
Warmińsko-mazurskie	1,429							0
Wielkopolskie	3,360							0
Zachodnio-omorskie	1,696							0
TOTAL	38,190							6,375

Such a key allows to convert the statistical data given only for the level of the voivodships to data at the level of RZGWs. The use of this algorithm is related to commitment of some errors because the distribution of incomes is not identical inside the voivodships.

Example of determination of a disposable income for RZGW Kraków:

- *Identification of voivodships and of the disposable incomes in particular voivodships belonging to RZGW Kraków (at the basis of the statistical year-books of particular voivodships)*
- *Calculation of weights for particular voivodships*

Table 27 Example of definition of the average weighted disposable income for RZGW Kraków
Source: web sites of the statistical offices of voivodships

Voivodships (parts) belonging to RZGW Kraków	Disposable income in 2003	Weight of the voivodship in RZGW Kraków	Component of the income from the given voivodship
	zł/person/month	-	zł/person/Sc.
Lubelskie	648,02	0,163 / 6,375 = 0,026	0,026 * 648,02 = 16,57
Małopolskie	671,84	3,253 / 6,375 = 0,511	0,511 * 671,84 = 343,15
Podkarpackie	582,12	2,097 / 6,375 = 0,329	0,329 * 582,12 = 191,66
Śląskie	726,01	0,195 / 6,375 = 0,031	0,031 * 726,01 = 22,21
Świętokrzyskie	604,24	0,796 / 6,375 =	0,125 * 604,24 = 75,4

		0,125	
Average weighted disposable income in zl/person/month Σ			649,03

Table 29 Example of calculation of the percentage of the disposable income destined on the water services

RZGW	Disposable income	Water consumption	Volume of produced wastewater	Water price (average weighted)	Price for the wastewater collection (average weighted)	Total bill for services zł/person/month	Share of bill in the income
	zł/person/month	m3/ person/ month	m3/ person/month	zł/m3	zł/m3	m3/ person/ month	%
Szczecin							
Poznań							
Wrocław							
Gliwice							
Gdańsk							
Warszawa							
Kraków	649,03	2,93	2,93(a)	2,08	2,32	12,89	2,00%
Poland							

A disadvantageous option in terms of the calculation of financial charge has been adopted. The statistical volume of wastewater is less important than the statistical volume of water purchased because the percentage of the population connected to the network is lower. The formal consequence of this phenomenon should be a lower value in the „volume of wastewater" position than in the „water consumption" position. Source: Economical analysis RZGW Kraków

The correct interpretation of the obtained results is important. The percentage multiplied by the disposable income isn't a good indicator for the assessment of incomes of the water services operators. The perception lower than 100%, the permanent payments existing sometimes are important arguments in favour of the analysis of the operators' incomes by the surveys of their financial reports.

The calculated meter should be interpreted only in accordance with the context in which it has been created, i.e. the social one.

The presented method is correct from the technical point of view, it doesn't reflect however all the social aspects. The ability to pay (and in the same time the perception of bills for water services) isn't determined by the average disposable income but by the group of people having the lowest incomes. Within a deeper analysis one shouldn't use the routine division into the income groups (pensioners, working on the proper account etc.) – these groups don't show a big differentiation of incomes. The correct analysis should be referred to the decile groups, i.e. to the population organised according to the level of the disposable income and divided into 10 equal sub-groups, the so called decile groups. The scale of divergence of incomes is presented at the illustration 20. Such a detailed analysis isn't realised (or at least published) by GUS every year, that's why the data for the year 2001 – the last published – have been used.

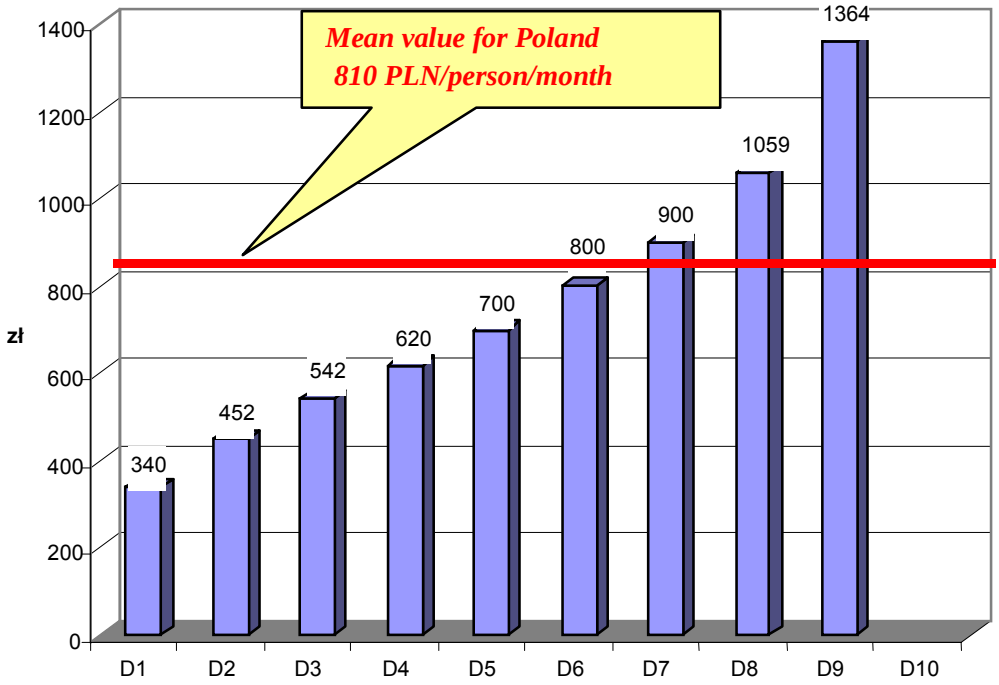


Illustration 20 Inequalities of households In terms of incomes in 2001. (disposable income PLN/person/month)
Source: Diversification of life conditions of the population in Poland in 2001, GUS, Warszawa 2002.

After the analysis of the first income decile the payments for the water services of order of 13 zł/month don't constitute 2% anymore, but 3,8% which points out the necessity to implement the protective social measures or to accept the low perception of invoices for water services. Newer national studies by Markowska already show a 6% level in the group of people having the lowest incomes. The general conclusion is the statement that the effort within the collection of data shouldn't end up only with the conversion from the voivodship's level to the RZGW's level, but with the identification of a sub-population particularly sensible to the changes of prices.

c Valuation of the external environmental costs

Economists have developed different methods to place monetary values on environmental services:

a) *Market methods*: based on values from prevailing prices for goods and services traded in markets that reflect changes in environmental quality: for example, lower water quality affects negatively the quality of shellfish and hence its price in the market.

b) *Cost-based* valuation methods: based on the assumption that the cost of maintaining an environmental benefit is a reasonable estimation of preventive and / or mitigation measures. However this assumption is not always correct. Not in all the cases the mitigation is possible, and especially in those where the mitigation costs constitute and underestimation of the effective environmental costs. The mitigation measures can also be not efficient in terms of costs and lead to an overestimation of the environmental costs. A distinction needs to be made between :

The costs of measures already adopted, which are theoretically already included in financial cost category**.** These costs (internalised environmental costs) should be reported as a distinct financial cost category. Counting them as environmental costs would be double counting.
The costs of measures that need to be taken to prevent environmental damages up to a certain point, such as meeting the WFD objectives. These costs can be a good estimate of what society is willing to forego.

c) *Revealed preference methods*: The underlying assumption is that the value of goods in a market reflects a set of environmental costs and benefits and that it is possible to isolate the value of the

relevant environmental values. These methods include recreational demand methods, hedonic pricing models and averting behaviour models:

The Hedonic Pricing method explains variation in the price of goods using information on "qualitative and quantitative" attributes. They are used to value how environmental attributes and changes affect property prices. For instance, in addition to structural features of the property, if a property price is determined by the proximity to a river, the change in property price due to the pollution of the river is the cost of this degradation.
Averting Behaviour: it can be defined as measures taken to reduce the risk of suffering environmental damages and actions taken to mitigate the impact of environmental damages, for example by buying bottled water. The expenditure produces a value of the risk associated with the environmental damage.
Recreation Demand Models: Improvements or deterioration in the water quality may enhance or reduce recreation opportunities, e.g. swimming, in one or more sites in a region. Reductions in trips to a river due to deterioration of water quality and associated changes in expenditures reveal the cost of this deterioration.

d) *Contingent Valuation*: Contingent Valuation is based on survey results. A scenario including the good that would be delivered and how it would be paid for (e.g. through an increase of the water bill) is presented to the respondent. Respondents are asked for their willingness to pay (WTP) for the specified good. The mean willingness to pay is calculated to give an estimated value of the good. One of the difficulties with this approach lies in ensuring that respondent adequately understands the environmental change that is being valued in the survey.

Estimation of the environmental costs in Poland

Poland has a developed system of payments for the use of the environment and for the modifications introduced in it. Even if the unitary rates haven't been determined on the basis a refined economical analysis, we can risk the statement that the system of fees internalises – at least partially - the externalities generated by the environment users. Also some studies have been conducted (*Economical analysis of the functioning of the new system of financial and legal means concerning the use of the environment and in particular the rates for the water withdrawal and wastewater collection.* Report on the command of the Ministry of the Environment, AK Consulting. Warszawa, November 2003 and *Analysis of the systems of ecological fees in the water and wastewater management in industry for the year 2002*. Report for the Ministry of the Environment. ATMOTERM 2003) concerning the incentive role of the system in terms of the reduction of pollution and decrease of water's withdrawal. The most important question is if the existing unitary rates fully (or partially) internalise the externalities. The positive answer (YES, fully) would allow to avoid the long listing calculations concerning the not internalised externalities. Unfortunately there are no studies allowing to confirm such an audacious hypothesis, that's why the measurement of costs must be dome „from the basis".
The assessment of the environmental costs requires each time to analyse the individual conditions, i.e. to assess the changes of a concrete (assigned to the local conditions) flow of benefits related to the aquatic environment. Due to a too elevated number of such studies it is highly probable that these kinds of studies will not be realised at the local scale. That's why it is necessary to use the estimations from other regions or the national estimations. These considerations suggest a certain indication: within the dilemma of choice of the available results of estimations, the priority is given to the local studies taking into account the local securities, the question of the used technique of study (if it has been realised correctly) is of secondary importance.
In Poland, with almost complete lack of studies done at the regional scale the choice of method (and in practice of a unitary indicator) can be done from among the existing national or European studies. Here below will be conducted a discussion on the possibilities of using the studies realised in 2003 in Poland by A. Markowska with help contingent valuation on a reliable sample of inhabitants (Markowska A., *Costs and benefits of the implementation of the 91/271/EEC on the treatment of the municipal wastewater in Poland.* Warsaw University, Economic Sciences Department, Warszawa 2004). The discussion is conducted in the context of use and up-dating of the existing results with no necessity of further surveys at the scale of particular RZGWs.

This study distinguishes very clearly the investment aspect concerning the not connected inhabitants and the studies related to the value of improvement of the surface water resources as such. The questions on the willingness to pay for the connection to the network (addressed to the not connected

inhabitants) were asked separately respect to the questions on the willingness to pay for a national program aiming at the improvement of the quality of water resources. This general statement has been refined in form of the achievement by the Polish surface water of the standard for the recreational activities and allowing the fish breeding. The information didn't cover the status of the Baltic Sea. A separate flow of benefits was higher (i.e. satisfactory) quality of drinking water – another effect of this program. The declared (in form o fan additional payment for water services) amounts can be therefore identified with the monetary valuation of disadvantages resulting from the low quality of the water resources in Poland. The set of results is presented in the Table 30.

Table 30 Willingness to pay for the improvement of the quality of surface waters In Poland, level of prices 2003
Source: Markowska A., *Costs and benefits …* opus cit. page 110

Specification	Average in zł/person/month	Average in zł/person/month
WTP – quality of surface waters	5,42	65,04
WTP – quality of drinking water	5,56	66,72
WTP - jointly	10,91	130,92

It should be underlined that the actualisation of the results of studies doesn't limit itself only to the conversion of the prices' levels. Besides the phenomenon of the change of money value (inflation) we can distinguish at least two processes that should be taken into account within the actualisation of the calculations:
Increase of incomes of households (influences the increase of WTP value),
Progressive realisation of the investment program for the improvement of the water status resulting in the improvement of quality of surface waters (influences the decrease of WTP value).
The procedure of taking into account the first of the mentioned phenomena is relatively simple and is composed of the following steps:
(a1) Convert the average disposable income from 2003 (680,50 zł in 2003 prices) to the new basic year of calculations using the indicator of changes of the prices of consumption goods and services,
(a2) Compare the income from the basic year and the actualised income from 2003 and multiply the difference between the two values by 0,05 (During the studies Markowska determined the correlation between the increase of the disposable income per person and the change of WTP. The increase of income of 1 zł/person/month results in an increase of the willingness of 5gr (for the both analysed categories))
(a3) Add the difference obtained in such a way to the WTP value contained in the Table 30.

What is much more difficult to take into account in the calculations is the second step . Hypothetically the simplest solution is:
(b1) to track the incurred investment expenditures
(b2) to determine a level of the realisation of the whole program in %.
(b3) in the subsequent step the WTP can be decreased of the percentage of the realisation of the program.
Such procedure has however some weak points:
(c1) the incurred expenditures are not linked with the obtained results (ex. restoration investments, variable hydrological conditions) in a linear way,
(c2) the effects don't have to influence the WTP in a linear way,
(c3) meantime the KPOŚK has been submitted to a verification and its costs increased despite the realisation of a series of important investments (the increase amounted from 35,4 mld zł prices level 2003 to 42,6 mld zł prices level 2005) .

Despite the identified weaknesses this solution has been used for Poland in the Baltic survey (valuation concerning the clean Baltic Sea) in the analysis of the environmental benefits of the integration (Peszko G., (red) *Economical benefits for Poland resulting from the implementation of the UE environment protection law.* UKIE 2003).
Passing to the operationally of the presented conception, one can give the financial indicators for the realisation of the first years of the implementation of the program – see table 31

Table 31 Estimated financial indicators of the realisation of KPOŚK,
Source: proper study

Specification	Expenditures in particular years			% realisation of programme in a given year = (4)/Total 46,63	% growingly
	mld zł current prices	Indicator of change of the investment expenditures for 2002	mld zł permanent prices 2002' =(2)*(3)		
Joint investment expenditures, status for 2002 [(a)]	46,63	1,00		-	-
Expenditures In subsequent years [(b)]					
2003	2,588	0,9891	2,560	5,49%	5,49%
2004	2,747	0,9697	2,664	5,71%	11,20%
2005					
….					

[(a)] The studies of Markowska concerned the first version of KPOŚK (before actualisation), the respondents weren't however presented the financial calculations but an adjectival description. That's why the „joint expenditures" column presents the newest assessment from the actualisation (2004) increased by the expenditures from 2004 and 2004 and converted into the fixed prices from 2002.
[(b)] Expenditures on the WWTPs and sewage systems, without pluvial sewage system according to GUS.

In frame of the Twinning Project the assessment of the environmental costs was tested in the Narew basin using the restoration and avoidance method. The test has covered the following elements:

- identification of local problems in terms of pollution / degradation of the aquatic environment related to households, agriculture, industry and hydromorphology,
- elaboration of unitary investment and operational costs of measures required to mitigate each type of damages,
- quantification of the necessary local measures needed to mitigate these damages.

These elements have been used to calculate the annual values for every category of users.

The advantages of the restoration and avoidance method are its easiness and low costs of application. It allows to estimate the full costs of water / wastewater for each category (which may be helpful for the decision maker). However it is important to understand that this method is not a programme of measures. It is only a theoretic approach, one among others, to the estimation of the environmental costs. It is based on the existing programmes related to the "daughter" directives completed and verified by the supplementary measures aiming at the suppression of the remaining pollution.
The test of environmental costs assessment methods is needed to enrich the conducted analysis as any of these methods isn't significantly better than another one neither in terms of the pertinence of the approach nor in terms of accuracy of the obtained results.

Example
The calculation of the environmental costs in a sub-basin inhabited by 10 000 persons in 2004. The attention should be paid to the fact that the searched result is a partial result (environmental costs will be added to, for example, resources costs) – it must be therefore given in the prices of the basic year of the calculations of the cost recovery – i.e. in the 2004 prices – and not in the prices of the basic year of the project concerning the WTP. The indicator of disadvantages for the year 2003 amounted to 10,91 zł/person/month (table 30). The level of the realisation of the programme for two years (2003 & 2004) amounted to 11,2%, what reduces the value of WTP from 10,91 to 9,69 zł/person /month *(100% - 11,2%)).
The indicator of the disposable income per capita amounted (in 2004) to 735,40 zł/person/month (according to GUS for Poland). The increase of the income equalled therefore 735,40-(680,5*1,02) = 41,29 zł. A monthly WTP amounted then to 41,29*0,05 = 2,06 zł. Finally the monthly WTP equals 9,69 + 2,06 = 11,75 zł/person, that is 141,05 zł/year. The environmental costs for the sub-basin amount therefore to 1,41 mln zł/year (141,05 zł/person/year * 10000 persons)

Possibilities of adaptation to the regional conditions

There is at least one possibility of partial consideration of the local conditions of different application's level: in the „income" correction the increase of WTP can be counted on the basis of a „regional" and not national mean . In theory the degree of „regionalisation" of the indicator can be improved by tracking the level of the realisation of KPOŚK in particular RZGWs. In practice the obstacle is the lack of aggregation of the incurred investment expenditures according to the particular RZGWs.
As it has been already mentioned before, in the questionnaire used for the WTP studies the issue related to the improvement of Baltic Sea's quality – the effect of the implementation of KPOŚK (and eventually of other programmes) - has been omitted. The study dealing with the disadvantages resulting from the low quality of the Baltic Sea was conducted In 1994 but the construction of the two questionnaires permits to treat the both studies as complementary. However the question of the actualisation of the valuation remains. The authors of studies from 1994 didn't publish the correlation between the change of income and the change of WTP. However in a long period of time his function may be different (important increase of income causes the change of the leisure places for the „distant and prestigious" ones). Therefore the actualisation will limit itself to a trial of determination of advancement in frame of the realisation of the programme aiming at the reduction of run-off of the pollutants' loads. As the Baltic Sea didn't have such a complex programme as KPOŚK (the HELCOM initiative wasn't that precisely quantified (neither quantitatively nor financially), the assessment of the improvement of quality has been done at the basis of an absolute (%) reduction of run-off of the pollutants' loads between years 1994 and 2004 (into account have been taken: BOD 5, CODCr, Nog, NNH4, Norg, Pog, PPO4, and heavy metals: Zn, Cu, Hg, Ni, Pb, Cr, Cd.). The average relative reduction of loads amounted to 53%. This estimation is compliant with the indicator 0,5 reducing the benefits related to the improvement of Baltic Sea adopted for the actualisation of the valuation by Peszka (*Economical benefits … opus cit.*). The annual benefits resulting from the improvement of the Baltic Sea for the year 2004 have been valuated at 207,1 zł/person/year (prices 2004).

Interpretation and way of use of the obtained results

The presented considerations end up with the obtainment of two complementary indicators of the annual benefits resulting from the improvement of the quality of surface waters and of the Baltic Sea. It is therefore possible to determine a joint indicator amounting to 218,85 zł/person/year for 2004. The last important question is the issue of allocation of responsibility for such assessed incurred environmental disadvantages. It is true that the survey's questionnaires associated the responsibility for such status of waters only with the municipal sector, it is however evident that the industrial and agricultural activity has a significative share in the present low quality of water and the related inconveniences. That's why, even if the indicator uses the financial units per one inhabitant, the inconveniences concern effectively all the management processes (including agriculture and industrial activity). The issue of allocation of responsibility (at the basis of the key of, for example, structure of discharges of the pollutants' loads between various sectors: municipal, industrial and agricultural) hasn't been yet worked out in Poland.

d Proposal of methodology for the assessment of the resource costs

The resource costs or the costs of lost opportunities appear when there is an alternative way (ways) of using the given good, excluding the other ones. The cost of lost opportunities equals the benefits related to the best alternative use of a given good (resource). (In literature one can also find wrong definitions referring to the quantity of good whose production must be abandoned. The difference is essential – the quantity of the good is identified with its value. The correct definition refers to the benefits resulting from this production and not to its value. A full analysis of this category can be found for example In: Brouwer R., Pearce D., *Cost-Benefit Analysis and Water Resources Management*. Edward Elgar Publishing 2005. pages 28-29). The definition contains a very important indication – these costs are bigger than zero only if the competitive methods – excluding one another – of use of the concerned good exist. Bringing the discussion to the question of water resources – the resource costs will appear only in case of deficit of water understood not only as raw material. At stake are all kinds of uses, excluding one another, and taking into account all its utilities ([19] The examples of different utilities are: using of water resource as a

source of drinking water, as a place of pollution's deposit, as a source of energy, as a mean of transportation). If it is possible to satisfy the demand of all the actors supplying them with the requested volume – the resource costs don't appear. So if on a given area (more precisely– in a given calculation unit in the sense of the analysis of cost recovery) there are no water deficits (if no conflicts appear at the stage of attribution of permits for withdrawal) we cannot talk about external resource costs. In this moment the appearance of the notion of external resource costs should be underlined. The considerations concern Poland and in context of fees for water abstraction the actors acquitting such fees incur private (internalised) resource costs. If the existing rates ensure the balance or the prevalence of offer vis-à-vis the demand– the external environmental costs equal 0.
Because at the majority of Polish areas the water deficits don't appear, a big part of partial analysis could be concluded at this stage. In case of demand exceeding offer one should focus on the analysis of loss of benefits related to the best alternative use of water.
The further considerations illustrate the divergences appearing in the literature in terms of the definition of the alternative costs. What is at stake is the interpretation of benefits resulting from the use of resource in the best alternative way. The proposed and recommended method refers to the direct interpretation of this term through the identification of the benefits with the gross profit resulting from the best alternative use of water. There is however another concept that identifies the benefits with the value of goods (services) produced in result of the best alternative use of water. This dilemma can be clearly seen at the example of the agricultural production. Assuming that the concrete actor (producer) experienced a deficit amounting to, ex. 10 000 m3/r causing the decrease of crops of 1000 t/y, the alternative (resource) cost can be calculated in two ways:
(recommended way). The volume of not obtained production should be multiplied by the profit rate (gross) achieved with this production and the result should be identified with the resource cost.
The volume of not obtained production should be multiplied by the price of its sale and the achieved value should be identified with the resource costs.

Due to the fact that the profitability of the production in practice doesn't exceed 10%, the results obtained with the two methods differ by at least one order of magnitude. Therefore a discussion justifying the choice is necessary.

The first method supposes that the lack of water will cause the abandon of production at the defined culture area. The supply of the missing water would provoke the continuation of culture and the gain of profit. The second method supposes the continuation of production at the whole area but with a lower profitability (resulting from a worse irrigation). The supply of water would cause the increase of crops and the value of the additional crops identified with the additional gross profit is considered as the resource cost. It seems that the first method is cursed of less important errors than the second one but the key role is played by the behaviour of the producer linked with the choice of production modalities. The weakness of the second method is the fact that it treats the whole value of the additional crops as the benefit. Though there are costs of collection of the additional crops, of their storage and transport, eventually also the costs of the additional irrigation. There are in fact some studies taking into account the necessary correction, repeating them for the Polish conditions may however exceed the capacities of the RZGWs (the description of studies can be found in: Bate R., Dubourg R., *A net-back analysis of irrigation water demand in East Anglia* „Journal of Environmental Management" 1997, No 47 p. 311-322.the theoretical assumptions are available in: Pearce D., *Water Pricing: Investigating Conceptual and Theoretical Issues*. W: Pricing water Economics, Environment and Society. Conference Proceedings. Sintra 1999. DG Environment, EC 2001). Considering the proven imperfections of the calculations it is recommended to use the first method, but with the reserve that in the case if a producer's behaviour close to the option 2 is identified, the second criticised approach with a trial of correction should be used.

Returning to the recommended method, from the point of view of the economical analysis (the influence of taxes should be eliminated) the lost profit may be, with some error, identified with the gross lost profit.

For the national data it is therefore possible to make the following calculations:

1. For each sub-section of the industrial production (Nomenclature according to the Polish Classification of Activities - PKD) the following values can be determined: (a) water consumption, [m3/rok], (b) income from the total activity [mln zł/year], (c) gross profitability [%].

2. If we divide (in every sub-section) the annual income by the annual water consumption we obtain for every type of water and for every sub-section an indicator of production's water consumption [m3/zł]. It indicates how many zł of income we can achieve if we consume 1m3 of water.
3. If we multiply the declared deficit by this indicator (adequate for the sub-section for which the deficit has been declared) we obtain the value of income non achieved in result of the water deficit [zł/year].
4. If we multiply the non obtained income from the point 3 by the indicator of gross profitability we have the non obtained gross profit [zł/year]
5. The non obtained gross profit is identified with the external resource cost

In order to simplify the calculations the steps 1, 2 and 4 have been done in frame of the preparation of the present guidance and results of the calculations are presented in the table 32.

Table 32 National indicators of loss of profit resulting from the deficit of water
Source: Proper study at the basis of: Protection of the Environment GUS 2005, Balance financial results of the economic actors in 2004, GUS 2005.

PKD		SPECIFICATION	Loss of profit related to the water deficit in zl/m3 of deficit yearly
Group			
D		INDUSTRIAL PROCESSING	
DA	15	Production of alimentary products and beverages	51,4
DA	16	Production of tobacco products	570,4
DB	17	Textile industry	52,2
DB	18	Production of clothes and fur products	1480,3
DC	19	Production of leather and of leather products	72,7
DD	20	Production of wood and products of wood and cork (furniture excluded), products of straw and materials used to plait	189,5
DE	21	Production of pulp, paper and products of paper	18,4
DE	22	Publishing activity; painting and reproduction of the registered information supports	10953,9
DF	23	Production of coke, of the products of the crude oil's refining and of nuclear fuel	186,4
DG	24	Production of chemical products	11,8
DH	25	Production of gum and plastics products	253,1
DI	26	Production of products of other non-metallic raw materials	129,7
DJ	27	Production of metals.	51,6
DJ	28	Production of finished metal products, machines and installations excluded	940,0
DK	29	Production of machines and installations not classified anywhere else	327,0
DK	30	Production of Office machines and computers.....	141,8
DL	31	Production of electric machines and equipment not classified anywhere else	659,1
DL	32	Production of radio, TV and telecommunication equipment and devices	92,4
DL	33	Production of medical, precise and optical instruments, of clocks and watches	608,8
DM	34	Production of automotive vehicles, trailers and semi trailers	2202,8
DM	35	Production of other transportation equipment	11,0
DN	36	Production of furniture; production activity not classified anywhere else	1830,7
DN	37	Treatment of wastes.....	0,0
A		Agriculture, hunting and forestry.....	7,9
		Public sector.....	-3,1
		Private sector	19,2

B		Fishery.....	0,004
		Public sector.....	-0,0152
		Private sector.....	0,0143

(a) because of use of less than 0,05 hm3/y, the phenomenon is omitted in the statistics

With such an algorithm of procedure, in order to obtain the resource costs it is enough:

- *To identify the water deficits– at the basis of the delivered water permits*
- *To determine the type – according to PKD - of economical activity of the actor/group concerned by the deficit (it's enough to know the number from the PKD classification),*
- *To multiply the declared deficit by the value calculated for the pertinent sub-section of economic activity.*

An analysis of the possibilities of differentiation of the obtained indicators for different RZGWs and types of water (surface, groundwater) has been also done. After the analysis the feasibility of refinement of calculation taking into account the type of water has be moved apart as infeasible in the current system of data collection. The disaggregation according to RZGW has a purely theoretical character. From the technical point of view it is possible to refilter the financial data using the key of allocation according to the communes in the RZGW's system (i.e. giving the key in form of list of communes belonging to the particular RZGWs) – this operation would require a specific command for GUS. The following values would need to be reconverted taking into account the division into the RZGWs: water consumption according to PKD, total income from the activity and gross profitability. Even if the technical time of the realisation of such calculations doesn't exceed a couple of days, the formalisation of such activities and the agreement of the financial issues seems to be time consuming, if possible at all.

It should be noticed that the proposed methodology (analysis of the production's water consumption in the aspect of management of the available water resources is an approach known in the literature. A similar example can be found for example in: Merret S., *Introduction to the Economics of Water Resources. An International Perspective*. UCL Press 1997, s. 80.) It can be however refined at the level of a single actor concerned by the deficit. Instead of the national indicators presented in the table 21, one can try to prepare individual data for particular actors. In such case the specified values (points 1 and 4 from the above specification) must describe the concrete actor and must come from his financial reports. In the calculations for the whole sub-basin the modalities of assessment should be then marked out (national or individual indicators)

Example

A deficit of groundwater has been identified in form of the reduction of permit for water withdrawal from the postulated 30 000 to the conceded 20 000 m3 a year in a dairy plant. The activities have been realised according to the algorithm:
The reduction of the permit has been considered as deficit in the understanding of producer, amounting to10 000 m3 per year.
The classification of the plant according to PKD has been identified as DA 15 (and more accurately 15.51 treatment of milk and production of cheeses).
The indicator of profit loss for the group 15 has been identified at the amount of 51,4 zł/m3/year
After the multiplication the external resource cost has been determined amounting to 514 000 zł/year

II.8 RECOMMENDATIONS ON THE PUBLIC PARTICIPATION IN THE IMPLEMENTATION OF THE WFD

II.8.1 Definition of problem and its place in the planning process

The public participation in the implementation of regulations of the Water Framework Directive is a process that appears at different stages of the construction of the water management plan and concerns the majority of activities realised in this field. The requirements of the Water Framework Directive related to the public participation have been adapted to the Polish conditions in the document "Programme of public participation in the implementation of the Water Framework Directive in Poland" elaborated by the Public Participation group established by the Water Resources Department of the Ministry of the Environment. This document – adopted by the Ministry of the Environment in 2005 - presents in detail the definitions related to the public participation, presents the legal basis of this process in the Polish and European legislation, it also defines the objectives, forms and tools of the public participation in Poland at the national level (river basin district) and regional level (the area of a hydrographic region). The regional programmes elaborated at the beginning of 2006 by particular regional offices for water management constitute a refinement of the "Programme…".
In the pilot river basin "Upper Vistula" were conducted some activities that aimed – among others – at testing the adaptation and application of the European guidance dealing with the public participation in the Polish conditions as well as evaluating the difficulties and the necessary complements to the guidance. The recommendations contained in the present chapter are a result of these activities. They are based on the experiences gained during the tests of various forms of public participation. They describe the tools, examples and experiences obtained in frame of the testing activities.
The document provides guidance in practice on how to involve the public, water users and representatives of groups having special interests in the water management aspects (hereinafter referred to as "stakeholders") in order to increase transparency and participation when developing river basin management plans.. It also aims at creating the common basis, which will help to harmonise the public consultation tools and procedures in various river basins and regions.
The recommendations are addressed to the persons in charge of information, organisation of consultation and of public participation in frame of water management, in particular at the level of water region. Based on the experiences obtained thanks to the activities realised at the local level (pilot river basin, poviat), they constitute a complement of the programmes mentioned in the introduction.

The requirements dealing with the public participation are introduced in the article 14 of the Framework Water Directive that supposes three forms of the public participation;
access to the information
three stages of consultation in frame of the planning process
active participation of all the interested parties in all the aspects of WFD implementation.
Two first forms are mandatory whereas the active involvement of all the interested parties should be encouraged.

From the formal point of view WFD requires to organise three public consultations:
the first one, till the end of the year 2006, on the schedule and programme of works
the second one, till the end of the year 2007 on the main issues of the water management
the third one till the end of the year 2008 on the draft management plan.

The article 14 of the Water Framework Directive suggests to encourage the interested parties to the get actively involved in the overall process of the implementation of the Directive. However such involvement will not give any results if it is limited to the three stages procedure of information and public consultation mentioned in the article 14. The river basin management plan should be in a great part a synthesis and justification of all the choices and a quintessence of the results of the previous involvement of the public in the planning works.

II.8.2 Recommended approach for the public consultation

a Short characteristics of the approach

Information, consultation and active involvement are the issues that differ very much from the
Information, consultation and participation are issues very different from technical issues included in the water-framework directive. They are however very important as their success is in itself a condition of success of other technical aspects. These issues are tools to meet the objectives of the directive.

Water issues involve various types of actors and their involvement in the participation process is variable. Therefore work in common needs to be enhanced and the role of each one needs to be clearly defined. The directive incites to a co-construction of the water management strategy in the basin. Indeed, active participation of the interested parties makes it possible to identify wishes and local expertises and to favour a better local appropriation of the issues and objectives. A real partnership between competent authorities and parties involved from the beginning of the basin diagnosis (article 5 report and identification of the main issues) will facilitate the preparation of the water management plans and programmes of measures and, as a consequence, contribute to their success during implementation.
However, if interested parties are already well aware of water issues, water management is rather not well known by the general public. The need of transparency mentioned in the Water Framework Directive will lead to explain and to make people better understand choices adopted. This supposes to give an information understandable for non-initiated people, involving experts in technical issues and experts in communication. Generally speaking, the implementation of the directive leads to a new, much more interdisciplinary work methodology.
All competent authorities (Ministry of the Environment, KZGW, RZGW) need to be involved as well as their partners (territorial institutions, chambers of farmers, chambers of industries, associations, etc) and more generally all interested parties.
The most important evolution is probably public consultation which has never been organised on documents of water planning at scale of a large river basin.
It will be necessary to adopt objectives and pragmatic methodologies depending on publics, territories and issues : briefly, be flexible and evolve, keeping in mind transparency and credibility objectives.

b Forms of activities with specification and description of tasks

Form 1. Information

The **access to information** is the base of every form of public participation. According to the article 14 of the WFD, members States have to ensure that, for each river basin district, they publish and make available for comments to the public:
- a timetable and work programme,
- an interim overview of the main water management issues,
- a draft river basin management plans.

The article 14 also highlights that, on request, access has to be given to background documents and information used for the development of the draft river basin management plan. In other words, the Directive imposes only the obligation of giving an access to basic information but doesn't require its active diffusion. It should be however stressed that the **diffusion of the information** is one of the key conditions to ensure the success of a public consultation and active involvement of interested parties.

Four main questions need to be answered in order to determine the necessary works:
- Who should get information ?
- What information should be given ?
- How information should be provided ?
- Who has information ?

Who should get information ?

It is obvious that the WFD requires to involve the greatest number of European citizens and get an overall mass effect that will contribute to meeting WFD environmental objectives. For that reason, “the public” should be understood in a broad sense and information be aimed at this broad, general public. However, it is also clear that the general public is not a uniform mass of people but rather a mixing of different groups of people characterised by their age, socio-professional features and living place. Consequently, the impact of the information will be all the more important as this information is adapted to **people targeted.** The information should be therefore addressed to different groups of users and institutions that have an influence on the status of the aquatic environment. The form and the language of the information should be adapted to a particular target group.

What information should be given?

Generally speaking, public asks for more information on issues linked to health and environment, as people have progressively been more aware of the impact of some activities. Water is part of these preoccupations. However people often have a restricted idea of water issues, with concerns frequently expressed on drinking water supply but rather less interest in aquatic environment… **Consequently, information should first insist on basic notions related to water in the environment**, but also provide information claimed by the public on water treatment, water quality and economic issues (price of water, polluter pays principle for instance). One should take care of giving appropriate information on the main features of the river basin where people live in.

Water in the aquatic environment.
People often do not have any precise knowledge about links between aquatic environment and drinking water connections at home. They also generally do not know how waste water is treated and then rejected into the environment. They can not give precise definition of river basin or wetland.
Therefore, first information should focus on basic notions explained by simple drawings such as the cycle of water and the river basin.

Water uses

Most people know water through their own uses at home. They often want more information on:
- drinking water treatments and sewage water treatments
- quality,
- pollution of water,
- how can we save water, what practices to adopt,
- the present situation of water reserves,
- rates of water consumption,
- chemical composition of water,
- dangers that threat water future,
- the price of water, its justification,
- decisions and political decisions about water, …

Appropriate information should be given about all these subjects. Attention should be given to the formulation of the explanations. Technical terms should be avoided and replaced by simple words that everyone will be able to understand. Drawings can be particularly useful in presenting water networks and circuits of water from the environment to residential areas.

Additional information about water

Some people already have basic information on water and water management. For instance experts, local stakeholders, parties interested and involved in water issues may be interested in more detailed information on specific subjects related to water and aquatic environment. In such cases, specific information should be provided with more scientific information on water issues.

Description of the river basin

Inhabitants are often very interested in having specific information related to the place they live in.
For that purpose, information should be made available and give understandable inputs about :

- hydrology, geology, pedology data
- surface water and groundwater description
- protected areas with areas of high interest regarding biodiversity
- population distribution
- main water uses (industries, agriculture, households)
- Water related issues.

Information of the Water Framework Directive

Information should be as simple as possible, avoiding technical or specific terms linked to the WFD. People should understand the main objectives and the reasons why such a mechanism is in place. Examples linked to local issues can help people understand issues at stake. Information can be presented with a series of simple questions and answers. Tables, drawings, schemes may also help describe the overall process.

How information should be provided?

Several means of information can be used to disseminate information. They are often complementary. Therefore one should not focus on one mean only, but rather try to take advantage of the specificity of different options.
Public generally considers TV as the most appropriate media to receive information. National campaigns of information with TV spots contribute to making citizens be more aware of water issues. The choice of the medium depends however in direct way on the available financial resources.
People are also very interested in receiving documentation at home by postal mail. For instance, information can be attached to water invoices and consist in a guide of good practices (how water can be saved ? examples of daily simple action).
Radio, regional and national written press, town magazines are effective media to diffuse information.
Documents can also be distributed with the help of local partners such as mayors who can put documents at disposal of inhabitants in town halls.
Internet is an interesting vehicle for information but still a lot of people do not benefit from individual web connection at home. However, such a means should not be ignored as the rate of people equipped with Internet is progressively rising.
Communication of information at school is very important. Events can be organised with children such as drawing competitions related to water and aquatic environment or visits of places linked to water (water treatment plants, waste collecting along water courses,…). Such punctual action may make children be more aware of water sensitivity and the importance of preserving water resources. Water can also be directly introduced in school programmes. In this case, all children are ensured to have knowledge on water.
Finally, the organisation of local public meetings can be a good opportunity to provide inhabitants with information and answer to questions linked to local issues. The launching of local events can help increase the interest of citizens in water : original local initiatives with exhibitions, play on the theme of water, round table,…

Who has information?

Most people consider that **municipalities** and **institutes specialised in water** are best placed to disseminate information about water at district level. Therefore, credibility of the information is based on **technical competencies** and **local proximity**. Associations of environment protection and firms in charge of distributing and invoicing drinking water may be good partners to diffuse information. On the contrary the government and European Union are often considered as distant authorities and not able to give information related to local issues and problems.

Form 2.Public consultation

Organisation of consultation
The public consultation is the first level of an effective public participation. The public is given an access to the particular stages of the elaboration of the programme of measures and encouraged to formulate remarks and proposals. The participation in this process is not tantamount to the participation in the decision making process and the specialists do not have any formal obligation to take into account the expressed opinions.
We can distinguish two kinds of public consultation: written and oral consultation. Accordingly to the article 14, paragraph 1, that says: "the Members States (…) publish and make available for comments to the public, including users", the written consultation is the minimal requirement. The oral consultation constitutes a form of a more active involvement where the interested parties can have a dialogue or discussion with the competent authorities.
According to Article 14 consultation concerns the following requirements and timetable for consultation (with a repetitive cycle of 6 years for future river basin management plans):

December 2006 (at the latest)	Publication and making available for comments of the document: „ Time table and work programme for the production of the plan, including a statement of the consultation measures to be taken;",
December 2007 (at the latest)	Publication and making available for comments of the document: Interim overview of the significant water management issues identified in the river basin
December 2008 (at the latest)	Publication and making available for comments of the document: Draft copies of the river basin management plan available
December 2009	Start implementation of the plan.

The consultation consists therefore in publishing the documents and then in making them available for comments during 6 months for the public which is a wider range than stakeholders only.

Before proceeding to the organisation of the public consultation, we should answer the following questions:

- Why are we organising the consultation?
- When public should be consulted?
- What documents are to be consulted?
- Who should be consulted?
- How public should be consulted?

Why we organise the consultation?

The consultation with the inhabitants and the local interested parties is organised in order to make use of their knowledge, observations, experiences and suggestions. The purpose of the public consultation is to obtain some information or opinions of all those who are concerned to search solutions that – in the opinion of the inhabitants, water users and other representatives of the interested parties – should receive a special attention.

When the consultation should take place?

When choosing the date of the consultation, we should first take into consideration the WFD deadlines. It is obvious that consultation will be all the more visible as dates are the same all over the country. Therefore, dates should be decided at national level.

Which form of documents should be consulted?

The example presented below concerns the consultation on the main water management issues (second public consultation to be organised).
The public needs a clear, simple and concise document that explains :

- The objectives of the Water Framework Directive
- What it is about (titles of important issues, explanation for each issues)
- Who consults the public? (regional offices for water management, national authorities of water management…
- Modalities of the consultation: how, when, where? 1
- 2 pages per issue to explain the problems and the action priorities
- Map of the basin or district, summary of the issues, logos of the partners – last page

The consultation documents include the summary of the document submitted for consultation and a questionnaire of consultation.

Who should be consulted?

Consultations are aimed at the general public. The consultation process should not be restricted to the institutions directly interested in the water management but should be open to all citizens.
A typology of possible publics concerned by the consultation:

- Professionals – public and private sector organisations, professional voluntary groups and professional NGOs (social, economic and environmental). This also includes associations for the protection of the environment, business, industry….
- Authorities, elected people – governmental and territorial administration
- Local Groups- non-professional organised entities operating at a local level. It usefully breaks down into:
  - Communities centred on place – attachment centred on place, which includes groups like residents associations and local councils
  - Communities centred on interest – e.g. farmers' groups, fishermen, birdwatchers.
  - Individual citizens, farmers and companies representing themselves. Key individual landowners for example or local individual residents.

How should the public be consulted?
Different tools may be used in the consultation. Their choice will depend first of all on the purpose of the consultation and on the character of the group invited to take part in it. To help the organiser to choice the best tool(s) for the consultation, here are listed the main tools and a notation of their effectiveness.

Table 33: various tools for participation

Tools	Effectiveness (French experience)
To collect quantitative opinion, you can use a **questionnaire**.	
If sent at home + media campaign	Very high
If attached to local magazine sent at home + media campaign	Very high
If fulfilled during a meeting	high
If uploaded on a specific website	high (the effectiveness will be probably very high in future)
If disseminated with associations and partnerships	high (but only satisfactory or low if local leaders are not correctly involved)
If disseminated in partnerships with municipalities (with designation of a local leader)	high (but only satisfactory or low if local leaders are not correctly involved)
If made available in public places where the public is not used to going frequently	Low

If sent at home without document of explanation and without media campaign	Low
Involvement of schools	High
To collect qualitative information but with few persons you can organise **the public debate**	High
Organise a media campaign to inform the public about the consultation	high if the message delivered is well focused on consultation

Form 3. Active participation of the interested parties

We can speak of an active involvement when the interested parties participate in the planning process, discuss the problems and propose the solutions. The essential element is the possibility of influencing the process by the participants. It isn't of course tantamount to the responsibility for the water management.

Existing committees

The law on water of 2001 has created an overall water management committee for each RZGW scope area. The water management committee is an advisory forum, which has to formulate comments on water management in the hydrographical area concerned.

Enlarging the scope of the existing structures

Interested parties generally go beyond the sole members of the water management committee.
A stakeholder analysis allows to identify all the parties that need to be involved in the planning process [In this framework, questions such as "what are the major water issues in the basin?", "where are the main water conflicts?", "who are the main stakeholders in the basin?" should be addressed.]

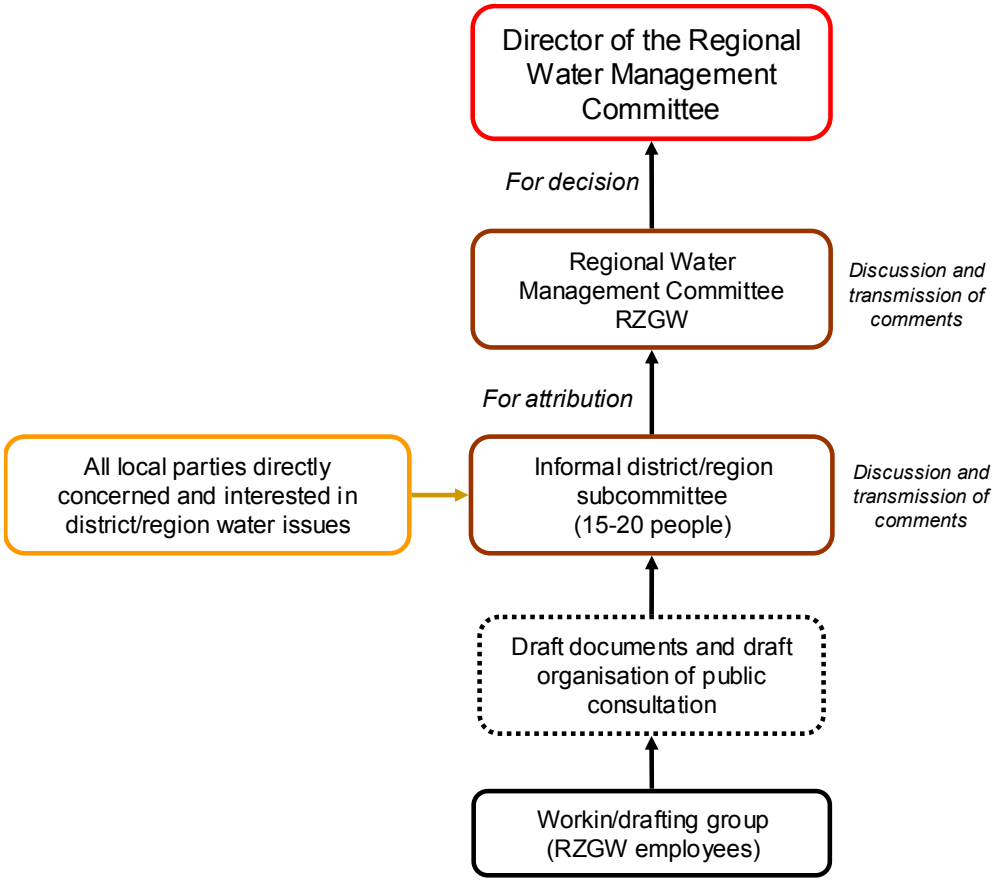
Creating an informal subcommittee

Active involvement of the interested parties will be possible only if an informal subcommittee is set-up and gathers all parties identified thanks to the stakeholder analysis.
This subcommittee would not have any decisional power.
It should be considered as an informal subcommittee of the water management committee set-up by the law on water.
The newly created subcommittee should gather some of the members of the water management committees and additional interested parties.
It should include:

- One third of representatives of administrations and institutions
- One third of representatives of associations of water users, association of protection of environment
- One third of representatives of local authorities (elected people).

It is obvious that, without such a subcommittee, risk is high that parties interested in district/region water issues will do not feel at all involved in the process and could later reject its results.

Illustration 21: Place of informal committee in the existing structures



The subcommittee will have to:

- Participate in:
  - the determination of the main issues of the water management ,
  - elaboration of the programme of measures and the water management plan ,
- Consult:
  - the results of WFD article 5 reports (pressures and impacts, economic analysis, definition of baseline scenario, risk assessment analysis, provisional identification of HMWB)
  - the documents submitted to the consultation,
- Be informed:
  - of WFD objectives and the implementing process in the district/region
  - of water management organisation in the district/region
- Be involved in the organisation of the public consultation,
- Take part in a field visit in order to introduce some of the key water management issues,

Key points and final reports of the meetings will be sent to the water management committee. Committee should take into account these results when addressing WFD issues.

The first meeting of the committee shall aim to:

- explain the context of the district/region
- explain the organisation of the subcommittee
- endorse further steps proposed (work programme, next public consultation)
- explain WFD objectives and main deadlines
- explain next steps

Next meetings should aim to involve members in WFD implementation through their participation in the elaboration of the documents, the consultation of the draft documents, …

Interest of the subcommittee is to go beyond sole information and consultation and ensure a real involvement.

2.8.3. Activities supporting the consultation

The priority is the quick and efficient information on the organisation of the planned consultation. This type of communication should be clearly distinguished from action of ecological awareness of the public and information about water issues. Indeed, this last action requires much more permanent communication in the middle to long-term.

Moreover, if the communication about the consultation event is mixed with a lot of information about water issues, this information can influence the answers of the public to the questionnaire

Therefore the p**ublic awareness and public information** will be logically continuous with the help of local action, longer messages, local media sometimes punctually reinforced by national media support (for instance in case of water shortage or flood events). But, informing and educating the public during the consultation creates confusion and dilutes the message. People may be happy to have information about water issues but, due to the large number of information provided, they may not understand, heard or keep in mind that a consultation is in place.

Communication about the consultation needs to be “strong” and independent of public awareness and information : a short and percussive message, national and local media advertising (TV, radio, press, posters) in a short period. A concentration is preferred to a spreading out during a long period. This campaign is made for immediate results.

Messages need to be homogeneous all over the country with the objective to inform the public about the existence of the consultation and to invite him to take part in it.

*Communication will gain in clarity and strength if it is symbolised by **a logo*** set-up at national level and used in all national, district, regional and local tools and events of communication. Also different kind of gadgets evoking the consultation (cups, t-shirts, pens,…) may be helpful.
Attention will need to be paid on the clarity of the logo and messages used during the communication about the consultation, as many public and private actors relate to water issues. The communication about the consultation should be clearly assigned to the administrations in charge of organising it (Ministry of the Environment, KZGW , RZGW) and not to other actors not at all involved in the organisational process.

Co-operation with media

All citizens should get a minimum information about the organisation and dates of the public consultations. For that purpose, an effective mean is probably to edit a legal advertisement in the main national newspapers and at least one regional newspaper per region. Involve journalists must be a priority as they are one of the main relays towards the broad public. If newspapers do not present at all the consultation process, risk is high that most people are not aware of it.
Press conferences allow to providing specific information about the process and ensure that journalists have the right information. Written documents may be distributed at these occasions and encourage journalists relay the information.

In addition to press conferences, press relations may not be neglected as relations with journalists are being constructed in the middle, long-term. At the same occasion, confidence between administrations in charge of organising the consultation and press may be reinforced thanks to the event.

Action towards schools

Involve children constitutes a key priority, as they are usually open to new issues and can easily reproduce good practices. Exhibitions, plays, visits of places related to water and aquatic environment may contribute to this awareness.

Children are also used to transmitting information to their parents and can make them be aware of water issues and good practices.

Where public can find documents of consultation?

Public consultation means that citizens are invited to formulate comments on draft documents and issues presented in the documents of consultation. Therefore, *the places where documents of consultation will be put at disposal of the public requires specific attention*

Dissemination of the consultation documents in most frequented public places

Public places are town halls, churches, voïvodies, libraries, post offices, railway stations, schools, supermarkets.

However, one should not ignore that only a limited number of people take part in consultation in these public places (most of them don't know that it is possible to obtain the consultation materials in the public places).

Sending the documents home

Previous public consultations organised in other member States have shown that most people are very much in favour of receiving documents of consultation at home by postal mail. In this case, the format and aspect of the documents should be clearly distinguishable from advertising. Otherwise, inhabitants could mistake them and be tempted to throw the documents of consultation away.

Use of new technologies

Internet can also be a useful tool to disseminate the documents of consultation. It is true that the number of people having a computer at home and being connected to Internet is still rather low. But, taking into account present tendencies, such vehicle should not be neglected at all, as it could become one of the main means of information in the next ten to twenty years.

Use of local magazines

In addition to their availability in public places, documents of consultation can be attached to local magazines (town, local or regional council magazines) that are sent by postal mail to all inhabitants. This possibility can be as efficient as sending independent documents of consultation at home.

Distribution of the consultation documents to the territorial activities – partnership

RZGWs as the authorities in charge of organising consultation should focus part of their communication on territorial authorities as they are precious partners at local or municipality scale. Inhabitants are used to visiting town halls for administrative reasons and are often attentive to information coming from their municipality.

Distribution of the documents to other territorial institutions, natural parks, actors linked to water issues – partnership

It is obvious that all local actors open to water issues will need to be involved right from the beginning in the process. Natural parks, associations of environment protection, associations of water users, chambers of farmers, chambers of industries are used to dealing with environment issues and are often ready to relay information to their members and even more largely.

Volunteers, leaders, exhibitions …

Elaboration of the questionnaire

The questionnaire should not be too complicated and too long. Otherwise the risk is high that people do not fill it up or only partly, just because they find the process annoying or have the feeling that they waste time.

Questions should refer as much as possible to local issues, specificities, sensitivities so that people feel concerned and decide to involve themselves in the process. At the end of the questionnaire, questions should aim at better knowing people who have accepted to fill it up.

A general framework of the questionnaire has to be drafted by each district to facilitate public participation and the analysis of comments in every RZGW. It is particularly essential that the questionnaire does not exceed 4 pages (A 4 dimensions) and that following conditions are respected :

- *Page 1* needs to introduce the role of the regional water management office, as the organiser and manager of the public consultation. It should explain the content, objectives and following steps of the consultation. It should also give the different possible means of participating in the consultation : fill the questionnaire in consultation places or on a dedicated website, send a postal or electronic mail to RZGW. It should also announce the next planned consultation.
- *Pages 2 and 3* should be devoted to the questions described in the document submitted to the consultation (for examples main issues of the water management). Each question needs a short preliminary explanation. One should be able to give answers in a simple way thanks to an evaluation scale whenever necessary. Place for free comments may be arranged at the bottom of page 3, in order to make it possible for consulted people to indicate issues or questions they consider as important and are not mentioned in the questionnaire. Otherwise, such place for free comments should be planned on internet or by mail.
- *Page 4* should contain some questions that will allow to get some information about people answering the questionnaire.

The questionnaire can be disseminated in the same way as the consultation documents (see point 4.9.3.1). the analysis of the questionnaire is described in the point 4.9.5 and the analysis of results done with the use of the consultation questionnaire – in the point 4.9.6.

2.8.4. Public debate

The present part presents the strategy of organisation of a public debate proposed by the French experts in frame of the Upper Vistula pilot project activities in order to encourage the local community to take part in the consultation meetings. The issue is to involve the local stakeholders in the process of the meeting's implementation, to decentralise and to operate an active involvement of the local public. This strategy is as important as the meeting itself.

2.8.4.1. Preparation of the public debate

First step - define three main elements:

- Definition of the objectives of the local meeting.
- Consulting the public about..... (here define the subject)
- Collection of the opinion of the local public to complete the questions no identified by the RZGW on their river basin;
- Definition of the material to be submitted to the local meeting: ex. the main questions identified by the RZGW
- Elaboration of the agenda of a local meeting (see description below): duration(around 4h00), content (a part of information, a part of debate…).

The second step - make a scheme of the participative meeting process witch contents the number and the places of the meetings, and the dedicated budget.

The number of meetings depends on the budget of the organiser, of the administrative organisation in water matter, it is one of the first questions to know because it has an impact on the choice of the places. The organiser must decide what is his reference area (the country, the river basin, the local level…).

The organiser has two possibilities:

- to collect the opinion of a great numbers of people in the frame of a great numbers of meetings (for example if 50-80 people come in 100 meetings, you could have the opinion of 5000-8000 people and you have to analyse these huge quantity of information !)
- to organise a few meetings in each representative area of the specificities of the river basins (for example if 50-80 people come in 10 meetings you can obtain the opinions of around 500-800- people and it is easier to take in account their opinion)

The administration responsible for the realisation of the public consultation will decide how many consultation meetings will be organised. It should be however stressed that the public debates are a very important instrument of the public consultation and it wouldn't recommended to renounce of it. The public debates will play a special role on the territories where some specific, particularly important problems related with the water management appear. We can suppose that the reparation programmes of measures elaborated for such areas can meet a great resistance of various social groups. The organisation of public debates on such areas can prove inevitable in order to minimise the expected conflicts.

It is necessary, as soon as possible, to know **where** the meetings will be organised to reserve the rooms needed, to inform the local authorities, to make out the list of the participants. The choice of the place of the meeting depends of:

- The local elected people interested in hosting the meeting,
- The rooms available: number and size - for 50 people you must have one room around 100-150 m2 or 1 large room for 50 people and 4 little rooms of 15m2 for the debate in group. For example, during the holidays or on Saturdays, it could be nice to use a school equipment with many rooms,
- The place must be easy to reach for the participants (roads…)

Early in the organisation of the meeting, the list of the participants must be done. The **invitation has to be send at the later time 15 days before** the meeting.

Organisation of the meeting

- **Choice of a technique to moderate** the meeting, with several moderators or only one general moderator
- **Prepare the logistic** and material (paperboard, paper, video projector, permanent markers with large point, make sure it will write!, Patafix and adhesive tape to fix the papers on the walls), choice a large room around 300m^2 for 8 groups (10-15 people/group). It is not necessary to use table for the group. Above are presented three possibilities to organise the debate in little groups.
- **Sign-posts** to find the rooms (and the toilets…) inside the building if several rooms are used for the meeting to guide the participants
- **Human resource**: 1 moderator per group + a general moderator or only one general moderator, 1 assistant per group if possible (he-she notes all the discussion and the main points to leave a trace of the discussion). The moderator has to follow a short training to know how lead the group) and how to use the debate's guide
- **Convocation to the meeting**: this document presents the essential information for the participants. Ask a confirmation of their participation in the convocation (or a best organisation). Recall the participants (by phone 2 or 3 days before) to remind them the meeting

Invitation content		
The participants ask	Information to give	Comment

WHEN is the meeting	Date and hours	It is the minimum to give
WHERE is the meeting	Exact address and clear (with a map possibly)	
DURATION of the meeting	How many time	The participants can manage their time
WHY it is important to participate	Objectives	Information and motivation of the participants
WHO will be participate	List of the participants	To complete the information

Before the meeting, prepare all documents you will need and an aide-memoire (a memo) to be at ease during the animation:

- *Memo* with the main questions to ask to the participants, the timing for each exercise, the objectives and how the results of the debate will be used,
- *Logistic documents*: a sheet where participants have to sign (name, surname, address, E-mail), a report-form to note the main ideas formulated by the group, an anonymous assessment's questionnaire of the meeting
- *Documents for submission* (the list of the main questions with 3 lines of explanation per each question)
- *Other documents* to be distributed at the end of the meeting (leaflet of the main questions, booklet…)
- *Material*: tables to put the documents that participants can take in the end of the meeting and a table to let the assessment's questionnaire; water and glasses for each group

The report from the debate in group should be composed of three parties*:*
Part 1: Brainstorming' results about the state of water
List of ideas and class into family → main ideas to reach a good state of water in 2015
Part 2: Opinion of the mains questions and main conclusions of the participants of the group
*Part 3:*Main questions asked by the participants (don't give the answers)

During the public debate

When **opening the meeting** one should remind and the objectives of the meeting and precise:

- Duration: announce its duration. It is essential to respect the fixed temporal framework.
- Agenda: the agenda has to be clear for the participants. They have to know how the meeting is organised with the different steps and the timing, what they have to product…

Example of meeting' agenda of a public debate

- Part 1 (max 45mn): General presentation - Introduction, give the objectives of the meeting, give the planning of the meeting, presentation of the WFD and public participation, presentation of the document submitted to the consultation → with slides
- Part 2 (2h00): Debate (in group or not) → with a guide to lead the discussion (see table 2 under)
- Part 3 (15mn): Collective restitution of the debates
- Part 4 (15mn): Questions of the participants and answers from the experts; conclusions
- Part 5 (30mn-1h00): Buffet

Total duration: 4h-4h30

A visual presentation which sums up the organisation of the meeting and the timing per step should be prepared/

When **leading the meeting** the following principles should be respected:

- Manage the different points of view of the participants, without stock up for yourself and don't justify.
- Don't use the group to stand over the one who formulates an opposition; but try to know what are the origins of the opposition formulated (in asking "why did you say that…" and/or "someone want to add something" and/or "give some concrete examples please to illustrate what you say…")
- Don't try to persuade
- Use the paperboard to write the opinions, use mental image to help the participants to speak
- Maintain the attention, encourage the participation and interactivity

When concluding the meeting one should:

- Make restitution of what have been produced during the debate in group (results of the meeting)
- Ask the agreement of the participants of the summary and thank for their participation
- Tell to the participants how and when they will receive the report of the meeting.
- Evaluate the meeting: Give a questionnaire for each participant to evaluate the meeting and to know if they want to participate one more time.

c Principle for Animation - Role, functions and main qualities of the moderator

3 functions of the moderator

- Production (to product results, solutions, decision, proposition…),
- Management (to encourage the expressiveness, to organise and to set in order the discussion),
- Management of the people (the relations between the people…)

11 qualities of the moderator:

- To be active (to inject enthusiasm in the group),
- To give open the floor: to make each participants speaking and to collect the opinions of all
- To hold the attention of the participants
- To synthesise regularly during the discussion. The synthesis has to reflect what is saying
- To specify clearly the *meeting objectives*: in the invitation letter, before the meeting, in the beginning of the meeting
- To refocus on the subject
- To manage time: Recall the time for each point to be discussed, respect the time, conclude the meeting at time
- To give heed in what is occurring in the group
- To give the participants ground in minimising the interventions of the moderator: don't give your opinion; you are not a participant, you are the moderator;
- To conclude the meeting: make an abstract of the main points of the discussion, thank the participants for their participation (it is an encouragement to participate and to contribute to the next meetings); Tell to the participants how and when they will have the report of the meeting and when will organise the next meeting (if you know this information)
- To use a visual aid: the visual aid makes easier the understanding for the group of participants

The animator should note the guidelines of work, the mains sentences, the abstracts, main questions, schemes, ideas, conclusions and decisions.

When animating the local meeting one can use different techniques encouraging the participants to get involved in the discussion.

2.8.5. Techniques to animate the public debate

The participation forms presented here are the ones for which the techniques are easy to use and at the same the effective.

Brainstorming

It is used at the beginning of the meeting to make clear the terms of the discussion. The needed material : paperboard / permanent marker with large point to be read by the participants
This time is a warming up to encourage the participant to speak. You have to use this technique to make clear the subject of the discussion. The participants have to speak freely about what do mean for them the words of the discussion. Like that they have a common language and it to precise what is exactly the subject of the discussion. During the brainstorming no comments, censure and critics are allowed.
The duration of this exercise is around:

- 5-10mn for a simple warming-up
- 30mn if you want to use the production for the following discussion.
-

To conclude the warming-up, the moderator tries to synthesise/summarise the ideas and ask for the agreement of the group. He-she doesn't give an interpretation of the ideas.

The moderator listens, gives the words ; the reporter or the moderator notes all the ideas given by the participants on the paper board which stays visible during all the workshop. The reporter notes on a fact sheet Report the synthesis and comments. Important: the moderator is the chief of the workshop.

"Citizen Circle"
The citizen circle has for objective to gather together around 80 people, by group of around 10 people (max 15), with half interested parties (like members of water management councils) and people from the broad public. Each group can have a moderator or not and a secretariat.
This technique is used:
- To make the public speaking and not only to inform them
- To improve the knowledge of the public in water domain
- To ask to the public its perception of the state of the water
- To have a large diversity of participants

Debate in groups

The same questions should be asked in all the groups. **Be careful** when you beg the question. It has to open the discussion (and not to close it). Use the words like "How…", "What is your opinion…", "What is for you….", "To your opinion what are…", "What can we do for…"

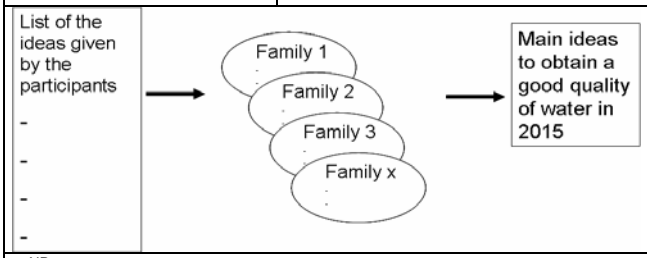
Rule: No censure, discussion with facts, real life experience, emotional aspects.
Two organisations can be made depending of the number of disposable moderators:

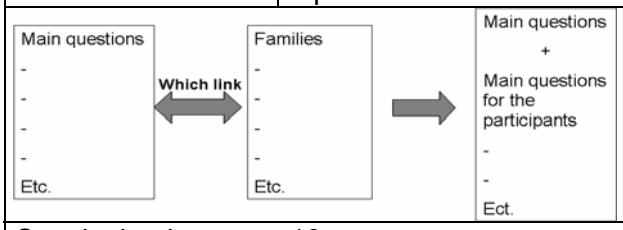
- with **"multiple moderators" :** there is one moderator per group of 10-15 people and one general moderator for all the meeting;
- with one **"general moderator"** : there is no moderator per group of 10-15 people, but only one moderator for all the participants (max 80 participants) and an animator per group chosen by the participants.

Guidelines to lead the debate (cf. table 34)

- Introduction: 5mn
- Moderator has to remind the objectives of the meeting and of the debate in group, explain the instructions: no censure, very essential that each participant can speak, respect the words of each other, don't speak in the same time, to share the words between all the members of the group, remind the hour of the end, go quickly round the table to present each participant, ask the participants to fill full a sign list
- Reminder of the quality of the moderator: To listen the participants / To give the word at each participant / To manage the discussion (if people speak too much or if they don't speak) / Reformulation / Support / Investigations ("why do you say that…" etc.) / No judgement.

Table 34 : Guideline for the debate:

Objective	To help the debate…
1ST PART: Debate around of state of water → 45-60mn	
To know what is the state of water for the participants 30mn	You have seen some presentations concerning the problems of water in the river basin Upper Vistula. **Moderator**: What is for you the state of the water in the Upper Vistula? (What you know from your experience and/or what you have eared through the presentations) **Moderator**: Brainstorming, write all the ideas on the paperboard ***Assistant*** : notes on the report the main opinions and discussion
Class into family the ideas 10mn	We are going to try to regroup the ideas in families. What are the ideas which are similar or have a link. Give a title for each family The moderator: Take a new sheet from the paperboard and organise the family; note the titles
Conclude and make a link with the 2nd part of the meeting 5mn	**Moderator**: What are the 2 or 3 main ideas to obtain a good quality of water in 2015. Why? Write the 2 or 3 ideas on the paperboard.
	
2ND PART: Debate around the main questions of the river basin (district) → 45-60mn	
Introduce the mains questions 15mn	Distribution of the list of the main questions. Give 5-10mn for the participants to read them What is your opinion? Can you organise into a hierarchy the questions? **Moderator**: Help the participants, they can give 3 groups: the 3 main important

Objective	To help the debate…
	questions, 3 less important questions and the others. Note on the paperboard the classification
Examine the main questions and collect the opinion of the participants 30mn	**Moderator**: What are the links between the list of the mains questions and the families that you have made during the 1st part of the debate? Comment and debate. What the link, the differences… why… etc. Ask to the participant to classify the new list of mains questions. ***Assistant***: write for each question the comments of the participants on the report
	
Conclusion in group: 10mn	
Synthesise the debate with the agreement of the group 10mn	Summarise what are the products that the group wants to give to the others groups and to the decision-maker. Try to give a rise on what have gathered and separated the group. Try to show that the exchanges have been rich Moderator: you have to expose the synthesis in 3 minutes! so don't make a literal and linear summary **Assistant**: note the synthesis in the report
Thanks and Assessment	**Moderator**: Thank the participant for the quality of the exchanges Ask to the participants in the matter of water: "On what and how would you like to participate the next time?" Give the assessment questionnaire: they have to let it before leaving the meeting.

2.8.5.4. Debate in plenary session

To minimise the budget of the public debate, it is interesting to organise a meeting without groups, with all the participants (but the number does not exceed 30 people). The principles, rules and technique of animation are the same as the debate in groups. There is ONE moderator in front of 30-35 participants. She-He has to write all the ideas of the public in a paperboard. The duration could be around 2h00 including:
Part1 (15-20mn): Presentation of the documents of consultation → role of the expert
Part2 (1h30): Three questions (20mn/questions) → role of the moderator
Part3 (15mn): Expert answers to the questions of the participants

d Organise a water event

Organisation of a water event can have different dimensions (as concerns the scale of the event itself, the budget, the number of manifestations, of the involved persons and partners. In this document two types of big events allowing to reach a few hundred of people at one time, during one or a couple of days, will be presented:

- Water forum
- Water festival

Water forum

The forum (or conference, meeting...) is an important moment of education /information, exchange of information, of increasing the awareness in terms of the water related issues at a local level, such as poviat or basin (territory of RZGW). The organiser can gather the regional water actors in order to raise their questions, discuss their projects, their obstacles as well as the means they have to lift them and to draft the perspectives of work together.
The forum lasts a couple of days (1,5 to 2 days) during which between 200-250 and 500 participants can be gathered, depending on the engaged means and the dimension of the concerned territory.
The programme of such days can deal with the following aspects:
- During the plenary session: presentation of the situation
- Introduce the axes of reflection and the regional problems that will be covered during these days:all the subjects related to the WFD and submitted or not to the public consultation.
- Present the regional water actors: Who does what? (national, basin and local administration, associations for the protection of nature, professionals from the water domain, professionals using a great quantity of water …)
- Present the water management instruments available in the country and in the region
- Talk over the activities accomplished and being realised by the administration and other principal water actors in the region …
- The exchange of ideas workshop: to identify the difficulties met difficulties met by various regional actors in frame of the workshop of "participative" debate (see the description of techniques of leading a public meeting.)
- The exchange of experiences workshop: to exchange the information and give the elements of responses. The purpose is to gather the regional actors to talk – in frame of a workshop - about their water related experiences and give some elements of response to the questions asked by the participants during the exchange of ideas workshop.
– Definition of an actions' plan
- Restitution of the workshops at the plenary session: this step allows to show the participants that we have heard their messages and that they are transmitted – in front of all

– to the decision-makers - 1 to 3 round tables, each of them composed of 3 persons, the round table allows to ask a question to a speaker in order to open different perspectives of work, of assistance, of articulation between the principal decision-makers … each of them shouldn't last longer than 20 min. There should be from 1 to maximum 3 round tables because, as they take place at the end of the session, the capacity of listening of the participants is very reduced.

The important thing is the choice of speakers. It is very important to encourage to speak the local actors and to give them a role during the forum: president of the session, reporters, animators, witnesses, experts…. Each category of local actors should have the possibility to play at least one of such roles: elected people, representatives of organisations, fishermen, farmers, industry's representatives can be presidents of sessions, reporters; scientists and representatives of the administration can play the role of experts … In such case every institution is placed on the position of "responsible" for the workshop and therefore have a constructive role instead of being in the opposition only. Depending on the topics discussed it is possible to plan the participation of persons from other water regions or countries, who could share their experiences that may prove to be helpful for the local actors in the research of answer to their problems.

The organisation of the forum at the level of water region takes at minimum about 6 months of preparation which corresponds to 30 to 50 full working days (if a pedagogical dossier is realised, see below).

Example of distribution of work for the organisation of 1,5 day forum:

- 15 days to prepare the parameters of the forum (see « Conception »)
- 7 days to choose and contact the speakers
- 2 days per person for the animation of the workshops during the forum
- 7 days for the redaction of the acts
- 25 days for the redaction of the pedagogical dossier

The costs of the rental of rooms, of one treat (coffee, croissants, fruit juices) per day, of a buffet should be planned in the budget.
The organisation of the forum passes through the following stages:

(a) Conception of the forum :
Define the objectives, the expected results, the date, the place (find a place where 200 to 500 people can be gathered, with small rooms for the workshops), target groups (the participants), determine the subjects of the workshops and the form of the reports from the debates.

The organiser has to define the means that will be necessary to organise the forum:

- Technical means: rooms, paper and electronic supports, documents to be presented, invitations to be sent at latest 3 weeks earlier, evaluation form
- Human resources: speakers, depending on the determined subjects, define the content of their intervention), the general animator of the forum, the animators of the workshops, a general reporter, the workshops' reporters, the personalities (opening and closure of the forum, presidency of the workshops …)

(b) Animation :

Two types of animation can be used : *simple animation* (presentation, discussion, exchanges) with an animator who plays the role of a moderator and gives the voice to the participants ; this kind of animation can be used within the exchange of experiences workshop. *The participative animation* for the exchange of ideas workshop (see part A of the present document).

The task of the organisers is to determine the potential speakers, to define with them the details of their intervention (subject, duration), to identify the people who will be secretaries of the group responsible for the realisation of a report from the discussion.

(c) Acts: necessary
The organisers can elaborate the forum's acts to keep a "trace" of the debates. Such acts include:

- Resume of the forum (context, principal objectives, number of participants and their origin, proceeding and main stages of the manifestation, principal ideas that emerged during these days, lessons)
- The programme of the forum
- A synthesis of the speakers' contributions
- Reports from the workshops: some typical forms can be used in order to get homogenous results
- Perspectives for the future (conclusions of the round tables)
- A press revue

The acts can be addressed to all the communes/powiats of the basin or vovoidship, to all the institutional actors, to the participants (about 2000 copies)…

Water festival

Its objective is quite different from the one of the water forum. With a water festival, we can reach a broad public. The festival is an occasion to discover the territory (country, region, basin) through the water related subjects. The festival covers many communes, each of them can propose one or several water related manifestations. The organiser prepares a common programme for all these manifestations and communicates it to the broad public.

Duration and content
The festival lasts several days (3 days to 1 month in the summer period and in a tourist region) during which all the event are open and free of charge for the broad public. The majority of the manifestations take place in the open air or in an interior, but without tickets or reservations ; these are:

- concerts,
- expositions on water,
- conferences, and mini-conferences in the Cafés,
- thematical spaces (weather, energy, wastewater treatment, spas, environmental education…),
- open door (spas, breweries, mills, dams, wastewater treatment plants …),
- street spectacles, games and water activities, navigation,
- discovery of Water and the Natural Environment with the guides-specialists…

Despite this programme for the broad public, some specific educational activities can be conducted for schools or in frame of the Water University

Organisation : one year earlier

The organiser has to play the role of **director** and it is very important that each party is responsible for the realisation of its manifestation from the beginning to the end.
The missions of the organiser:

- Define a territory (RZGW, Vovoïdship…)
- Define the dates (summer period …)
- Ask for contribution of the institutions from the concerned territory in order to identify those that are eager to organise a water related event during this period (communes, associations, etc.). Every institution is responsible for the organisation of its manifestation (reservation of rooms or other places, organisation of the open door ….).
- Lean on the local actors (ask for support), especially for the open door days
- Fix the subjects of the conferences et search the speakers or inversely, ask for contribution the universities, the scientists, the water administrators, the water distributors … who would want to share their knowledge during the festival,
- Inform by the press the artists that would like to expose their water related works of art (paintings, sculptures, spectacles, photo, texts,…)
- Organise a campaign of information and communication (posters, leaflets with the programme, written press and, if possible, radio and TV, relay-partners in the communes, internet sites …) addressed to the broad public in order to inform the people about the water

II.8.3 Analysis and evaluation of the consultation process

a Report on the results of consultation

The report is an effect of the consultation process. It can be entitled “Opinions expressed by the public – key points” and should contain:
a level of interest of the public for the consulted problems,
a level of social acceptation for the main issues identified by RZGW and informal committee as well as for the proposals of solutions,
social suggestions.

b Evaluation of the consultation process

The following criteria are recommended to be taken into account within the evaluation of the public consultation.
Quantitative criteria concerning:

The meetings

Number of invitations sent per meeting,
Number of participants per meeting,
Cost : cost per category of action, total cost, cost per participant
- Preparation : number of days spent (days spent in preparatory meetings, to look for a place for the meeting, to prepare invitations, send different mails, organise the welcome, prepare listing, participant list, prepare power-point presentations…), day cost (of the staff), cost to rent meeting rooms
- Drafting of documents linked to the meeting (document submitted to consultation, brochures of information, glossary, questionnaire of evaluation of the meeting…) : number of days, cost of reproduction of the documents (publication)

- Sending : cost related to the sending of the documents and invitations
- Implementation : participation of animators in equivalent day, cost of the breaks (buffets, coffee breaks,...)
- Deliveries : number of days spent to analyse the results of the debates, number of days spent to analyse the questionnaires of evaluation of the meeting, number of days spent to prepare a final document (minutes) sent with a specific mail to all participants, cost of reproduction of the minutes, cost related to the sending and dissemination of the minutes.

The questionnaires

Number of questionnaires edited
Number of questionnaires disseminated
Number of questionnaires sent at home
Number of questionnaires sent back, proportion of questionnaires filled-up on Internet
Number of questionnaires correctly filled-up
Cost : indicate the cost per type of action, the overall cost, the cost per edited questionnaire, the cost per individual touched (per questionnaire sent back)

- Preparation : number of days spent (days spent in preparatory meetings, testing the questionnaire with a sample of people not familiar with water issues, day cost (of the staff),
- Questionnaire drafting : number of days, cost of the reproduction (edition)
- Dissemination of the questionnaire : number of days spent by the leader or other partner, day cost of the leader, cost of the sending at home…
- Synthesis : number of days spent to analyse the results of questionnaires, number of days spent to prepare a document of synthesis, day cost, cost of reproduction of the synthesis

The brochures or any other document (in addition to the questionnaire and to documents specific to the public debate)

Number of brochures/documents drafted
Number of brochures/documents sent
Cost : indicate the cost per type of action, the total cost, the cost per brochure/edited document

- Preparation : number of days spent (days spent in meetings, drafting, refining), day cost (of the staff),
- Drafting of the brochure/document : number of days, cost of the reproduction (edition)
- Dissemination of the brochure/document : cost of the sending...

Media

Number of press articles
Number per type of media involved : newspapers, TV, radio, local newspapers (municipalities), press conferences
Promotion of the consultation : cost of an advertisement or an announcement of the consultation, of a meeting,... in the press

Internet

Number of days spent to set-up the website and total cost
Number of days spent to feed the website and total cost
Number of connections during the period of consultation, with number of consultations of the questionnaire pages (even if not filled-up)

Qualitative criteria to be determined thanks to the following questions:

On basis of meetings and evaluation questionnaires distributed during the public debates

- Male/female distribution
- Age category

Childre n	School youth	20 – 40	40 – 60	> 60

- Categories : Interested parties / general public

Analysis of the answers to the questionnaire of evaluation:

- Is the first time that people take part in a consultation
- Are they satisfied with this kind of consultation
- How do they wish to be associated next time
- Have their ideas evolved during the debate
- The most adapted means to diffuse information...

On basis of the questionnaire of consultation :

- Male/female distribution
- Age category
- Socioprofessional categories
- Opinion on the questionnaire and its modes of dissemination (positive and negative points, improvements to introduce…)
- The best level to disseminate information (administrative, organisational, ex. In the commune, by the associations)

III CONCLUSION

The guidelines and recommendations for the water management planning process accordingly to the requirements of the Water Framework Directive presented in the chapter 2 have been drafted in frame of the realisation of the Polish-French Twinning Project „Continuation of the Implementation of the Water Framework Directive 2000/60/EC". They have been developed at the basis of the realised tests and pilot activities that allowed gathering the practical experiences. The essential task of the present document is to create a basis for further works and discussions on the planning procedures that the Polish administration responsible for the water management planning should be realising during the nearest years.

The following subjects have been identified within the elaboration of guidelines and recommendations in frame of the realisation of the Polish-French Twinning Project „Continuation of the Implementation of the Water Framework Directive 2000/60/EC":

1. elements of co-operation between the institutions involved in the WFD implementation process
2. problematic of aggregation of the homogenous surface water bodies, and especially the reasons and principles of this aggregation.

Ad.. 1 The elements of co-operation between the institutions involved in the WFD implementation process.
Being aware of the necessity of a direct co-operation between the institutions involved in the WFD implementation process, the Ministry of the Environment, and then the National Office for Water Management elaborated an agenda determining the tasks and the institutions involved in the WFD implementation process in Poland. They are contained in a *list of tasks and activities for the water management planning process accordingly to the requirements of WFD in the period 2006-2010*, which is a working document elaborated by the National Office for Water Management in co-operation with the Regional Offices for Water Management and the General Inspectorate for the Protection of the Environment. It contains the tasks to be realised in the period 2006-2010 covering the first planning cycle that will conclude with the elaboration of the first river basin district management plans. This list can be divided into principal tasks, i.e. planning of the schedule of works and tasks related to the creation of the water management programmes for the river basin districts, elaboration of the monitoring programmes for the surface waters, for the groundwater and for the protected areas, realisation of a refined assessment of risk of non achievement of the WFD environmental objectives, identification of main issues of water management, refining the economical analysis of water uses, elaboration of water and environment programmes for the country (accordingly to WFD – of the programmes of measures) and of the water management plans. The important place in this first planning cycle is given to the public consultation that will accompany the schedule of works and tasks related to the establishment of water management plans for the river basin districts in the period XII.2006-VI.2007, the main issues of water management in the period XII.2007 – VI. 2008 and the water management plans – XII.2008 – VI.2009. The units involved in the process of implementation of the tasks contained on the above mentioned list are above all: KZGW, RZGW, GIOŚ, WIOŚ, institutes of science and researches. For the reasons of a quick and effective realisation of this process a new structure of working groups will be created soon. Such a structure will constitute a platform for the co-operation, exchange of ideas, discussions on the above mentioned issues and will gather specialists, experts and representatives of actors interested in the water management.

Ad. 2 The problematic of aggregation of the homogenous surface water bodies and especially the reasons and rules of this aggregation

Accordingly to the Water Framework Directive, in total 5569 homogenous surface water bodies have been designated in Poland in 2004, 3438 in the Vistula's river basin district and 2131 in the Oder river basin district as well as 160 homogenous groundwater bodies. During the works in the Upper Vistula pilot river basin a necessity of aggregation of the homogenous water bodies according to the defined criteria appeared.
Generally speaking, the aggregation issue is related to the following conditions:
necessity to scale the area in the sub-basins systems depending on the type of issue related to the process of the surface and groundwater outflow
necessity to relate the type and scope of a given land use and the outflow conditions
availability of the monitoring data defining the status of waters.
In each case the problem of the availability data should be considered independently, as well in the matter of data describing the water status as those that describe the reasons of such status. Therefore the question of level of the available information appears also in two first conditions. It is in a direct relation with the relative dimension of the homogenous water body that plays an essential role here, namely:
in case of surface water bodies this dimension is incomparably smaller than the so called partial sub-basin (understood in the hydrologic categories), than the surface of a commune for which the so called averaged use indicators are determined and in reference to the homogenous groundwater body;
qualitative and quantitative monitoring of surface waters is quite rare in the spatial system, localised in the characteristic points (mainly in the node areas) of the main hydrographic systems that makes more difficult the interpretation of these data in reference to a homogenous water body.
Taking into account the recommendations of densification of the monitoring network and the logical and economical side of this enterprise, a serious and justified analysis and evaluation of this issue must be done first. It will be based on the interpretation of the monitoring results and on the information on the land use in a spatial system taking into account the homogenous water bodies.
The essence of the aggregation of the homogenous surface water bodies is to ensure the following conditions for the realisation of the analysis and evaluations and to enable a spatial interpretation of the monitoring data; definition of an area for which it is possible to interpret the results of anthropogenical impacts in the important types of reasons of this impact and conversely – definition of an area for which it is possible to evaluate the influence of the restoration measures (programmes of measures or single measures) on the status of waters.
The transition from the aggregated to the homogenous water bodies for the evaluations and in consequence for the assessment of risk of non achievement of the environmental objectives should be realised logically, that is:
using the available information on the exact location of an important punctual impact possible to identify in terms of quantity and when it is possible to assess its impact on the level of risk of non achievement of the fixed environmental objective,
in case of a lack of such possibilities it should be admitted that the homogenous surface water bodies – in the area of their integration – have an identical assessment of status and of the risk of non achievement of the fixed environmental objectives.
Taking into account the above considerations, the basis of the construction of the restoration measures programme in the homogenous surface water bodies is an initial averaged assessment done for the properly aggregated bodies of such waters.

What's more it should be underlined that the reporting to the European Commission will be linked with special requirements and that the homogenous water bodies will remain the basic unit in frame of this reporting. As it has been explained in the present chapter and confirmed in tests in the pilot river basin the aggregated water bodies could constitute a pertinent unit for some measures what would allow to save time and would enable to realise the works using the available data.

When summarising it should be highlighted there is a necessity of a pertinent orientation and fast decisions regarding the timely realisation of the planning activities at the area of the whole country. An appropriate efficiency of the activities is conditioned by the integration of the capital in terms of human resources and in terms of data base – information and tools in general. The water management planning process has a cyclic character whose determinant should be an institutional continuity, and whose feature should be a constant methodological and instrumental improvement and actualisation of data bases. In order to obtain such results of the realisation of the planning tasks, a proper procedure of their realisation as well as its formal and essential institutional must be guaranteed.

It's obvious that the supervision of the planning process and the responsibility in terms of documents integrated at national scale or at the scale of the river basins falls to the President of the National Office for Water Management. However an effective realisation adapted to the local conditions, basic types of water and local problems of water management should be situated in the Regional Offices for Water Management.

This is fully justified because:

- only the RZGWs, at the basis of the water cadastre, are able to integrate the data bases from different sources and in particular from GUS, WIOŚ, marshal's offices and communes at the area of a region;
- the RZGWs, thanks to the highly qualified personnel, are able to ensure an essential institutional continuity of the planning process using the appropriate methodology and procedures as well as the planning tools.

It should be underlined also that a co-operation of the RZGW with the scientists and researchers is an additional condition for ensuring the continuity of works and of their pertinent level. Only in such context a synergy effect, guaranteeing the a high quality of planning can be obtained. It will be accompanied by a very desirable effect of integration of a branch's milieu. It has an important meaning and influence on the proper orientation of the development of the planning and designing methods in water management, based on the contemporary criteria of evaluation of the efficiency of activities.

It is therefore necessary to invest in the proper qualifications of their employees of the regional offices of water management, to postulate for the proper equipment and possibilities of the realisation of tasks, to build good conditions of inter-branch co-operation. This should bring effects in terms of stable and well prepared executive personnel, supported from the exterior by methodological and instrumental solutions with a proper time outrun.

Bibliography

Directive 2000/60/EC of the European Parliament and Council from the 23rd October 2000 establishing a framework of the common activities in the water politics, O.J. of the European Commission nr L327, 2000
Guidance „Economy and environment, the challenge of implementation of the Water Framework Directive" – prepared by the Working Group 2.6 – WATECO
Horizontal guidance ob. The use of "water body" term in the context of the Water Framework Directive – elaborated by the Working Group on the water bodies.
Guidance for the analysis of pressures and impacts accordingly to the Water Framework Directive, - elaborated by the Working Group 2.1 – IMPRESS, 2002
Guidance for the identification and designation of the heavily modified water bodies. Handbook. - elaborated by the Working Group 2.2 – HMWB, 2002
Methodological guidance for the elaboration of the typology, reference conditions and systems of qualification of the transitional and coastal water bodies - elaborated by the Working Group 2.4 - COAST.
Methodological guidance for the creation of the intercalibration network and on the realisation of the inter-calibration exercise - elaborated by the Working Group 2.5. – Intercalibration, 2002
Methodological guidance on the monitoring compliant with the Water Framework Directive - elaborated by the Working Group 2.7 – Monitoring, 2003
Methodological handbook on the public participation in the implementation of the regulations of the Water Framework Directive - elaborated by the Working Group 2.9 – Public Participation
Guidance on the implementation of the elements of the Geographical Information System of the Water Framework Directive – elaborated by the Working Group 3.1 – GIS, 2002
Methodological guidance for the definition of reference conditions and of limits of the environmental quality classes of the surface waters- 2.3 – REFCOND, 2004
Guidance on the planning process– elaborated by the Working Group 2.9 – planning process, 2003
Technical report 1. Statistical aspects of the identification of trends of pollution of the groundwater and aggregation of the results of the monitoring ", 2001
Identification and evaluation of anthropogenical impacts on waters and its results with the indication of the water bodies at risk of non achievement of the environmental objectives determined by law, Wydawnictwa Politechniki Krakowskiej, Kraków 2004.
Civco D.L., Chabaeva A.A., Prisloe S., Geospatial Extension Specialist, Development of a Population Density and Land Use Based Regresion Model to Calculate the Amount of Impreviousness, ASPRS Annual Conference Proceedings, Denver, Colorado, 2004
Georgia Stormwater Management Manual, vol.1, Stormwater Policy Guidebook. AMEC Earth and Environmental Center for Watershed Protection, Debo and ASSOciates, Jordan Jones and Goulding, Atlanta Regional Commission, US, 2001
Kauffman G., Campagnini J., Development of the University Of Delaware Experimental Watershed Project, 2001
Pilot TMDL Aplications using the Impervious Cover Method. ENSR Corporation, Project No 10598-001-002, US Environmental Protection Agency, 2005
Urban Water Management Strategy, Waters and River Commission, US, 2002
Zielinski J.,*Watershed Vulnerability Analysis.* Center for Watershed Protection, Elliot City, MD 21043, US, 2002
Agudelo J.I. *The Economic Valuation of Water. Principles and methods*. Value of Water Research Report Series No. 5. IHE 2005
Economical analysis of functioning of the new system of financial and legal means dealing with the use of the environment and especially the levels of fees for water abstraction and wastewater collection. Report on command of the Ministry of the Environment, AK Consulting. Warszawa, November 2003

Analysis of a system of the ecological payments in the management of water and wastewater in the industry in the year 2002. Report for the Ministry of the Environment. ATMOTERM 2003.
Assessment of Environmental and Resource Costs in the Water Framework Directive. Information sheet prepared by Drafting Group ECO2, CIS, Working Group 2B. June 2004.
Bate R., Dubourg R., *A net-back analysis of irrigation water demand in East Anglia* „Journal of Environmental Management" 1997, No 47 str. 311-322.
Berbeka K., Analysis of the water services cost recovery level. Report for RZGW Krakow. Kraków 2005
Berbeka K., Financial Flows and Affordability in Water Resources Management in the CEE Region. Analyse of financial flows in water economy -case of Poland. Draft report for GWPCEETAC. Cracow 2002
Brouwer R., Pearce D., *Cost-Benefit Analysis and Water Resources Management*. Edward Elgar Publishing 2005
Economics and the Environment – The Implementation Challenge of the Water Framework Directive. Guidance Document No. 1 Common Implementation Strategy for the Water Framework Directive (200/60/EC). EC 2003
Household Water Pricing in OECD Countries. ENV/EPOC/GEEI(98)12/Final. OECD 1999.
Information Sheet on Assessment of the Recovery of Costs for Water Services for the 2004 River Basin Characterisation Report (Art. 9). Common Implementation Strategy Working Group 2B: Drafting Group ECO1. Final version May 5, 2004. Prepared by DG ECO 1
Markowska A., Assessment of benefits resulting from the improvement of quality of the Baltic Sea. Use of the contingent evaluation in Poland. Uniwersytet Warszawski, Wydział Nauk Ekonomicznych, Warszawa 1995
Markowska A., Costs and benefits related to the implementation of the 91/271/EEC directive concerning the municipal wastewater treatment in Poland. Uniwersytet Warszawski, Wydział Nauk Ekonomicznych, Warszawa 2004.
Merret S., Introduction to the Economics of Water Resources. An International Perspective. UCL Press 1997
Miłaszewski R., Walczykiewicz T., Guidance on the realisation of the economical analysis in the water regions for the needs of water management process. Ministerstwo Środowiska 2004.
Pearce D., *Water Pricing: Investigating Conceptual and Theoretical Issues*. W: Pricing water Economics, Environment and Society. Conference Proceedings. Sintra 1999. DG Environment, EC 2001
Peszko G., (red) Economical profits for Poland in result of the implementation of the environment protection law in Poland. UKIE 2003.
Sozański M.,(red.) Systems of water distribution and wastewater collection in Poland, traditions and modernity. Polska Fundacja Ochrony Zasobów Wodnych. Poznań-Bydgoszcz 2002.
The Benefits of Compliance with the Environmental Acquis for the Candidate Countries. Final report, for DG Environment. ECOTEC 2001.
Accountancy Law from 29.09.1994 OJ 1994 Nr 121 poz. 591 ze zmianami.
Water pricing in selected Accession Countries to the European Union, current policies and trends. A report produced for the EC, DG Environment. Final report 2000.
Guidance G1:Economical analysis of water management in Poland in accordance with the requirements of the water Framework DIRECTIVE 2000/60/CE in Poland. Arcadis, Proeko, BCEOM. Ministerstwo Środowiska 2005.
Zaag P van der, Savenije H.H.G., *Water as an Economic Good: the Value of pricing and the Failure of Markets*. Value of Water Research Report Series No. 19. Unesco-IHE 2006