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International Cooperation under the Water Framework Directive (2000/60/EC) - Factsheets for International River Basins

Accompanying the document

REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

on the implementation of the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC)
Second River Basin Management Plans
First Flood Risk Management Plans

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Acronyms

EQS	Environmental Quality Standard Directive
FD	Floods Directive
km	Kilometre
km^2	Kilometre squared
KTM	Key Type of Measure
ICPDR	International Commission for the Protection of the Danube River
ICPR	International Commission for the Protection of the Rhine
iPoM	Joint Programme of Measures
iRBD	International River Basin District
iRBMP	International River Basin Management Plan
PoM	Programme of Measures
WFD	Water Framework Directive
WISE	Water Information System for Europe

Foreword

The factsheets for the International River Basin Management Plans cover a wide range of issues and are not identical in all. This is because information for some issues may be available in some international River Basin Districts (iRBDs) but not in others, depending on the level of cooperation.

The International Basin Assessment factsheets were drafted on the basis of the national river basin management plans (RBMPs), international iRBMPs (where available), as well as information that was reported by the Member States through the Water Information System for Europe (WISE) electronic reporting. All tables, figures and maps presented in this report have been sourced from WISE. Where information was not available regarding international cooperation in the second water management cycle, the report uses information obtained from the 2012 Pressures and Measures study on international cooperation[1].

The compilation reflects the situation as reported to the European Commission in 2016 and with reference to either the international or national River Basin Management Plans (RBMP), where appropriate.

[1]See:http://ec.europa.eu/environment/archives/water/implrep2007/pdf/Governance-Transboundary%20Fact%20Sheets.pdf

Introduction

The Water Framework Directive (WFD) stipulates that Member States shall ensure that a river basin covering the territory of more than one Member State is assigned to an iRBD. Appropriate administrative arrangements, including the identification of the appropriate competent authority for the international river basin district shall be established by the Member States. Member States shall ensure that the environmental objectives of the Directive are met in international river basin districts. To this end, Member States shall coordinate at the international level on a programme of measures.

In the case of an international river basin district falling entirely within the Community, Member States shall ensure coordination with the aim of producing a single international river basin management plan (iRBMP), including involving third countries. If an iRBMP is not produced, Member States shall produce river basin management plans covering at least those parts of the international river basin district falling within their territory to achieve the objectives of the Directive.

The European Commission is required to report to the European Parliament and Council in 2018 on progress made by Member States with implementing the WFD. The present document is part of this reporting and comprises a series of fact sheets for the international river basins (RB) which are describing the application of the Directive at iRBD.

International river basin districts and their coordination mechanisms

International river basins in the EU are either shared exclusively between EU Member States or between EU Member States and third countries. There are 75 iRBDs and 30 sub-basins in the EU. International coordination mechanisms (agreements, working groups etc.) under the WFDe vary among the different international river basins districts. Based on their level of cooperation, four main categories were identified. An overview of different types of international cooperation is given in Table 1.

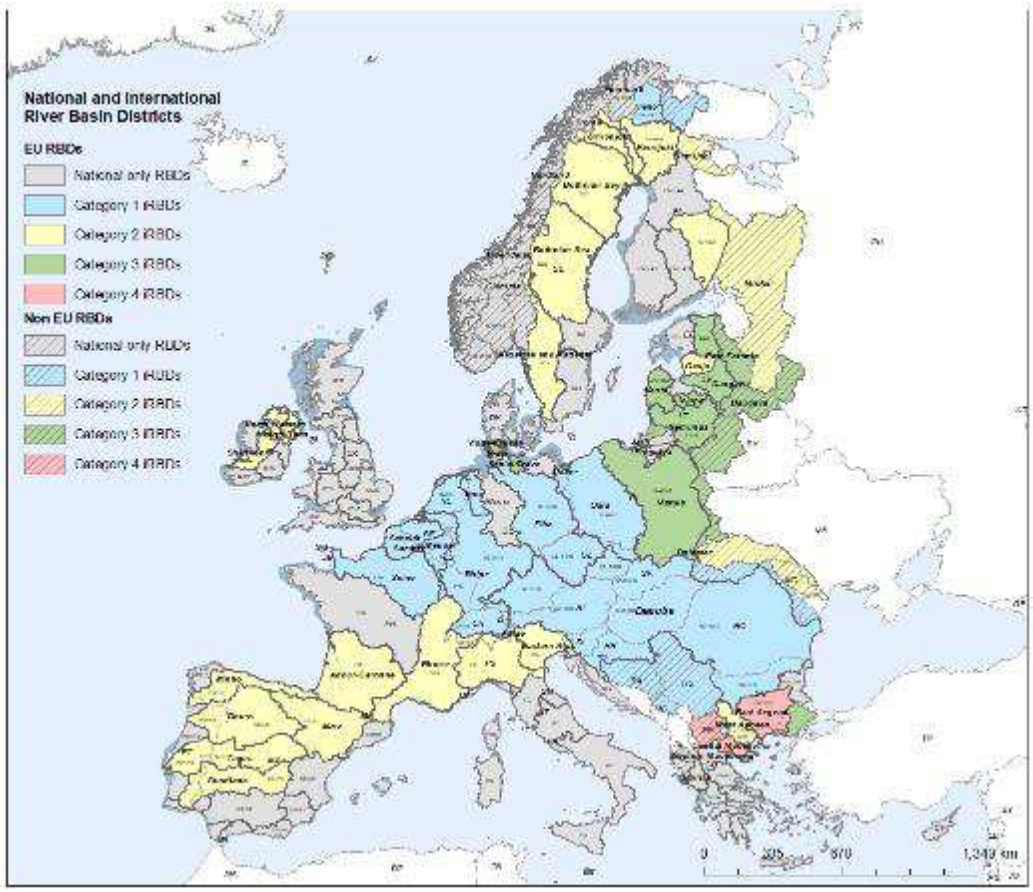
Table 1 Different types of international coordination in relation to the WFD

Category	Formal international agreement	International coordinating body	iRBMP produced
1	Yes	Yes	Yes
2	Yes	Yes	No
3	Yes	No	No
4	No	No	No

EU Member States were requested to report to WISE the international river basin districts in their territory and the level of international coordination taking place in these iRBDs. Greece, Ireland and Lithuania are not covered by this assessment due to late reporting. The categories of these iRBDs were taken from the assessment of international coordination in the first cycle[2].

The map below shows the international river basin districts and their level of international coordination.

Figure 1 Overview map of iRBDs



Selection of iRBDs for the assessment

21 iRBDs were chosen for the assessment (see Table 2). The selection was based on the following criteria:

All iRBDs with iRBMPs were selected.

[2] See: Vogel, B., et al. (2012): Transboundary Cooperation Fact Sheets. Comparative Study of Pressures and Measures in the Major River Basin Management Plans. Available at: http://ec.europa.eu/environment/archives/water/implrep2007/pdf/Governance-Transboundary%20Fact%20Sheets.pdf

In cases where EU Member States/third countries share several iRBDs (e.g. there are four iRBDs shared between Portugal and Spain), the most representative basin was identified, taking into account the overall iRBD catchment area size, the balanced share of catchment area between the iRBD sharing countries and the level of international coordination.

iRBDs that hold an insignificant international share (e.g. <1 %) were excluded.

International basins shared with Greece (5 iRBDs[3]), Ireland (2 iRBDs[4]) and Lithuania (2 iRBDs[5]) were not assessed due to delays in the adoption of the national level River Basin Management Plans and reporting. As a result, Category 4 basins (see Table 1 for explanation) were not assessed. Table 2 presents the list of basins included in the assessment and the categories of these iRBDs as reported by the EU Member States.

Table 2 List of selected iRBDs for which an assessment was done

Category	International River Basin	EU Member States/Non-EU countries
Category 1	Danube	Austria, Bulgaria, Czech Republic, Germany, Croatia, Hungary, Italy, Poland, Romania, Slovenia, Slovakia *Non-EU: Switzerland, Albania, Bosnia and Herzegovina, Serbia, Ukraine, Moldova, Montenegro, Macedonia*
	Elbe	Austria, Czech Republic, Germany, Poland
	Ems	Germany, The Netherlands
	Meuse	Belgium, Germany, France, Luxembourg, The Netherlands
	Odra	Czech Republic, Germany, Poland
	Rhine	Austria, Belgium, Germany, France, Italy, , Luxembourg, The Netherlands *Non-EU: Switzerland, Liechtenstein*
	Sava	Croatia, Slovenia *Non-EU: Albania, Bosnia and Herzegovina, Montenegro and Serbia*
	Scheldt	Belgium, France

[3] Aoos/Vjosa, Drin, Western Aegean, East Aegean (Maritsa/Evros/Meric) iRBD and Central Macedonia (Axios/Vardar) iRBDs
[4] Neagh Bann and Northwestern
[5] Lielupe, Nemunas

Category	International River Basin	EU Member States/Non-EU countries
	Teno/Tana	Finland[6] *Non-EU: Norway, Russia*
Category 2	Adige/Etsch	Italy, *Non-EU: Switzerland*
	Dniester/Dnistr/Nistru	Poland *Non-EU: Moldova, Ukraine*
	Garonne – Cantabrico -Ebro	France, Spain
	Guadiana	Spain, Portugal
	Gauja/Koiva	Estonia, Latvia[7]
	Isonzo/Soca	Italy, Slovenia
	Luleälven, Umeälven, Piteälven	Sweden *Non-EU: Norway*
	Rhone	France, Italy *Non-EU: Switzerland*
	Torneälven/Tornionjok	Sweden, Finland *Non-EU: Norway*
Category 3	Eider	Germany, Denmark
	Narva	Estonia, Latvia[8] *Non-EU: Russia*
	Schlei Trave	Germany, Denmark
	Vistula	Poland, Slovakia, Lithuania *Non-EU: Ukraine, Belarus*

[6] Finland reported to WISE that the Teno, Näätämöjoki and Paatsjoki iRBD is a Category 2 basin. However, in 2016 Finland and Norway produced a Joint Management Report similar to an iRBMP. Therefore, the basin has been categorized as Category 1.

[7] In the case of the Gauja/Koiva, a long-term project with governmental representatives from both countries facilitated international coordination in the basin and as such the basin has been designated as Category 2 within this assessment.

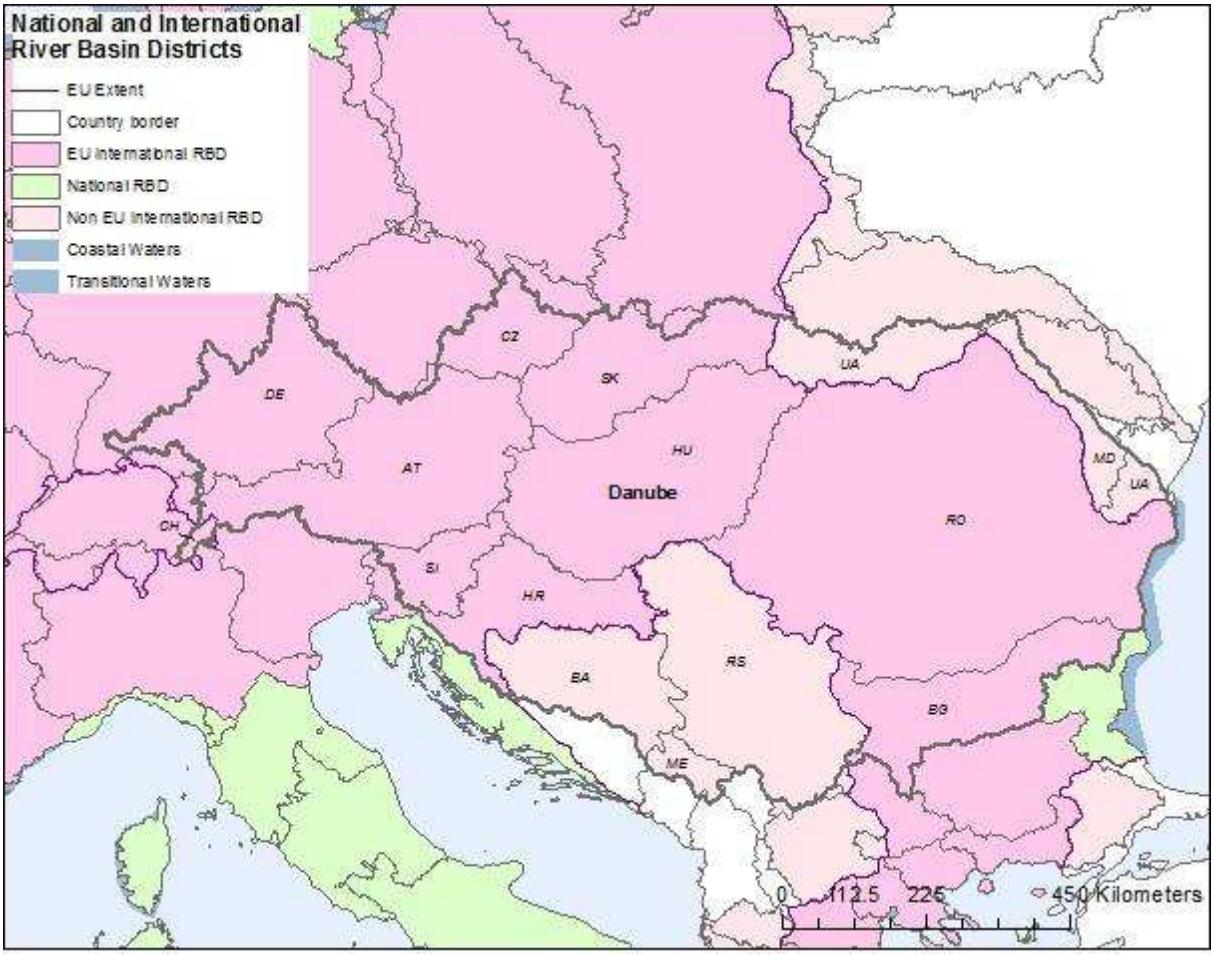
[8] In the Narva iRBD, there does not appear to be a permanent body or long-term project promoting coordination and hence the basin has been designated as Category 3

1. International River Basins - category 1

1.1. Danube River Basin District

1.1.1. General Information

Map 1.1.1 Danube International River Basin District



Source: WISE reporting 2016

The Danube International River Basin District (iRBD) is shared by Albania, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Germany, Hungary, Italy, Macedonia, Moldova, Montenegro, Poland, Romania, the Republic of Serbia, Slovenia, the Slovak Republic, Switzerland and the Ukraine. 14 countries[9] with territories > 2,000 km^2 in the Danube River Basin are, together with the European Union, Contracting Parties to the Danube River Protection Convention. The Convention established the International Commission for the Protection of the Danube River (ICPDR).

9 Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Moldova, Montenegro, Romania, Serbia, Slovakia, Slovenia and the Ukraine

The International River Basin District Management Plan (iRBMP) was elaborated in the frame of the ICPDR. Two EU Member States – Italy and Poland – and three non-EU Member States – Albania, Macedonia and Switzerland - are not Contracting Parties to the Convention as their international shares of the Danube are less than 2,000 km^2 (see Table 1). As such, their territories are not covered by the iRBMP.

This report focuses on the information included in the iRBMP for those countries who are cooperating in the frame of the ICPDR. Information reported to WISE by the Contracting Parties of the Danube River Protection Convention which are EU Member States (with the exception of Italy and Poland) complement the report.

The Danube iRBD is allocated by the Member States cooperating in the frame of the ICPDR to cooperation **Category 1**, which means that an international agreement, a permanent co-operation body and international WFD RBMP is in place.

Italy assigned its share of the Danube basin to the ITA Eastern Alps River Basin District, which includes also other basins next to the Danube, and assigned it in contrast as a Category 2 basin. Poland designated its share of the Danube Basin as a Category 3 basin. Poland reported to WISE information for its share of the Danube Basin. Italy reported to WISE information for the entire Eastern Alps River Basin District and not just the share of its national district within the Danube.

The iRBMP can be downloaded from the ICPDR website[10].

The table below presents the size of the total catchment area and national shares within the iRBD (km^2; %).

[10] http://icpdr.org/main/management-plans-danube-river-basin-published

Table 1.1.1 Size of the total catchment area and national shares for each international RBD

Shared International RBD	Total Area of Shared International RBD (km^2)	EU Member States/Non-EU countries in International RBD	EU RBD Code	National Area within International RBD (km2)	National Area within International RBD (%)
Danube	674,929.8	Austria	AT1000	80,423	10
		Bulgaria	BG1000	47,413	5.9
		Croatia	HRC	34,965	4.4
		Czech Republic	CZ1000	21,688	2.9
		Germany	DE1000	56,184	7.0
		Hungary	HU1000	93,030	11.6
		Italy	ITA	565	<0.1
		Poland	PL1000	430	<0.1
		Romania	RO1000	232,193	29
		Slovakia	SK40000	47,084	5.9
		Slovenia	SIRBD1	16,422	2
		Albania	N/A	126	<0.1
		Bosnia and Herzegovina		36,636	4.6 %
		Macedonia		109	<0.1
		Moldova		12,834	1.6
		Montenegro		7,075	0.9
		Serbia		81,560	10.2
		Switzerland		1,809	0,2
		Ukraine		30,520	3.8

Source: iRBMP

1.1.2. Governance and public participation

Cooperation framework: International, bilateral and/or multilateral agreements in place covering certain cooperation aspects

The key international multilateral agreement in the Danube iRBD on water management is the Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Danube River Protection Convention). Since 2000 the implementation of the EU WFD was declared as the highest priority of the contracting parties of the ICPDR (Resolution of the ICPDR Ordinary Meeting 2000 in Sofia). Further resolutions were adopted in which all contracting parties – including the Non-EU Member States - agreed to participate in producing a coordinated international River Basin Management Plan according to the requirements of the EU WFD. That the implementation of the WFD is considered a priority in the iRBD was also confirmed by the Danube Declaration, which was adopted in the frame of an ICPDR Ministerial Meeting on 13 December 2004 (Vienna), and follow-up Declarations.

The main objective of the Convention is to ensure that surface waters and groundwater within the Danube River Basin are managed and used sustainably and equitably. This involves: - the conservation, improvement and rational use of surface waters and groundwater; - preventive measures to control hazards originating from accidents involving floods, ice or hazardous substances; and - measures to reduce the pollution loads entering the Black Sea from sources in the Danube River Basin. A number of different international Expert and Task Groups are set up to address specific water management issues. The Expert Group on River Basin Management (RBM EG) coordinates the implementation of the EU WFD in the Danube River Basin. The Flood Protection Expert Group defines and prepares tasks related to the implementation of the EU Floods Directive (FD) in the Danube River Basin such as the development of flood hazard and risk maps and the Danube River Basin Flood Risk Management Plan.

In addition to the Danube Convention, a multitude of bi- and multilateral agreements are in place.

Joint activities within the iRBD

Development of an iRBMP and link to national RBMPs

The management of the iRBD is based on three levels of coordination – Part A (international, basin-wide level), Part B (national level and/or the international coordinated sub-basin level for the selected sub-basins Sava, Tisza, Prut and Danube Delta), and Part C (Sub-unit level, defined as management unit within the national territory). The ICPDR serves as the coordinating platform between the countries to compile multilateral and basin-wide issues at Part A of the iRBD.

According to the iRBMP, to ensure coherence with Part A and Part B, it is necessary for the national plans to refer to the main findings of the iRBMP. This includes providing information on the significant water management issues for surface and groundwater bodies identified at the basin level and how they relate the activities at national level. In addition to developing significant water management issues at international level, four other documents produced by the ICPDR, while not legally binding, are intended to serve as a "common roadmap" guiding national activities and supporting harmonization of actions throughout the basin. The documents are:

- Joint Statement Navigation;
- Guiding Principles on Sustainable Hydropower Development in the Danube Basin;
- ICPDR Strategy on Adaptation to Climate Change; and
- Ecological prioritisation approach for measures to restore river and habitat continuity.

According to the iRBMP, the national plan should refer to the above documents and take their findings into account with developing national activities in the relevant fields. However, the implementation of the measures in the Joint Programme of Measures is primarily a national task and performed via national water management plans.

Areas of joint cooperation

In the field of public consultation, meetings of the ICPDR and its expert group for public participation, which existence is specific compared to other river basin commissions, supported a basin-wide exchange on the national consultation work. To support information exchange between the responsible authorities and interlink national public consultation activities with the basin-wide level, information on national significant water management issue documents and draft management plan consultation measures was collected and centrally published on the ICPDR website. A consultation was held on the draft iRBMP at international level, as well as an online survey and a stakeholder workshop. Comments were evaluated and reactions have been published in an overview reply table[11].

Sectors and observers involved within the development of the iRBMP

There are 23 organisations approved as observers to the ICPDR, all of which had the opportunity to contribute to the development of the iRBMP through the relevant expert groups, task groups and plenary meetings (Standing Working Group and Ordinary Meetings). Sectors include:

[11] For more information see: See more information on all those activities http://www.icpdr.org/main/activities-projects/consultation-2015.

- Hydropower
- Navigation
- Public and private water services providers/utilities
- Environmental non-governmental organisations (NGOs)
- Dredging
- Tourism
- Research
- Sport fishing
- Government Agencies/Commissions

Existence of a transboundary Accident Emergency Warning System

An Accident Emergency Warning System is in place in the Danube - River Basin. It is activated if a risk of transboundary water pollution exists and alerts downstream countries with warning messages in order to help national authorities to put safety measures timely into action. The warning system is operated, maintained and enhanced by the ICPDR and it is regularly tested. In addition, the ICPDR is currently assessing the potential accident risk hot-spots and updating the catalogue of contaminated sites of the Danube Basin. Accident risk spots represent mainly existing industrial and energy production facilities that process, store, produce or release hazardous substances.

The accident risk spots inventories being compiled will evaluate the potential risk of the selected facilities based on the Water Risk Index values. The Water Risk Index assesses the hazard of the industrial sites based on the hazard degree of the processed materials and their volume stored at the sites. Contaminated sites include old industrial facilities, abandoned sites and landfills. For the contaminated sites, the risk assessment includes a rough assessment of the real risk based on the flood probability and safety conditions of the sites.

1.1.3. Characterisation of the River Basin District

Coordination of the Article 5 assessment

The iRBD sharing countries coordinated on elements of Article 5. The Danube Basin Analysis report was first published in 2004. It was also updated in 2013 and published on the ICPDR's website. The report provides details on characterisation; pressures and impacts; designation of the heavily modified and artificial water bodies; Impact and Risk Assessment; Inventory of Protected Areas; Economic analysis; and Integration issues. The Danube Basin Analysis provides the analytical basis for the iRBMP.

Delineation of water bodies and designation of heavily modified and artificial water bodies

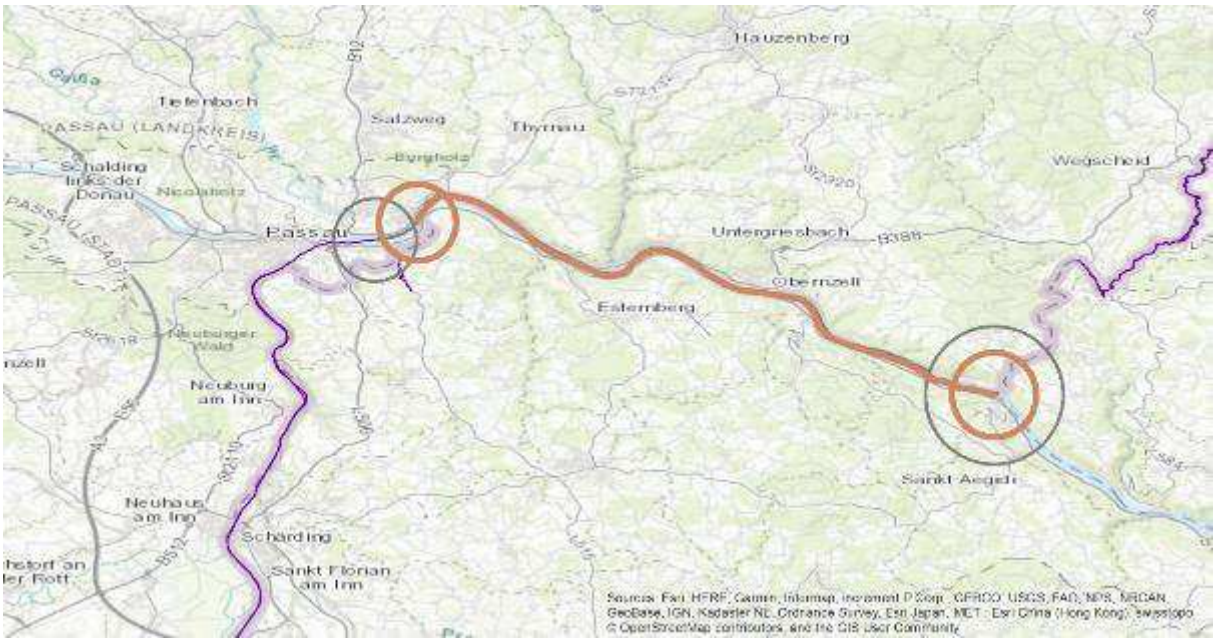
Surface water

Steps were taken to coordinate the delineation of transboundary surface water bodies. According to Danube Basin Analysis, while each country has its own approach for water body delineation, the approaches are similar. Water bodies were identified by typological criteria and afterwards updated based on the analysis of the pressures and monitoring data. The water bodies described in the Danube Basin Analysis cover those relevant on the basin-wide level, respectively rivers, with catchment areas larger than 4,000 km^2, and lakes >100 km^2. All other water bodies are dealt with in detail in the National Reports (Part B).

According to the Danube Basin Analysis, the criteria used for the delineation of water bodies are similar among the Danube countries. A change in type is indicated as the most frequent reason for the delineation of water bodies as well as a change in pressure, in particular a change in the degree of pollution. Also, changes in the hydrological regime and in morphology were frequently used criteria.

To determine whether the delineation of surface water bodies by the Member States was coordinated, GIS data reported to WISE from the bordering Member States for transboundary stretches in the Danube basin were assessed. The examples below show that coordination has not always resulted in similar delineation.

Map 1.1.2 Comparison of the delineation of a river along the Austrian-German border



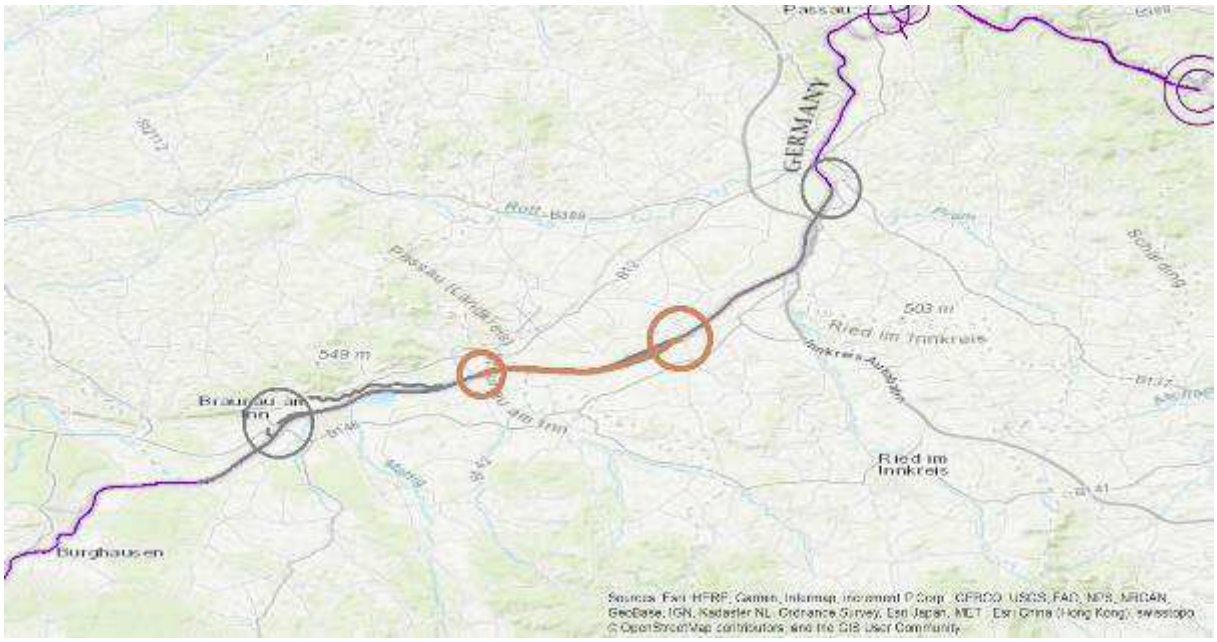
Source: WISE electronic reporting 2016

The brown line shows water body ATOK303070000 in Austria, the grey line shows the water body DERW_DEBY_1_F633 in Germany. While the starting points for the river are different, the end points match between the two countries[12],[13].

[12] Subsequent clarification by Austria indicates that bilateral coordination of water body delineation was performed between Austria and Germany for shared water bodies along the border with length of at least 1km. National methods for water body delineation differ between Austria and Germany (e.g. minimum length of water bodies) and have to respect a uniform pressure situation, which in fact may result in differing water body delineation. However, water body delineation was subject to bilateral coordination and is documented in the following report: https://www.bmnt.gv.at/wasser/wasser-eu-international/internationale-wasserpolitik/Bericht--ber-Abstimmung-an-deutsch--sterreichischen-Grenzgew-ssern.html

[13] Subsequent clarification by Germany indicates that retrospective changes in the established water body delineation can cause a whole range of administrative difficulties. In some cases, it can prove advantageous to both sides to leave (unintended) discrepancies unchanged, if they are considered to be of sufficiently minor magnitude. The examples given in the report are known to the administrations on both sides of the border and the current status has been confirmed in the course of the coordination efforts

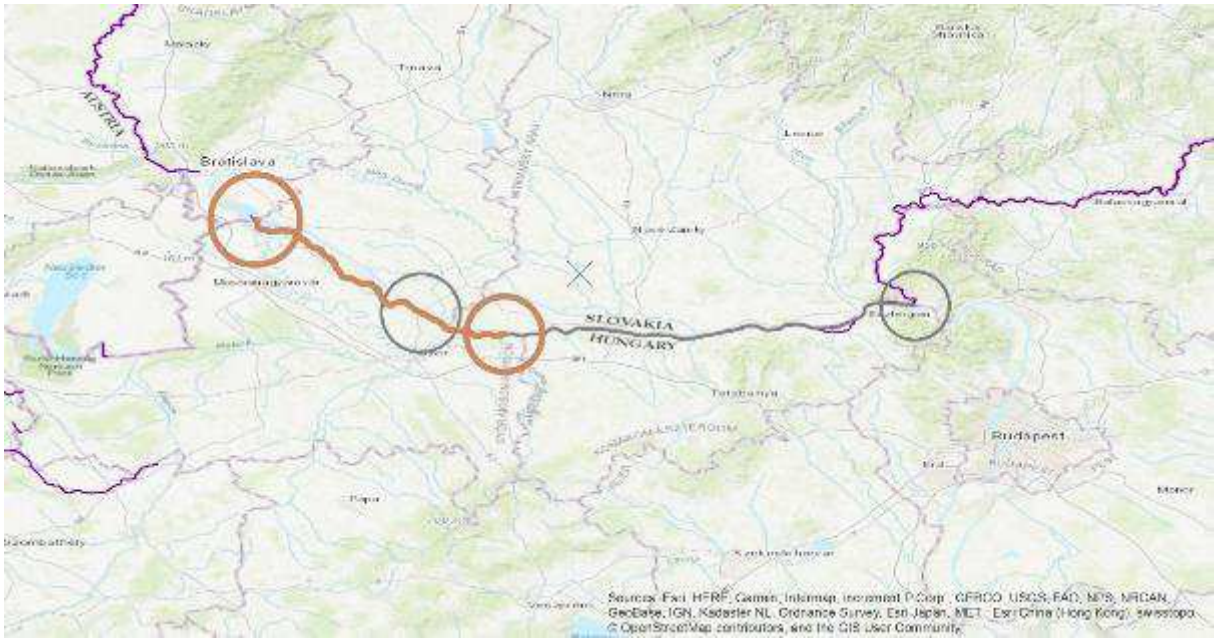
Map 1.1.3 Comparison of the delineation of a river along the Austrian-German border



Source: WISE electronic reporting 2016

The brown line shows the water body ATOK305340007 in Austria, the grey line shows the water body DERW_DEBY_1_F654 in Germany. The start and end points for the water body are different between the two countries.

Map 1.1.4 Comparison of the delineation of a river along the Hungarian-Slovakian border



Source: WISE electronic reporting 2016

The brown line shows the water body HUAEP443 in Hungary, the grey line shows the water body SKD0018 in Slovakia. The start and end points for the water body are different between the two countries.

Map 1.1.5 Comparison of the delineation of a river along the Bulgarian-Romanian border

Source: WISE electronic reporting 2016

The brown line shows the water body RORW14-1-B3 in Romania, grey line shows the water body BG1DU000R001in Bulgaria. The start and end points of the delineated water body are close to each other. Additionally, Bulgaria reported to WISE a more detailed spatial dataset, which includes also small tributaries along with the main stream of the water body.

Groundwater

Coordination took place on the delineation for transboundary groundwater bodies. According to the iRBMP, transboundary groundwater bodies are made up of national parts (which comprise individual national groundwater bodies that have been aggregated). The iRBMP and the Danube Basin Analysis provide an overview of important transboundary groundwater bodies in the Danube River Basin. They are defined as follows:

important due to the size of the groundwater body which means an area > 4000 km²
or
important due to various criteria e.g. socio-economic importance, uses, impacts, pressures interaction with aquatic ecosystem.

The criteria were agreed bilaterally. Other groundwater bodies, i.e. those with an area larger than 4000 km² and fully situated within one country of the iRBD, are dealt with at the national level.

Information on 11 aggregated transboundary groundwater bodies of basin-wide importance with eight countries concerned (Germany, Austria, Slovak Republic, Hungary, Serbia, Bulgaria, Romania and Moldova) is provided in the iRBMP. These aggregated groundwater bodies have been agreed by all countries sharing their parts. The most frequent method applied for the delineation of the aggregated groundwater bodies is based on geological boundaries in combination with a hydrogeological approach. In some countries other criteria like importance for water supply, groundwater quality, water temperature or surface water catchment areas were additionally considered.

Typology Coordination of surface water bodies

The iRBMP states that typology was updated for the second cycle. The typology of the Danube River was developed in a joint activity by the basin sharing countries for the first Danube Basin Analysis in 2004. The Danube typology therefore used a harmonised system used by all these countries. The Danube typology was based on a combination of abiotic factors of System A and System B. The most important factors are ecoregion, mean water slope, substratum composition, geomorphology and water temperature. Ten Danube section types were identified and the morphological and habitat characteristics are outlined for each section type. In order to ensure that the Danube section types are biologically meaningful, these were validated with biological data collected during the first Joint Danube Survey in 2001. All the Member States in the Danube iRBD reported to WISE that there was coordination on typology of surface water bodies.

The typologies of the Danube tributaries were developed by the countries individually. Stream types relevant on transboundary water courses were bilaterally harmonised with the neighbours. Most countries in the iRBD (Germany, Austria, Czech Republic, Hungary, Slovenia, Bosnia and Herzegovina, Serbia, Croatia, Romania, Bulgaria) have applied System B (Annex II, 1.2.1 WFD) for establishing their river typology. Slovakia and Ukraine have used System A. Countries using System B have used a number of optional factors to further describe the river types. River discharge, mean substratum composition and mean water slope are most frequently used. The common factors used mostly in iRBDs typologies are ecoregion, altitude, catchment area and geology. For the development of the typology of transitional and coastal waters System B was applied. The transitional waters are differentiated into lacustrine and marine transitional waters.

Coordination in the Establishment of reference conditions for surface water bodies

The Danube Basin Analysis states that on the basin-wide level, the Danube countries have agreed on general criteria as a common base for the definition of reference conditions for rivers. These have then been further developed on the national level into type-specific reference conditions. The definition of reference conditions was based on the following approaches:

- spatially based approach using data from monitoring sites;
- approach based on predictive modelling;
- definition of temporally based reference conditions using either historical data

or

- palaeo-reconstruction;

or

- use of expert judgement (where none of the above methods was possible).

For lakes, reference conditions were developed individually by the countries. The methods most frequently applied were the use of historical data, expert judgement and spatially based methods. Hungary also used historical data and palaeo-reconstruction for phytoplankton and physico-chemical conditions to define reference conditions in its lakes. A comparison of reference conditions reveals that similar approaches are being applied. All countries are basing their assessment on species composition, abundance and the diversity of species. In some cases, additional parameters were used (e.g. age structure, biomass, ratio of sensitive to insensitive species).

Coordination on Significant Water Management Issues (SWMIs)

The iRBMP defined four significant water management issues for surface and groundwater bodies:

- Pollution by organic substances
- Pollution by nutrients
- Pollution by hazardous substances
- Hydromorphological alterations

These issues relate to the impacts on the ecological and chemical status of surface waters. For transboundary groundwater bodies, both, qualitative and quantitative issues are addressed. In addition to these significant water management issues, the ICPDR is working on other relevant key issues like sediment management and invasive alien species in order to improve the data basis for these issues with the aim to determine their relevance on the basin-wide level and to propose appropriate measures.

1.1.4. Monitoring, assessment and classification of surface water ecological status

Monitoring of ecological status/potential

Joint monitoring programmes for surface waters and application of joint methods/joint surveys and interlaboratory tests

The iRBMP describes the international monitoring programme of the basin. The Trans-National Monitoring Network is a joint programme for the countries cooperating in the frame of the ICPDR. The major objective of the monitoring network is to provide an overview of the overall status and long-term changes of surface water in a basin-wide context (with particular attention paid to the transboundary pollution load).

To meet the requirements of both the WFD and the ICPDR, the Trans National Monitoring Network for surface waters consists of the following elements:

- Surveillance monitoring I: Monitoring of surface water status;
- Surveillance monitoring II: Monitoring of specific pressures;
- Operational monitoring;
- Investigative monitoring.

Surveillance monitoring I and operational monitoring is based on collection of national data on the status of surface water and groundwater bodies for the development of the iRBMP. Investigative monitoring is primarily a national task. However, on the basin-wide level, the Joint Danube Survey serves the investigative monitoring as required e.g. for harmonisation of existing monitoring methodologies; filling information gaps in monitoring networks; testing new methods; or checking the impact of "new" chemical substances in different matrices. Joint Danube Surveys are carried out every six years.

The monitoring networks' laboratories have a free choice of standardized analytical method, providing they are able to demonstrate that the method in use meets the required performance criteria. To ensure the quality of collected data, a basin-wide Analytical Quality Control programme is regularly organized by the ICPDR. During the 3rd Joint Danube Survey (2013) altogether 68 sites were sampled along a 2,581 km stretch of the Danube, 15 of which were located in the mouths of tributaries or side arms. The findings of 3rd Joint Danube Survey are supportive to the implementation of WFD as they provide an extensive homogeneous dataset production of which was mainly based on WFD compliant methods commonly used by the Danube experts.

Sensitive Quality elements (excluding river basin specific pollutants)

According to the WFD and as explained in the CIS guidance on monitoring, for operational monitoring, Member States are required to monitor for those biological and hydromorphological quality elements most sensitive to the pressures to which the body or bodies are subject. The iRBMP provides information on macrozoobenthos, phytobenthos, macrophytes, phytoplankton and fish and their link to pressures.

EU Member States were required to report to WISE which assessment methods of biological quality elements they considered to be sensitive for impact types. The analysis differentiates four biological quality elements (or three biological quality elements and two sub- biological quality elements), nine different impact types and four different water categories. The Member States reported for their entire national shares of the iRBD, not just for those water bodies delineated under the International Danube River Basin Management Plan.

An important assessment parameter is whether there is a minimum agreement between the iRBD sharing countries sharing a border with each other on the sensitivity of biological quality elements. Such an agreement would be expressed by the fact that there is at least one biological quality element that is considered to be sensitive (for each pressure) in both Member States. Such a quality element can then be used as the least common denominator for comparable assessments of ecological status, provided that the Intercalibration has been successful.

For rivers, the table below lists the assessment methods of biological quality elements sensitive for each impact type. There is a full agreement between the riparian countries on sensitive quality elements for nutrients (aquatic flora), organic pollution (benthic invertebrates) and morphological pressures (benthic invertebrates and fish). A number of Member States also reported a biological quality element sensitive to chemical pressures, namely benthic invertebrates (note that this assessment comes in addition to the risk assessment for priority substances and river basin specific pollutants). In the case of temperature pressures, three groups of border sharing countries do not use the same biological quality element (i.e. Austria-Slovakia, Austria-Hungary and Hungary-Romania). In the case of hydrological pressures, seven out the eight Member States that reported assessment methods share the same biological quality element benthic invertebrates.

Table 1.1.2 Sensitivity of biological quality elements towards different impact types for river water bodies

EU Member State	Phytoplankton	Other aquatic flora	Macrophytes	Phytobenthos[14]	Benthic invertebrates	Fish
Assessment method mainly sensitive to nutrient pollution						
Austria	yes		yes	yes		
Bulgaria		yes	yes	yes	yes	
Croatia	yes	yes		yes		
Czech Republic	yes	yes	yes	yes		
Germany	yes	yes	yes	yes	yes	
Hungary	yes	yes	yes	yes	yes	yes
Romania	yes	yes		yes		
Slovakia	yes	yes	yes	yes		
Slovenia		yes				
Assessment method mainly sensitive to organic pollution						
Austria					yes	
Bulgaria		yes	yes	yes	yes	
Croatia		yes		yes	yes	
Czech Republic		yes		yes	yes	
Germany					yes	
Hungary	yes	yes		yes	yes	yes
Romania	yes	yes		yes	yes	yes
Slovakia	yes				yes	
Slovenia		yes			yes	
Assessment method mainly sensitive to chemical pollution						
Bulgaria					yes	
Czech Republic					yes	
Germany					yes	yes
Hungary	yes	yes	yes		yes	
Assessment method mainly sensitive to elevated temperature						
Austria						yes
Germany					yes	yes
Hungary		yes		yes	yes	
Romania						yes
Slovakia		yes	yes		yes	
Assessment method mainly sensitive to altered habitats due to hydrological changes						
Austria			yes		yes	yes
Bulgaria		yes	yes			yes
Croatia		yes	yes		yes	yes
Czech Republic	yes				yes	
Germany					yes	yes
Hungary	yes	yes		yes	yes	yes
Slovakia						yes
Slovenia					yes	yes
Assessment method mainly sensitive to altered habitats due to morphological changes						
Austria			yes		yes	yes
Bulgaria		yes	yes	yes	yes	yes
Croatia		yes	yes		yes	yes
Czech					yes	yes

[14] Clarification by the ICPDR indicates that Phytobenthos covers different taxonomic groups in different countries, which in some cases may lead to different sensitivity to stressors.

EU Member State	Phytoplankton	Other aquatic flora	Macrophytes	Phytobenthos[14]	Benthic invertebrates	Fish
Republic						
Germany					yes	yes
Hungary		yes	yes	yes	yes	yes
Romania		yes		yes	yes	yes
Slovakia					yes	yes
Slovenia					yes	yes

Source: WISE reporting 2016

Coordination of River Basin Specific Pollutants (RBSPs) and matrices monitored

The WFD requires Member States to identify and select river basin specific pollutants and their environmental quality standards (EQS) at the national, river basin or water body level.

According to the iRBMP, the monitoring and assessment of river basin specific pollutants was coordinated in the basin. The analysis of a large amount of organic substances during the 3rd Joint Danube Survey enabled in cooperation with the EU FP7 project SOLUTIONS to provide suggestions for the update of the Danube river basin-wide list of specific pollutants. The prioritization methodology, which was based on the approach developed by the prioritization working group of the NORMAN network and the results of the 3rd Joint Danube Survey, produced a list of 20 substances suggested as relevant for the Danube river basin based on the target screening of 654 substances.

As part of the reporting to WISE regarding the assessment of ecological status, Member States were asked to report information regarding river basin specific pollutants at RBD level [15]. As such, the information in this chapter covers the whole Danube district, not just the surface water bodies at basin-wide level, as defined in the iRBMP. Nevertheless, the information the Member States reported is still relevant for surface water bodies at basin-wide level. Danube countries not part of the EU are not part of the assessment as they did not report to WISE.

For the reporting to WISE, Member States could report pollutants using pre-defined codes from a list set by the European Commission, and they could report pollutants to a category "other". The "other" category is not uniform among the Member States and therefore the information reported for these pollutants cannot be compared within the iRBD.

The river basin specific pollutants reported by the Member States to WISE were evaluated. The summary of the evaluation concern three essential aspects:

[15] Subsequent clarification by the Member State Germany indicates that they reported on river basin specific pollutants at the national level, i.e. they reported one list of pollutants without differentiating among the different RBDs.

1 which and how many substances have been selected for the entire basin or parts of it;

2 whether the substances have an environmental quality standard and are monitored; and

3 whether the environmental quality standards are the same or in one or another way comparable (in the same range/order of magnitude, for the same matrix).

For environmental quality standards of river basin specific pollutants, different aspects have to be taken into account to make comparisons. They can only be compared for a given substance if the specific pollutant matrix (water, sediment, biota etc), the unit (mg/L, µg/L etc.), the scale at which the standard is applied (national, water body, river basin etc.), the category (rivers, lakes, coastal water, territorial water and transitional water) and the standard (AA-EQS[16], MAC-EQS[17]) are comparable. Therefore, there are many different approaches and dimensions for such a comparison.

This assessment covers selected aspects of the topic at the iRBD scale for reasons of practicability. The most important aspects are environmental quality standards for 1) AA-EQS, 2) for the matrix water and 3) setting of the standard at the national level. The relevant results are a quantitative description of the harmonisation and cooperation with respect to river basin specific pollutants.

A summary for the number of established environmental quality standards is given in the table below. The table shows the number of Member States that have established an environmental quality standard for a certain river basin specific pollutant. This shows how many national standards defined at the national level can be compared between how many countries and describes the extent of harmonization[18].

[16] annual average environmental quality standard
[17] maximum allowable concentration environmental quality standard
[18] This analysis assumes a basin-wide view only, it does not show whether the pollutants are shared between neighbouring countries.

Table 1.1.3 Summary of the assessment of river basin specific pollutants for the Danube basin

Number of Member States	Number of river basin specific pollutants with an environmental quality standard	
	River basin specific pollutant scale	
	National [19]	All [20]
1	73	69
2	50	54
3	16	15
4	4	5
5	1	2
6	1	3
7	2	0
8	2	3
9	0	1

Source: WISE reporting 2016

There are 10 EU Member States that are part of the Danube (excluding Italy and Poland). Table 1.1.3 shows that there is not one river basin specific pollutant with an environmental quality standard that is monitored in all ten Member States in the Danube. 16 (national) environmental quality standards can be compared between at least three riparian countries. In this context, the results of the 3rd joint Danube survey should lead to significant improvements as this initiative resulted in a list of 20 pollutants that are considered to be relevant for the entire basin (see analysis of the iRBMP information above). Currently there are four pollutants with an environmental quality standard at the national level in at least four countries (that doesn't necessarily mean that the standards are the same or in the same order of magnitude). This means that there are few specific pollutants with quality standards set at the same geographical scale that are comparable in the iRBD.

River basin specific pollutants are only useful and supportive for the assessment of ecological status if an environmental quality standard has been adopted and the pollutants are monitored. The information the Member States reported to WISE was assessed using the following reporting elements:

1) RBSPvalue: If a value is provided in WISE criterion "EQS-yes" is fulfilled

2) chemicalLastMonitored: If a value>=2010 is provided in WISE the criterion "Monitored: yes" is fulfilled

[19] National means only standards for the national scale are included in the analysis.

[20] All means that the analysis takes all scales into account (i.e. national regional (sub-national), local/municipality, international RBD, RBD, sub-unit, water body, other).

For each river basin specific pollutants, the criteria mentioned above were evaluated according to the scheme given in table below. A filter is applied, considering the following schema elements: a) chemicalSubstanceCode, b) chemicalMatrix c) chemicalPurpose, d) rbspCategoryRW.

Table 1.1.4 shows how many river basin specific pollutants can be used for the assessment of ecological status. The number of pollutants that can be integrated into the assessment of ecological status ranges between 4 (Hungary) and 58 (Czech Republic). The Czech Republic, Germany and to a lesser extent also Slovakia have a comprehensive set of pollutants that have been be used for status assessment while most other countries have a short list of such status indicators. This information describes the role that river basin specific pollutants pay in the frame of the ecological assessment and whether the approaches are comparable. The results do not describe whether and how often these pollutants have been used in the frame of status assessment.

Table 1.1.4 Synthesis of environmental quality standards and sampling of river basin specific pollutants with pre-defined codes in the WISE reporting[21]

Member State or Region	Monitored: yes Environmental quality standard: yes	Not monitored Environmental quality standard: yes	Monitored: yes Environmental quality standard: no	Substances (number and percentage) that can be used for the assessment of the ecological status
Austria	9	13	85	9 / 10 %
Bulgaria	16	21	38	16 / 30 %
Croatia	7	0	11	7 / 39 %
Czech Republic	58	13	24	58 / 71 %
Germany	57	20	61	57 / 48 %
Hungary	4	0	49	4 / 8 %[22]
Romania	81	3	29	8 / 22 %
Slovenia	31	0	33	31 / 48 %
Slovakia	16	5	60	16 / 21 %

Source: WISE reporting 2016

Environmental Quality Standards for river basin specific pollutants

A comparison between environmental quality standards is given in the figure below.

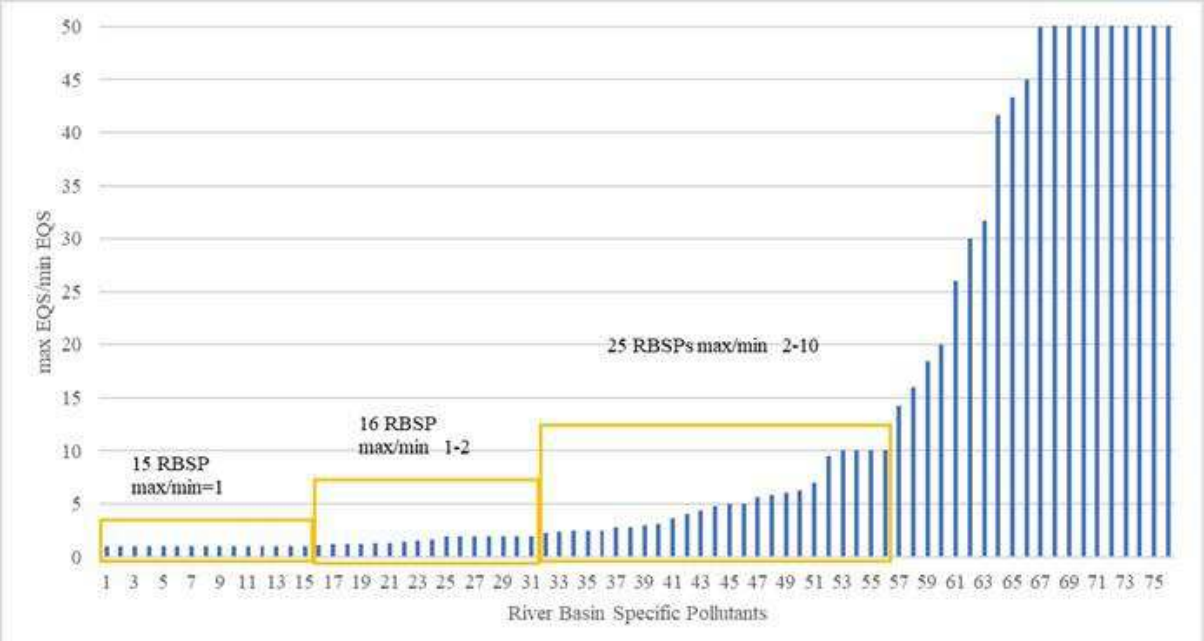
There is limited agreement between the riparian countries. There are only 15 pollutants with the same environmental quality standard but this standard is shared only between two countries (7 of them between Romania and Germany). The same measurement value leads to

[21] Information regarding "other RBSP" is not included in the table.
[22] Hungary subseiquently informed the Commission that there seems to be a mistake in the data extracted from WISE

different results of status assessment for most of the substances for most of the countries. For the majority of substances, the environmental quality standards differ by one order of magnitude or more. This makes it difficult to compare status between the Member States. The different standards used may also partly explain why some Member State identify certain substances as river basin specific pollutants while other Member States don't.

Improvements can be expected from harmonisation as a consequence of the 3rd Joint Danube Survey.

Figure 1.1.1 Ratio between the maximum and the minimum environmental quality standard for river basin specific pollutants in the Danube iRBD [23]



Source: WISE reporting 2016

Status Classification

Use of monitoring results for classification – transboundary harmonization

According to the iRBMP, the monitoring programme has made a considerable effort towards harmonisation. The findings of JDS3 are supportive to the implementation of WFD as they provide an extensive homogeneous dataset production of which was mainly based on WFD compliant methods commonly used by the Danube experts. These data do not replace the national data used for the assessment of the ecological and chemical status, being an excellent reference database serving for future efforts of method harmonization in the DRB, especially concerning the development of a concerted type-specific approach to the status assessment of large rivers.

Status classification

The iRBMP states that the outcome of the Joint Danube Survey in 2013 showed that there are still differences between national sampling and assessment approaches and underlined the need for further harmonization of the sampling methods in the Danube River Basin. The

[23] A ratio of one indicates that the Member States that have set a standard use the same value for this standard. The higher the ratio, the higher the differences in the standards used.

discussion on sampling and assessment methods shall be continued within the ICPDR and be also addressed in the frame of the next Joint Danube Survey.

There is some evidence from analysing GIS layers reported to WISE by the Member States that coordination of the status has taken place between countries in several cases. However, the iRBMPn does not make a clear statement and discusses confidence levels achieved for all data collected, which should enable meaningful assessments of status in time and space.

Intercalibration exercise and Geographical Intercalibration Group (GIG)

All Member States in the iRBD reported intercalibration types to WISE. 19 Geographical Intercalibration Group were reported for rivers, six were reported for lakes, one for transitional waters and one for coastal waters.

1.1.5. Monitoring, assessment and classification of surface water chemical status

Monitoring of chemical status in surface waters

As described under information on monitoring of ecological status, the Danube iRBD has a joint monitoring programme (Transnational Monitoring Network for the Danube) coordinated in the frame of the ICPDR. The programme is based on common methodologies. The programme includes all countries cooperating in the frame of the ICPDR.

During the 3rd Joint Danube Survey, several new analytical techniques and strategies were applied.

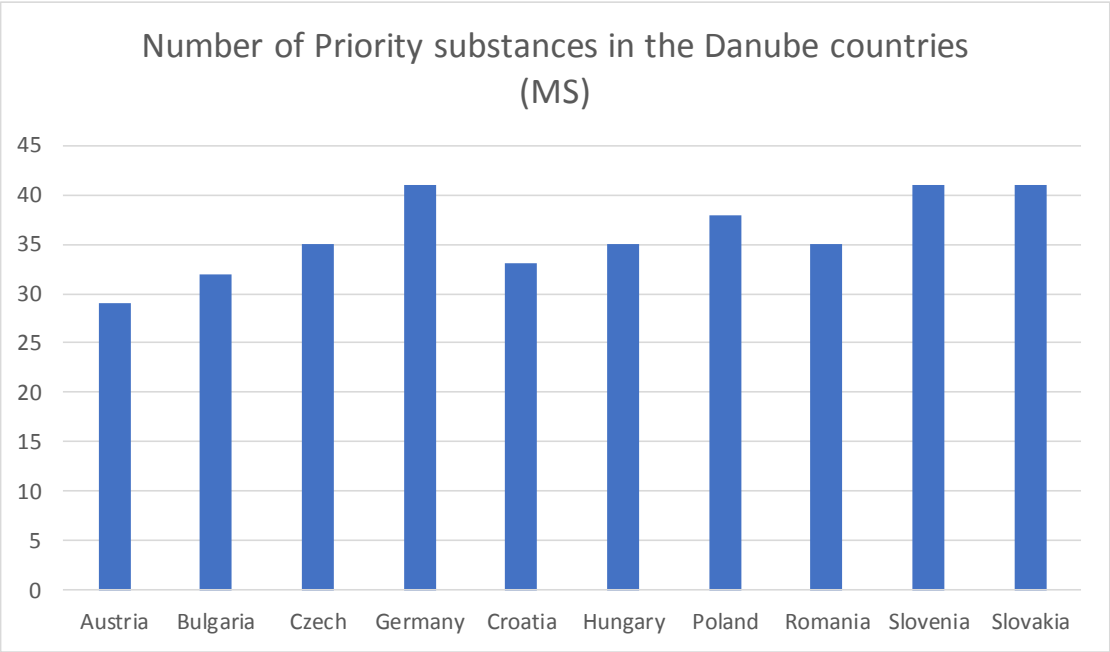
Coordination of monitoring and assessment of chemical status

Due to the 2013 update of the Environmental Quality Standard Directive, a review was carried out by the ICPDR of those priority substances for which more stringent standards were used in 2015 and this caused the change of the chemical status of a surface water bodies from good in 2009 to bad in 2015. In most of the Danube countries for this iRBMP the environmental quality standards set out in the Environmental Quality Standard Directive were applied. In Germany, Austria, Romania and the Czech Republic the new environmental quality standards for substances from the updated Directive have been used. The priority substances causing non-compliance in this iRBMP due to more stringent standards adopted were benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, fluoranthene, mercury, nickel, lead and PBDE.

In the Danube catchment all priority substances have been analysed. Figure 1.1.2 shows the number of priority substances monitored in each riparian country. Between 29 and 41

substances have been analysed in each country. Differences may originate partly in the fact that not all countries have fully implemented the amendment of 2008/105/EU in 2013/39/EU or the substances are not discharged. In combination with the numbers of samples for each substance (see Figure 1.1.3 and paragraph below) a comprehensive picture of the situation for Priority substances can be given for the entire catchment.

Figure 1.1.2 Number of Priority Substances analysed in the EU Member States of the Danube iRBD

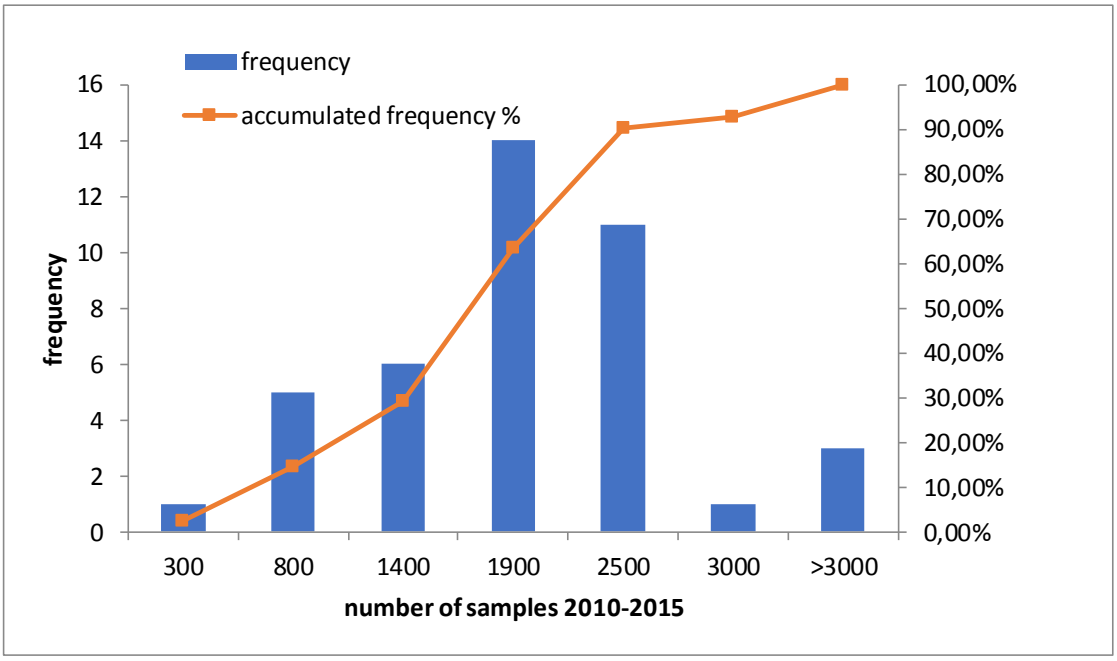


Source: WISE reporting 201624

The frequency[25] distribution of the number of priority substance samples in water from 2010 to -2015 is given in Figure 1.1.3. The number of samples per substance is for the entire catchment between 300 samples and 3500 with an average of 1700 samples in the entire water management cycle. The complete picture is displayed in Figure 1.1.3. A vast majority of substances (ca. 75 %) is analysed between 1400 and 2500 times within the 2010-15 period.

[24] Romania subsequently informed that 37 priority substances were analysed.
[25] Frequency is the number of cases (each Priority substance is a "case"') that fall into a class.

Figure 1.1.3 Frequency distribution and accumulated frequency of the number of samples per Priority Substance



Source: WISE reporting 2016

An important aspect for chemical status assessment is whether the water samples have been taken with the frequency recommended as a general rule in the WFD[26]. Monthly samples should be analysed for WFD compliant assessment of chemical status at a given site. Other frequencies need a justification based on expert judgement or technical knowledge. If the analysis excludes all frequencies that are lower than 12/year, the number of samples decreases from ~70500 to ~50100. This means that 71 % of the samples of Priority Substances in the Danube catchment can be used for WFD compliant assessment of chemical status without any further justification. In some countries, almost all samples (reported to WISE) can be used for WFD compliant status assessment without any further justification.

[26] Information reported to WISE did not differentiate between surveillance or operational monitoring. In the case of surveillance monitoring, water sampling has to been carried once a month for one year only within the management cycle. Operational monitoring requires monthly sampling every year of the management cycle.

Table 1.1.5 Percentage of Priority Substance samples (matrix water) that have been taken with the frequency recommended in the WFD (monthly samples >=12

Member State	Percentage of Priority Substance samples with a frequency >= 12/y	Samples usable for assessment of chemical status without any further explanation
Austria	43 % (out of 1 196 samples)	516
Bulgaria	71 % (out of 3 008 samples)	2 124
Croatia	23 % (out of 3 352 samples)	780
Czech Republic	50 % (out of 14 370 samples)	7 128
Germany	97 % (out of 10 845 samples)	10 496
Hungary	98 % (out of 2 181 samples)	2 136
Romania	70 % (out of 14 796 samples)	10 29627
Slovakia	85 % (out of 8 868 samples)	7 524
Slovenia	71 % (out of 8 108 samples)	5 796

Source: WISE reporting 2016

The total number of samples (see table below) was calculated by combining the information of the WISE reporting elements “chemicalfrequency” and “chemicalCycle”, as also illustrated in the reporting guidance under chapter 4.3.5.

[27] Romania subsequently informed the Commission that there was a mistake in the extracted information from WISE. The correct data would be: 88.25% (out of 20366 samples). 17973 samples have been taken with the frequency 12/year. 2393 samples have been taken with the frequency <12

Table 1.1.6 Number of analysed water samples for each Priority Substance and each national iRBD share for the period 2010-15[28]

	Number of samples for Priority substances (period 2010-2015)								
	Austria	**Bulgaria**	**Croatia**	**Czech Republic**	**Germany**	**Hungary**	**Romania**	**Slovakia**	**Slovenia**
CAS_104-40-5 - 4-nonylphenol	12	48	172	318	106	84	218	222	84
CAS_107-06-2 - 1,2-Dichloroethane	26	48	77	396	336	84	427	222	211
CAS_115-29-7 - Endosulfan	24	74	65		163	91	612	222	102
CAS_117-81-7 - Di(2-ethylhexyl)phthalate (DEHP)			101	80	52	12	52	222	86
CAS_118-74-1 - Hexachlorobenzene	28	108	65	368	163	91	557	222	102
CAS_12002-48-1 - Trichlorobenzenes (all isomers)		36		396	157	84	557	180	116
CAS_120-12-7 - Anthracene	12	68	49	345	187	84	567	222	108
CAS_122-34-9 - Simazine	44	158	100	447	566	19	601	222	320
CAS_127-18-4 - Tetrachloroethylene	26	126	221	426	336	84	543	222	211
CAS_140-66-9 - Octylphenol (4-(1,1',3,3'-tetramethylbutyl)-phenol)		36	172	318	104		219	222	84
CAS_1582-09-8 - Trifluralin		68		405	459	84	376	222	224
CAS_15972-60-8 - Alachlor	44	32	62	447	459	12	628	222	320
CAS_1912-24-9 - Atrazine	44	74	104	447	566	19	600	222	320
CAS_206-44-0 - Fluoranthene	12	36	53	417	187	84	560	222	108
CAS_2921-88-2 - Chlorpyrifos		36	67	417	291	12	382	222	320
CAS_330-54-1 - Diuron	28		44	384	566	84	514	222	114
CAS_34123-59-6 - Isoproturon	28		44	414	554	84	518	222	114
CAS_36643-28-4 - Tributyltin-cation	12				24	12		180	173
CAS_470-90-6 - Chlorfenvinphos		48	67	368	195	12	382	222	320

[28] All monitoring frequencies, all monitoring purposes and water as matrix included in this analysis.

CAS_50-29-3 - DDT, p,p'		152	65	392	157	19	635	222	130
CAS_50-32-8 - Benzo(a)pyrene	12	152	49	417	187		563	222	108
CAS_56-23-5 - Carbon tetrachloride	26	120	77	396	336	84	306	222	211
CAS_608-73-1 - Hexachlorocyclohexane		158	65	368	163	84	620	180	102
CAS_608-93-5 - Pentachlorobenzene		36	61	368	163	84	559	222	130
CAS_67-66-3 - Trichloromethane	26	120	77	426	336	84	526	222	205
CAS_71-43-2 - Benzene		36	75	426	334		546	222	24
CAS_7439-92-1 - Lead and its compounds	179	212	202	660	567	85	961	258	618
CAS_7439-97-6 - Mercury and its compounds	179	200	202	421	271	85	755	258	606
CAS_7440-02-0 - Nickel and its compounds	179	183	136	666	565	84	963	258	619
CAS_7440-43-9 - Cadmium and its compounds	179	209	311	826	303	85	999	258	619
CAS_75-09-2 - Dichloromethane	26	36	77	396	336	84	542	222	211
CAS_79-01-6 - Trichloroethylene	26	126	287	426	336	84	431	222	211
CAS_85535-84-8 - Chloroalkanes C10-13	12					12		180	82
CAS_87-68-3 - Hexachlorobutadiene		108	77	396	283	84	523	222	121
CAS_87-86-5 - Pentachlorophenol		36	67	312	106	84		222	80
CAS_91-20-3 - Naphthalene	12	48	53	345	283	84	561	222	108
EEA_32-02-0 - Total cyclodiene pesticides (aldrin + dieldrin + endrin + isodrin)				368	161		631	180	130
EEA_32-03-1 - Total DDT (DDT, p,p' + DDT, o,p' + DDE, p,p' + DDD, p,p')		80	8	368	161	7	270	180	130
EEA_32-04-2 - Brominated diphenylethers (congener numbers 28, 47, 99, 100, 153 and 154)						12		180	12

EEA_32-23-5 - Total Benzo(b)fluor-anthene (CAS_205-99-2) + Benzo(k)fluor-anthene (CAS_207-08-9)					163		556+550	180	108
EEA_32-24-6 - Total Benzo(g,h,i)-perylene (CAS_191-24-2) + Indeno(1,2,3-cd)-pyrene (CAS_193-39-5)					163		547+9	180	108

Source: WISE reporting 2016

Transboundary harmonisation of monitoring and assessment

Chemical status monitoring was coordinated in the basin based on national methodologies to some extent. The iRBMP mentions that a specific problem in the assessment of the chemical status is the application of the environmental quality standard in biota. The iRBMP further states that the lack of detection of the mercury problem in most of the Member States might be a consequence of the insufficient monitoring practices and of the fact that more stringent standards for mercury in water have not been set. In case data from other Danube countries will be available in future due to a better monitoring performance, the chemical status of water bodies in iRBD will very probably further change negatively.

In some countries a large number of priority substances is still not analysed because of lacking analytical instrumentation and because no proper methods are available.

1.1.6. Monitoring, assessment and classification of groundwater quantitative and chemical status

Joint monitoring of groundwater quantitative and chemical status

The iRBMP states that monitoring of the 11 transboundary aggregated groundwater bodies of basin-wide importance has been integrated into the Transnational Monitoring Network of the ICPDR. For groundwater monitoring in the frame of the transnational network, a 6-year reporting cycle has been set, which is in line with reporting requirements under the WFD. The monitoring programme includes both quantitative and chemical (quality) monitoring. It shall provide the necessary information to:

- assess groundwater status;
- identify trends in pollutant concentrations;
- support groundwater body characterisation and the validation of the risk assessment;
- assess whether drinking water protected area objectives are achieved and support the establishment; and
- assessment of the programmes of measures and the effective targeting of economic resources.

According to the iRBMP, to select the monitoring sites, a set of criteria has been applied by the countries, such as aquifer type and characteristics (porous, karst and fissured, confined and unconfined groundwater) and depth of the groundwater body (for deep groundwater bodies, the flexibility in the design of the monitoring network is very limited). The flow direction was also taken into consideration by some countries, as well as the existence of associated drinking water protected areas or ecosystems (aquatic and/or terrestrial).

As regards quantitative monitoring, WFD requires only the measurement of groundwater levels but the ICPDR has also recommended monitoring of spring flows; flow characteristics and/or stage levels of surface water courses during drought periods; stage levels in significant groundwater dependent wetlands and lakes and water abstraction as optional parameters.

Coordination and harmonization of assessment of quantitative and chemical status

According to the iRBMP, the Danube countries used different methodologies for the assessment of quantitative and chemical status; and the establishment of threshold values, trend and trend reversal assessment. Despite there being overall coordination facilitated by the ICPDR Groundwater Task Group, further harmonisation of the national methodologies is still needed. Data gaps and inconsistencies are still available in the collected data, resulting in uncertainties in the interpretation of data. To achieve a harmonisation of data sets for transboundary groundwater bodies, there is a need for intensive bi- and multilateral cooperation. In addition, the interaction of groundwater with surface water or directly dependent ecosystems need further attention.

The results of the status assessment of the 11 transboundary aggregated groundwater bodies of basin-wide importance are provided for the whole national part of a particular groundwater body (so called: aggregated groundwater body). If a national part of an aggregated groundwater body consists of several individual national-level groundwater bodies, then poor status in one national-level part is decisive in characterising the whole national part of aggregated transboundary groundwater body as having poor status.

To indicate the diversity of different status results of individual groundwater bodies within aggregated groundwater bodies a concept of the aggregation confidence levels was developed by the ICPDR. The reason of introducing these specific confidence levels for the iRBMP was the need to distinguish between the cases when all individual groundwater bodies in an aggregated groundwater body have the same status (high confidence) or not (medium confidence) or the assessment is based on the risk assessment data (low confidence). Information about the WFD-related confidence levels of status assessment for the individual national (non-aggregated) groundwater bodies can be found in the national plans and in WISE.

1.1.7. Designation of heavily modified water bodies, artificial water bodies and definition of good ecological potential

Cooperation and joint activities regarding heavily modified water body designation

The 2004 Danube Basin Analysis included provisionally identified heavily modified water bodies and artificial water bodies on the basis of specific basin-wide criteria. For the 2009 iRBMP, the Danube countries reported the nationally identified artificial and heavily modified water bodies. The Non-EU Member States performed a provisional identification based on criteria outlined in the 2004 Danube Basin Analysis, whereas all water bodies have been fully considered for the designation. Updated information on the designation of heavily modified water bodies and artificial water bodies was reported by the Danube countries for the 2013 Danube Basin Assessment and the 2015 iRBMP.

For the first iRBMP, the designation of heavily modified water bodies for rivers and transitional waters was performed for:

- The Danube River
- Tributaries in the iRBD > 4,000 km^2.

For the Danube River, the Danube countries agreed on a harmonised procedure for the final designation (the designation for Croatia, Serbia and the Ukraine was provisional) and on specific criteria for a step by step approach. The designations for the tributaries are based on national methods and respective reported information. However, the preconditions for the basin-wide final designation (regarding both the Danube River and tributaries > 4,000 km^2) are to follow the EC HMWB CIS guidance document. The designations for coastal and lake water bodies are based on national methods. The assessment of the GIS layers for the transboundary water body shown in Map 1.1.3 (transboundary water body between Austria and Germany) and Map 1.1.5 (transboundary water body between Romania and Bulgaria) show a heavily modified water body designation from both Member states involved.

Cooperation and Joint methods and approaches for the determination of Good Ecological Potential (GEP)

The iRBMP states that ecological potential for surface water bodies is assessed on the basis of specific typologies and reference conditions, which have been defined by individual EU Member States according to WFD Annex V. The iRBMP does not indicate whether international coordination took place[29].

[29] Subsequent clarification by the ICPDR indicates that the MA Expert Group is in charge of coordinating approaches and methods assessing the status/ potential in the Danube basin. As the definition /delineation of GEP is directly linked to the identification of hymo mitigation measures, and those which do not have a

Member States were requested to report to WISE information on how good ecological potential is assessed. Reporting to WISE by the Member States indicates Bulgaria, the Czech Republic, Germany, Slovakia and Slovenia use the CIS approach, Austria and Romania use a hybrid Prague /CIS approach. Austria, Bulgaria and Slovenia assess good ecological potential at water body level, whereas Germany and Slovakia assess for groups of HMWBs/AWBs of the same use/physical modification. The most commonly used elements are benthic invertebrates (6 Member States) and fish (5 Member States). As with ecological status, the use of at least one quality element by all Member States could be used as the least common denominator for comparable assessments of ecological potential. Similar mitigation measures were reported.

1.1.8. Environmental Objectives and Exemptions

The iRBMP states that details on the application of exemptions related to Art. 4 (4), (5), and (7) are part of the national Part B reports. There are no joint methods for applying exemptions in the basin but coordination has taken place in some instances. The transboundary water body shown in Map 1.1.4, which is shared by Hungary and Slovakia, is also exempted under Article 4(4). Thereby Hungary refers to natural conditions, while Slovakia refers to technical feasibility. For the transboundary WB shown in Map 1.1.5, both Romania and Bulgaria have both reported Art 4 (4) justified by technical feasibility, which is an indication of coordination[30].

Austria, Bulgaria, Germany, Hungary, Romania and Slovakia reported to WISE that exemptions have been coordinated for surface water bodies. The other Member States in the Danube - Czech Republic, Croatia and Slovenia - reported that they were not. A similar situation is found with respect to reporting on coordination of exemptions for groundwater bodies. Austria, Germany and Hungary reported to WISE that exemptions have been coordinated for groundwater bodies but Romania and Slovakia reported that they were not. Croatia, Czech Republic and Slovenia do not have transboundary groundwater bodies in their share of the iRBD. In the case of Bulgaria, none of the transboundary groundwater bodies have exemptions as they are in good chemical and quantitative status.

With respect to the application of Article 4 (7), future infrastructure projects (until 2021), including brief descriptions (if provided), are compiled in Annex 7 of the iRBMP.

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significant impact on specific uses or wider environment in particular, the HYMO Task group is supporting the MA EG in defining good ecological potential for HMWBs. Means, there is a coordination by both expert groups working in cooperation on this aspect.

[30] Indeed, additional details provided by the Member State Bulgaria indicates that joint coordination took place during the Management Planning Working Group on 19 May 2015 and 14 March 2016 and the Joint Commission on Water Management 15-16 March 2016. The Member States agreed on further exchange of data and information for coordination of WISE RBMP reporting on the common SWB (Danube River) in the line with the WFD requirements.

1.1.9. Programme of measures

General information

A Joint Programme of Measures (iPoM) has been developed and includes joint activities agreed by the countries sharing the iRBD that target at achieving aims for the basin-wide scale. Joint significant water management issues have been defined, a common vision and management objectives have been set and measures of basin-wide importance have been selected. The respective management objectives describe the steps towards the environmental objectives in the iRBD. In addition, future development scenarios were developed and the estimated effect of measures on the basin-wide scale is assessed.

The iPoM was developed along the line of the identified joint significant water management issues. The iPoM builds upon the results of the pressure analysis, the water status assessment and includes, as a consequence, measures of basin-wide importance oriented towards the agreed visions and management objectives for 2021.

Joint implementation mechanisms and link to national implementation

The iRBMP describes how the measures will be implemented through national and international mechanisms. The ICPDR serves as the coordinating platform between the countries to compile multilateral and basin-wide issues at Part A (basin-wide level) of the iRBD. The iRBMP provides links to national RBMPs, aiming to further improve the linkage between the international Danube basin-wide level and the national level. The iRBMP states that the national plans (Part B) should reflect the four significant water management issues identified on the basin-wide level and indicate how far they are relevant as well on the national level.

According to the iRBMP, the Joint Programme of Measures is based on the national programmes of measures. Priorities for the effective implementation of national measures on the basin-wide scale are highlighted and are the basis of further international coordination. Some additional joint initiatives and measures on the basin-wide level that show transboundary character are presented as well. They are undertaken through the framework of the ICPDR.

The effect of national measures on the Danube basin-wide scale is estimated and presented. Key findings and conclusions on identified measures and their basin-wide importance, as well as priorities regarding their implementation on the basin-wide scale, are summarised as part of the iPoM. The implementation of the measures of basin-wide importance is ensured through their respective integration into the national programme of measures of each Danube country.

Joint implementation of measures in the first management cycle

Each chapter of iPoM - organic pollution, nutrient pollution, hazardous substances pollution, hydromorphology and groundwater - includes a sub-section on progress in the implementation of measures from the first iRBMP.

For organic pollution, the first iRBMP included major efforts for the improvement of the urban waste water and industrial sector by upgrading or constructing sewer systems and waste water treatment plants as well as introducing Best Available Techniques (BAT) at the main industrial facilities. This resulted in considerable reduction of organic pollution.

For nutrient pollution, the first iRBMP summarized, on the basin-wide level, the basic measures in the urban waste water, industrial and agricultural sectors and the implementation of the ICPDR Best Agricultural Practice (BAP) recommendations as the main measures to address nutrient emissions.

For hazardous substances pollution, the Danube countries took significant steps in order to close the information gap on hazardous substances pollution. This included prioritisation of the emerging pollutants, data collection on the major point sources releasing hazardous substances and accident risk analysis of the industrial and contaminated sites.

For hydromorphology, 168 measures to improve river continuity were agreed on national level to be implemented by 2015. 80 measures have been completed and 45 are in the construction phase. For 36 measures the planning process is on-going, while for seven measures the implementation process was not started. The measures for reconnection are completed for three adjacent wetlands/floodplains and some of the planned measures have already been implemented. Six adjacent wetlands/floodplains still need to be reconnected. Construction works were ongoing for two wetlands/floodplain. In the first iRBMP 139 measures addressing hydrological alteration (impoundments, water abstractions, hydropeaking) were indicated to be implemented by 2015.

For groundwater, similar progress has been described for quality and quantity issues. Poor quantitative status has been tackled by Hungary through the revision of relevant legislation by 2013 concerning the licensing of domestic wells, construction and rehabilitation projects, demand management measures and inter alia, promotion of adapted agricultural production such as low water requiring crops in areas affected by droughts. Serbia focused its measures on research, development and demonstration projects and construction designs for new groundwater sources.

1.1.10. Measures related to water scarcity and abstractions

Joint identification of Pressures and Objectives

A basin-wide questionnaire indicated that water scarcity and drought are not considered as a significant water management issue for the majority of the countries. Czech Republic, Hungary, Moldova, Montenegro and Serbia consider them as a significant water management issue at national level. The main sectors affected by water scarcity and drought include agriculture, water supply, biodiversity, other energy production, hydropower, navigation and public health. The ICPDR concluded that water scarcity and drought is not considered as an issue requiring coordination and management on the basin-wide level in the second cycle. This is also due to the fact that the relevance of the issue and the situation is differing between the countries and regions within the iRBD.

Hydrological alterations impact the status of water, and surface water abstraction was identified as a key pressure that require measures on the basin-wide scale. Water abstraction from groundwater bodies of basin-wide importance is not a significant pressure in the Danube but a cause for failure in quantitative status in Serbia and Hungary.

For surface water bodies, the ICPDR's basin-wide vision for hydrological alterations is that they are managed in such a way, that the aquatic ecosystem is not influenced in its natural development and distribution. The management objective for surface water abstraction is enabling ecological flow, ensuring that the biological quality elements are in good ecological status respectively good ecological potential, and the flow requirements for protected species and habitats are met.

For groundwater bodies, the ICPDR's basin-wide vision is that the water use is appropriately balanced and does not exceed the available groundwater resource in the Danube River Basin District, considering future impacts of climate change. Management objectives were defined up to 2021 for all iRBD sharing countries, namely that over-abstraction of groundwater bodies within the iRBD is avoided by sound groundwater management. In addition, a management objective for solely EU Member States was defined: implementation of the WFD requirements that the available groundwater resource is not exceeded by the long-term annual average rate of abstraction.

Coordination on addressing water scarcity and droughts and abstractions

As it was concluded that water scarcity and drought pressures are not relevant at basin-wide scale, measures have not been addressed by the joint body and there is no joint approach in the iPoM. However, a specific chapter of the iRBMP is dedicated to water scarcity and droughts. Maintaining an exchange on the topic is considered to be beneficial, also in relation

to the ongoing discussions on climate change adaptation, what should be facilitated via the exchange of best practice examples.

Water scarcity and drought measures were included in a number of Danube countries' national PoMs, whereas specific measures are planned or already under implementation (e.g. increase of irrigation efficiency, reduction of leakages in water distribution networks, drought mapping and forecasting, education of public on water-saving measures, market-based instruments, wastewater recycling and rain water harvesting).

Measures to address pressures

Measures regarding water scarcity/abstraction are included in the iRBMP.

For 21 surface water abstractions, restoration measures to ensure ecological flows are planned to be implemented by 2021. For groundwater abstraction, measures focus on abstraction controls (registries). References are also made to explore solutions for preventing the deterioration of groundwater quantity and terrestrial and aquatic ecosystems dependent on groundwater, for example through restoring wetland areas that are in direct contact with aquifers.

1.1.11. Measures related to pollution from agriculture

Joint identification of Pressures and Objectives

Nutrient pollution from agriculture is a significant pressure in the iRBD. The iPoM defined general management objectives for pollution i.a. from agriculture at the basin scale, namely:

- Further reduction of the organic pollution of the surface waters from the major agricultural installations by implementing the Industrial Emissions Directive (EU Member States) and introducing Best Available Techniques at a specified number of industrial facilities (Non-EU countries).
- Further reduction of the total amount of nutrients entering the Danube and its tributaries and the nutrient loads transported into the Black Sea.
- Further reduction of the nutrient point source emissions by the implementation of the management objectives described for organic pollution as they address the nutrient pollution as well.
- Further reduction of the nitrogen pollution of the ground and surface waters by the implementation of the EU Nitrates Directive according to the developed action programs within the designated vulnerable zones or the whole territory of the country (EU Member States).

- Ensuring sustainable agricultural production and soil nutrient balances and further reduction of the diffuse nutrient pollution by implementation of basic and cost-efficient supplementary agri-environmental measures linked to the EU Common Agricultural Policy (EU Member States) and by implementation of best management practices in the agriculture considering cost-efficiency (Non-EU countries).
- Further reduction of the diffuse pollution of agricultural chemicals by implementation of supplementary measures linked to EU Common Agricultural Policy, implementing the Sewage Sludge Directive and the Pesticides Directive (EU Member States) and by implementation of best management practices in the agriculture (Non-EU countries).
- Ensuring the safe application of chemicals (EU Member States: by implementing inter alia the Plant Protection Products Directive, the REACH Regulation and the Biocides Regulation).
- Nutrient pollution from agriculture was reported to be addressed by all of the EU Member States in the iRBD.

All of the EU Member States except Austria, Slovenia and Slovakia reported to WISE that they identified general management objectives regarding nutrient from agriculture for their national shares of the iRBD. In addition to the general management objectives, Bulgaria, Croatia, Germany, Hungary and Romania reported to WISE that they set quantitative management objectives for reducing nitrogen and phosphorus pollution.

Coordination on addressing pollution from agriculture

The iPoM includes measures to address pollution from organic, nutrient and hazardous substances pollution. Joint measures to address agriculture pollution are also included. One joint measure mentioned is the elaboration of basin-wide management strategies with the ultimate aim to reduce nutrient loads of surface and coastal waters. A set of measures related to the concept of best agriculture practice is also set and implemented in the entire Danube Basin. The concept has been applied to different extent among the countries to manage inter alia diffuse nutrient emissions that are partly covered by the Nitrates Directive for nitrate pollution in the EU Member States. It concerns appropriate land management activities (source and transport control measures) that are able to prevent, control and minimize the input, mobilization and transport of nutrients from fields towards water bodies.

In addition, the ICPDR intends to organize in close cooperation with the agricultural sector and all relevant stakeholders a broad discussion process with the aim of developing a guidance document on good agricultural practices in the iRBD. The objective of the guidance would be to recommend agricultural practices and policy instruments towards the reduction of water pollution caused or induced by nutrients from agricultural sources. The document would provide with a sound knowledge base on the agricultural sector and the linkages to

water environment, highlight the existing relevant European legislative framework and financial mechanisms, summarize cross-compliance as well as supplementary measures related to the Common Agriculture Policy and other financial programs. The guidance document would also recommend potential policy tools and cost-effective measures supported by case studies in order to facilitate the introduction of good agricultural practices within the iRBD.

Measures to address pressures

The iPoM includes national measures that address the joint management issues and objectives set in the international plan.

For organic pollution, the iRBMP states that it recommended that the Non-EU Member States introduce regulations for manure and sewage sludge application on agriculture fields. Reference is made to the implementation of the IED directive and the application of best available technology is recommended for Non-EU Member States, for which the ICPDR developed guidance documents. For nutrient and hazardous substances pollution, reference is also made to implementation of the Nitrates Directive and the Pesticides Directive, as well as to the measures linked to the EU CAP.

The iPoM refers to the implementation of agri-environmental measures to address agriculture pollution. They cover a wide range of measures including nutrient management (e.g. nutrient balance calculations, optimization of fertilization), modified cultivation methods (restricted crop rotation, catch crops, green manure crops), land use changes (maintenance of grasslands, buffer strip allocation), soil conservation (erosion control techniques, ensuring proper soil coverage, maintenance of humus content in topsoil, maintenance of tile drainage systems) and additional natural water retention measures (wetlands, grass filters and grassed waterways).

Annex 13 of the iRBMP presents tables on the implementation of the Nitrates Directive in the Member States and which measures they implement as a result, for example manure storage requirements, spreading of nutrients restrictions, restrictions of some agricultural activities on slopes and afforestation (in the context agri-environmental measures under the Common Agriculture Policy). The Annex also indicates which of the iRBD sharing countries implement the following measures:

- Organic farming: Austria, Bulgaria, Germany, Croatia, Czech Republic, Moldova, Romania, Serbia, Slovakia, Slovenia and Ukraine.
- Measures against erosion: buffer strips: Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Moldova, Romania, Serbia, Slovakia, Slovenia and Ukraine.

- Erosion-minimizing cultivation systems (catch crops): Austria, Bulgaria, Czech Republic, Germany, Hungary, Romania, Serbia, Slovakia, Slovenia and Ukraine.
- Re-establishment of wetlands: Austria, Hungary, Moldova, Romania, Slovenia and Ukraine
- Nutrient balances: Austria, Bulgaria, Czech Republic, Germany, Hungary, Romania, Serbia, Slovakia and Slovenia.
- Farm advice: Austria, Bulgaria, Croatia, Germany, Czech Republic, Hungary, Moldova, Romania, Serbia, Slovakia, Slovenia and Ukraine.

Montenegro did not report to the ICPDR.

With respect to prioritisation approach for relevant measures, the iRBMP states that the critical area concept is an emerging approach in several countries that aims to find technically and economically feasible measures. It considers that management activities should focus on those areas where the highest emissions come from and where the highest fluxes from land to water probably are transported. Targeting management actions to these critical fields can provide cost-efficiency (high river load reduction at minimal implementation costs and area demand). Nevertheless, it should be taken into account that due to the longer time necessary for an effective management of diffuse nutrient pollution (longer residence time of groundwater, stored nutrients in bottom sediment of reservoirs) the water quality impacts of any changes in agriculture induced by the implementation of the Nitrates Directive or best agricultural practices recommendations will probably not be instantly visible but after several years or even decades only.

In order to enable a comparable grouping of measures in the national and international programme of measures, the European Commission introduced the concept of Key Types of Measures (KTMs) in 2012 to simplify reporting[31]. KTMs are groups of measures identified by Member States in the PoMs which target the same pressure or purpose. The individual measures included in the PoM (being part of the RBMP) are grouped into KTMs for the purpose of reporting. The same individual measure can be part of more than one KTM because it may be multi-purpose. All the Member States reported applying KTM2 - Reduce nutrient pollution from agriculture and KTM3 - Reduce Pesticides pollution from agriculture. Austria, Bulgaria, Croatia, Germany and Hungary also reported applying KTM12 - Advisory services.

[31] The need for KTMs was borne out of the large differences in the level of detail reported in 2010 by the Member States. Some Member States reported 10-20 measures whilst others reported hundreds or even thousands.

1.1.12. Measures related to pollution from sectors other than agriculture

Joint identification of Pressures and Objectives

Pollution from sectors other than agriculture is addressed by all the Member States. Coordination took place to identify pressures stemming from pollution from sectors other than agriculture.

The iPoM defined management objectives for pollution from sectors other than agriculture at the basin scale, namely:

- Further reduction of the organic pollution of the surface waters via urban waste water within the iRBD by implementing the Urban Waste Water Treatment Directive (EU Member States) and by constructing a specified number of wastewater collecting systems and municipal wastewater treatment plants (Non-EU Member States).
- Further reduction of the total amount of nutrients entering the Danube and its tributaries and the nutrient loads transported into the Black Sea.
- Further reduction of the nutrient point source emissions by the implementation of the management objectives described for organic pollution as they address the nutrient pollution as well.
- Further reduction of the organic pollution of the surface waters from the major industrial installations by implementing the Industrial Emissions Directive (EU Member States) and introducing Best Available Techniques at a specified number of industrial facilities (Non-EU Member States).
- Further decrease of the phosphorus point source pollution by implementation of the EU Regulation on the phosphate-free detergents (EU Member States) and by reduction of phosphates in detergent products (Non-EU countries).
- Closing knowledge gaps on the hazardous substances of Danube basin relevance.
- Further elimination/reduction of the amount of hazardous substances entering the Danube and its tributaries (EU Member States: by implementing the Environmental Quality Standards Directive).
- Further reduction of the point source emissions by the implementation of the management objectives described for organic pollution as they address the hazardous pollution as well.
- Ensuring the safe application of chemicals (EU Member States: by implementing inter alia the REACH Regulation).
- Minimisation of the risk of accidental pollution events by using enhanced technologies and putting in place appropriate safety measures (EU Member States: by implementing the Seveso, Mining Waste and Industrial Emission Directives, Non-EU Member States:

by fulfilling the obligations/adopting recommendations of the UNECE Convention on the transboundary effects of industrial accidents).

Coordination on addressing pollution from sectors other than agriculture

The iPoM includes measures to addresses organic, nutrient and hazardous substances pollution from sectors other than agriculture. A number of joint measures are described as well. The ICPDR has been supporting the introduction of the phosphate-free detergents in the Danube countries which committed themselves at ministerial level to initiate the introduction of a maximum limit for the phosphate content of the consumer detergents. In addition, the Danube countries have made efforts in order to ensure effective and quick responses to transboundary emergency cases. The Accident Emergency Warning System (AEWS) was developed to timely recognise emergency situations in order to help the national authorities to put safety measures timely into action.

Measures to address pressures

For the most part, the iRBMP focuses on basic measures when describing the measures of basin-wide importance, e.g. implementation of the Urban Waste Water Directive, SEVESO, Mining Waste Directive, UNECE Convention on the transboundary effects of industrial accidents, the Industrial Emissions Directive, the Sewage Sludge Directive, REACH Directive and the EQS Directive.

Annex 12 provides an overview of basic and supplementary measures related to progress in urban wastewater and industrial sectors by 2015. The focus is on the UWWTD and IED Directives as well as P-free detergents and BAT.

All Member States reported KTMs to WISE, mainly related to the urban waste water (KTM1 - Construction or upgrades of wastewater treatment plants; KTM21- Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure) and industrial sectors (KTM4 - Remediation of contaminated sites (historical pollution including sediments, groundwater, soil); KTM15 - Measures for the phasing-out of emissions, discharges and losses of Priority Hazardous Substances or for the reduction of emissions, discharges and losses of Priority Substances; KTM16 - Upgrades or improvements of industrial wastewater treatment plants).

1.1.13. Measures related to hydromorphological alterations

Joint identification of Pressures and Objectives

Hydromorphological pressures are a basin-wide issue in the Danube. Three key hydromorphological pressure components of basin-wide importance have been identified, namely interruption of longitudinal river continuity and morphological alterations; disconnection of adjacent wetlands/floodplains, and; hydrological alterations, provoking changes in the quantity and conditions of flow.

The iPoM defined general management objectives for river continuity, namely:

- Construction of fish migration aids and other measures at existing migration barriers to achieve/improve river continuity in the Danube River and in respective tributaries to ensure self-sustaining sturgeon populations and specified other migratory fish populations.
- Specification of number and location of fish migration aids and other measures to achieve / improve river continuity, which will be implemented by 2021 by each country.
- New barriers for fish migration imposed by new infrastructure projects will be avoided; unavoidable new barriers will incorporate the necessary mitigation measures like fish migration aids or other suitable measures already in the project design according to BEP and BAT.
- Restoration, conservation and improvements of river morphology, habitats and their connectivity for self-sustaining sturgeon populations and other type-specific fish populations in the Danube River and the respective tributaries, also contributing to the improvement of other aquatic biological quality elements.
- Specification of location and extent of measure for the improvement of river morphology, which will be implemented by 2021 by each country.
- Closing the knowledge gaps on the possibility for sturgeon and specified other migratory species to migrate upstream and downstream through the Iron Gate I & II dams including habitat surveys, based on progress achieved on this issue. If the results of these investigations will be positive the respective measures should be implemented and step by step a similar feasibility study will be performed for the Gabčíkovo Dam and in case of positive results also for the Upper Danube.

All the Member States reported measures addressing river continuity, other hydromorphological measures and sediment management to WISE. All the Member States except Slovakia and Slovenia reported to WISE that they set general management objectives to address hydromorphological alterations. In addition, all the Member States, except Slovenia and Slovakia reported establishing quantitative management objectives.

Coordination on addressing hydromorphological alterations

The iPoM includes measures to addresses hydromorphological alterations, which includes interruption of river continuity and morphological alterations; disconnected adjacent wetlands/floodplains; and hydrological alterations.

Joint measures have been included in the iPoM. A major focus for measures in the iRBD is on establishing/improving migration for long and medium distance migrants of the Danube River and the connected lowland rivers that are addressed at the Roof level. In support for implementing fish migration measures, the ICPDR organised in 2012 a workshop on river and habitat continuity. The workshop allowed for exchange between fish migration experts and for the elaboration of the Technical Paper "Measures for ensuring fish migration at transversal structures", summarising the latest knowledge on fish migration aids.

The iPoM also describes the project "Towards a Healthy Danube – Fish Migration Iron Gates I & II". The project was initiated in 2013 and completed in October 2014. The project allowed for further investigations on potential technical solutions and for the elaboration of a road map, providing guidance for a project process that leads to a feasibility analysis of the implementation of fish migration measures at both Iron Gates I and II. Further steps are now being carried out jointly to fulfil the roadmap.

Within the iRBD, river continuity measures are being planned jointly taking into account ecological prioritisation process in the Danube. In order to enable a sound estimation of where to target measures most effectively at the basin-wide scale, an ecological prioritisation of measures to restore river and habitat continuity in the iRBD was carried out for the first iRBMP. The elaborated approach provided indications on the step-wise and efficient implementation of restoration measures at the basin-wide scale. It provided useful information on the estimated effects of national measures in relation to their ecological effectiveness at the basin-wide scale and served as a supportive tool for a number of countries in the implementation of measures. Therefore, it also supports feedback from international to national level and vice versa. The ecological prioritisation approach has been further developed and updated for the DRBM Plan – Update 2015.

To avoid or mitigate new hydromorphological pressures, the iPoM includes a sub-chapter on future infrastructure projects. The management objectives include precautionary measures (best environmental practices and best available techniques) that should be implemented to reduce and/or prevent impacts on water status. In the framework of the ICPDR, respective guidance has been developed in this regard for inland navigation (Joint Statement) and hydropower (Guiding Principles). Both documents describe respective processes in detail and the organisation of regular meetings.

Measures to address pressures

The Danube countries have reported on the measures that will be undertaken by 2021 to ensure fish migration (where still needed) e.g. by the construction of fish migration aids. Measures that will be taken are intended to ensure both up and downstream migration of fish and will also help to improve the migration of other fauna. The functioning and maintenance of function of fish migration aids is important to be monitored and assessed. The iRBMP summarises the numbers of measures to address river morphology and their implementation status but does not specify which measures are being implementing in the iRBD sharing countries.

All the Member States reported to WISE that they are applying KTM5 'Improving longitudinal continuity' and KTM6 'Improving hydromorphological conditions of water bodies other than longitudinal continuity'.

Other hydromorphological measures have been addressed in the iPoM. These relate to the restoration of wetlands and floodplains and hydrological alterations. The iRBMP mentions that the Danube countries have to report information on national wetlands/floodplains >500 ha with a potential to be reconnected to the adjacent river and respective reconnection measures to be undertaken by 2021 or beyond regarding WFD art. 4(4). As regards hydrological alterations, the iRBMP describes river impoundments, water abstraction and hydropeaking.

1.1.14. Economic analysis and water pricing policies

An economic analysis has been undertaken and is part of the iRBMP. The Danube Basin Analysis (article 5 report) was updated in 2013; it includes an economic analysis of water use. The iRBMP includes a summary chapter of this economic analysis. The summary includes sub-chapters on 1) description of relevant economic water uses and economic meaning (including characteristics of water services and uses; 2) cost recovery; 3) projection trends in key economic indicators and drivers up to 2021; and 4) economic assessment of measures (including sub-chapters on cost-effectiveness analysis; cost-benefit analysis and approaches towards disproportionality of costs); as well as 5) a summary and key findings section.

The information on economic analysis and water pricing policies summarized in iRBMP is based on the joint work performed for the 2013 Update of the Danube Basin Analysis.

Two questionnaires were developed and sent out in 2013 for the collection of information on economics from the Danube countries (the information was updated, if necessary, by the Danube countries in 2015). The questionnaires treat inter alia water pricing, cost recovery and environmental and resource costs - topics which are closely interlinked. Annex 11 of the

iRBMP presents a synthesis on the approaches in place in the Danube countries. The collected information is summarised in form of tables.

A second survey was undertaken in the aftermath of the ICPDR Task Group on Economics meetings in Zagreb and Vienna (2014/2015), and concerns approaches towards Disproportionality of Costs and Exemptions, as well as projections of trends regarding socio-economic developments. The results of this survey are presented in the Chapter 7 Economic Analysis and in the Annex 11 of the iRBMP.

The overview tables, as well as the summary in the main body of the iRBMP, highlight the commonalities and differences in approaches among the Member States and third countries in the Danube. The iRBMP states that cost-effectiveness analysis is currently only addressed at national level and no basin-wide cost-effectiveness analysis was performed for the iRBMP. However, the planning period until 2021 could be used to "pave the way" for a possible use of cost-effectiveness analysis in the third management cycle, when, as can be expected, supplementary measures will gain importance for reaching WFD objectives for certain significant water management issues (such as nutrient pollution).

1.1.15. Considerations specific to Protected Areas

A joint Protected Areas inventory between the countries sharing the iRBD is part of the iRBMP. At the Danube basin-wide scale, Protected Areas for the protection of habitats and species, nutrient sensitive areas, including areas designated as nitrates vulnerable zones and other protected areas in Non-EU Member States have been compiled and are updated. Transboundary Protected Areas are not specifically mentioned in the joint inventory. Annex 10 to the iRBMP provides a detailed list of the Protected Areas in the basin.

Other types of protected areas according to WFD Article 6, Annex IV (e.g. areas designated for the abstraction of water intended for human consumption under Article 7 WFD, areas designated for the protection of economically significant aquatic species, or bodies of water designated as recreational waters, including areas designated as bathing waters under Directive 76/160/EEC, repealed by Directive 2006/7/EC) are not addressed at the basin-wide level but are subject to national registers. Out of a total of 1,487 protected areas, 886 (60 %) have been designated following the EU Habitats Directive and 319 (21 %) are bird protected areas (EU Birds Directive), 43 (3 %) areas are protected under both the Habitat as well as Birds Directive. All of them are Natura 2000 sites designated in EU Member States, 239 (16 %) are protected area types reported by EU Member States and Non-EU Countries and are mainly nature reserves and biosphere reserves. A significant share of designated Natura 2000 sites is located along the Danube River.

The iRBMP has a sub-chapter on interlinkages between river basin management and nature protection and highlights how measures under the WFD and the Birds and Habitats Directives need to be coordinated and included in the WFD PoM. The iPoM refers to Protected Areas when describing measures to improve fish migration along the Danube.

1.1.16. Climate Change and droughts

Adaptation to climate change is one of the "Integration" issues in the iRBD. The iRBMP also explicitly mentions that an ICPDR Strategy on Adaptation to Climate Change was developed in 2012 and will be updated in 2018.

The Strategy was initiated through a request by the Danube Ministerial Conference 2010. Based on a scientific study on Climate Change in the Danube Basin, the adaptation strategy was adopted in 2012. The ICPDR's Climate Change Adaptation Strategy provides guidance on adaptation measures for the Danube River Basin, such as restoring water retention areas, addressing water scarcity and drought, or taking important steps for the sustainable management of risks stemming from floods.

The Strategy document has a section on framework conditions, knowledge base (including details in impacts of climate change in the basin), guiding principles and next steps, which include information specific to the WFD. The section on climate change impacts includes information on water scarcity and droughts, as well as other impacts like flooding. Adaptation measures that address droughts are also included.

The Strategy states that the guiding principles should be generally applicable, and assist relevant experts, active in the framework of the ICPDR, during the next steps in the implementation process of the WFD and FD in the Danube River Basin. The guiding principles are particularly relevant for the planning process towards the second iRBMP and the first Flood Risk Management Plans. However, they are also applicable to the subsequent steps of WFD and FD implementation, at both the national and international level.

The guiding principles are structured according to the following five main fields of actions, allowing orientation for relevant experts dealing with specific issues in the frame of river basin management:

- Climate modelling, projections, scenarios, potential impacts and uncertainty
- How to build adaptive capacity for management under climate change?
- WFD and adaptation
- Flood risk management and adaptation
- Drought management, water scarcity and adaptation

The contracting parties used the adaptation strategy to decide on adaptation measures as part of planning their national RBMPs and for the elaboration of the iRBMP and the international Flood Risk Management Plans.

First adaptation activities will be implemented during the second management cycle. In particular “no-regret-measures” and “win-win-measures” have been considered as part of the iPoM and the national PoMs. One of the key challenges for future climate adaptation activities will be the further closing of knowledge gaps as outlined in the Strategy. The iPoM also went through a climate proofing exercise.

1.1.17. Recommendations

Important efforts have been made in the Danube iRBD on international coordination addressing a range of water management aspects. The following recommendations can be made to further improve cooperation:

- There is a need to futher coordinate transboundary water body delineation and typology, particularly in the context of EU approximation of non-EU Member States.
- Coordination on environmental quality standards for river basin specific pollutants should continue towards a more coherent set of substances and thresholds.
- In some countries a large number of priority substances is still not analysed because of lacking analytical instrumentation and because no proper methods are available. Here, the monitoring practices need further improvement in terms of method development, capacity building and enhancing of equipment.
- Harmonisation and application of methodologies for the designation of Heavily Modified Water Bodies and definition of good ecological potential should be improved.
- Exemptions for transboundary water bodies should be explicitly coordinated among the countries and a harmonised approach for setting exemptions should be elaborated.
- Efforts on integration issues should be continued and intensified, particularly to ensure the sustainability of future infrastructure projects in line with WFD requirements.
- Joint efforts on sturgeon conservation as a flagship species for the Danube River Basin should be continued.
- The efforts to develop harmonised approaches for the economic analyses and assessments should be followed up.

Complete list of RBSPs for Hungary: monitored and EQS

internationalRBDName	Danube	
euRBDCode	HU1000	
chemicalMatrix	Water	
chemicalLastMonitored	(Mehrere Elemente)	
Zeilenbeschriftungen	Number of samples	EQS exists
CAS_1007-28-9 - Desisopropylatrazine	7	
CAS_1024-57-3 - Heptachlor epoxide	7	
CAS_139-40-2 - Propazine	7	
CAS_14798-03-9 - Ammonium	44	
CAS_1610-18-0 - Prometon	7	
CAS_1806-26-4 - Octylphenol	84	
CAS_21087-64-9 - Metribuzin	7	
CAS_21725-46-2 - Cyanazine	7	
CAS_2385-85-5 - Mirex	7	
CAS_26259-45-0 - Secbumeton	7	
CAS_30125-63-4 - Desethylterbuthylazine	7	
CAS_309-00-2 - Aldrin	19	
CAS_319-84-6 - Alpha-HCH	7	
CAS_319-85-7 - Beta-HCH	7	
CAS_319-86-8 - Delta-HCH	7	
CAS_33213-65-9 - Beta-Endosulfan	7	
CAS_33693-04-8 - Terbumeton	7	
CAS_3424-82-6 - o,p'-DDE	7	
CAS_465-73-6 - Isodrin	19	
CAS_51235-04-2 - Hexazinone	7	
CAS_53-19-0 - o,p'-DDD	7	
CAS_57-74-9 - Chlordane	7	
CAS_58-89-9 - Gamma-HCH (Lindane)	7	
CAS_5915-41-3 - Terbuthylazine	7	
CAS_59473-04-0 - AOX	7	
CAS_60-57-1 - Dieldrin	19	
CAS_6190-65-4 - Desethylatrazine	7	
CAS_72-20-8 - Endrin	19	
CAS_72-43-5 - Methoxychlor	7	
CAS_72-54-8 - p,p'-DDD	7	
CAS_72-55-9 - p,p'-DDE	7	
CAS_7286-69-3 - Sebuthylazine	7	
CAS_7287-19-6 - Prometryn	7	
CAS_7439-95-4 - Magnesium	44	
CAS_7440-09-7 - Potassium	44	
CAS_7440-23-5 - Sodium	44	
CAS_7440-38-2 - Arsenic and its compounds	121	
CAS_7440-38-2 - Arsenic and its compounds		yes
CAS_7440-47-3 - Chromium and its compounds	120	
CAS_7440-47-3 - Chromium and its compounds		yes

CAS_7440-50-8 - Copper and its compounds	120	
CAS_7440-50-8 - Copper and its compounds		yes
CAS_7440-66-6 - Zinc and its compounds	120	
CAS_7440-66-6 - Zinc and its compounds		yes
CAS_7440-70-2 - Calcium	44	
CAS_75-01-4 - Chloroethene (vinylchloride)	7	
CAS_76-44-8 - Heptachlor	7	
CAS_789-02-6 - DDT, o,p'	19	
CAS_834-12-8 - Ametryn	7	
CAS_886-50-0 - Terbutryn	7	
CAS_959-98-8 - Alpha-Endosulfan	7	
EEA_33-02-3 - Benzol	84	
EEA_33-05-6 - BTEX	7	
EEA_33-23-8 - Petroleum hydrocarbons	7	
EEA_33-32-9 - Total DDD (DDD, o,p' + DDD, p,p')	7	
EEA_33-45-4 - Volatile halogenated hydrocarbons (VHH)	7	
EEA_33-56-7 - Total PAHs (Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Indeno(1,2,3-cd)pyrene)	91	

Complete list of RBSPS monitored and EQS for Romania

Zeilenbeschriftungen	Number of samples	EQS exists and reported	
CAS_108-88-3 - Toluene	282	yes	EQS - y & Moni - yes
CAS_108-95-2 - Phenol	240		EQS - no & moni - yes
CAS_1330-20-7 - Xylene	258	yes	EQS - y & Moni - yes
CAS_1336-36-3 - Polychlorinated biphenyls		yes	EQS -yes & moni - no
CAS_14265-44-2 - Phosphate	24		EQS - no & moni - yes
CAS_14797-65-0 - Nitrite	24		EQS - no & moni - yes
CAS_14798-03-9 - Ammonium	24		EQS - no & moni - yes
CAS_14998-27-7 - Chlorite	24		EQS - no & moni - yes
CAS_191-24-2 - Benzo(g,h,i)perylene	414		EQS - no & moni - yes
CAS_193-39-5 - Indeno(1,2,3-cd)pyrene	78		EQS - no & moni - yes
CAS_205-99-2 - Benzo(b)fluoranthene	414		EQS - no & moni - yes
CAS_207-08-9 - Benzo(k)fluoranthene	414		EQS - no & moni - yes
CAS_208-96-8 - Acenaphthylene		yes	EQS -yes & moni - no

CAS_31508-00-6 - PCB 118 (2,3',4,4',5-pentachlorobiphenyl)	72		EQS - no & moni - yes
CAS_35065-27-1 - PCB 153 (2,2',4,4',5,5'-hexachlorobiphenyl)	72		EQS - no & moni - yes
CAS_35065-28-2 - PCB 138 (2,2',3,4,4',5'-hexachlorobiphenyl)	72		EQS - no & moni - yes
CAS_35065-29-3 - PCB 180 (2,2',3,4,4',5,5'-heptachlorobiphenyl)	72		EQS - no & moni - yes
CAS_35693-99-3 - PCB 52 (2,2',5,5'-tetrachlorobiphenyl)	72		EQS - no & moni - yes
CAS_37680-73-2 - PCB 101 (2,2',4,5,5'-pentachlorobiphenyl)	72		EQS - no & moni - yes
CAS_57-12-5 - Free cyanide		yes	EQS -yes & moni - no
CAS_64743-03-9 - Phenols	252	yes	EQS - y & Moni - yes
CAS_7012-37-5 - PCB 28 (2,4,4'-trichlorobiphenyl)	72		EQS - no & moni - yes
CAS_7439-89-6 - Iron and its compounds	12		EQS - no & moni - yes
CAS_7439-95-4 - Magnesium	12		EQS - no & moni - yes
CAS_7439-96-5 - Manganese and its compounds	12		EQS - no & moni - yes
CAS_7440-09-7 - Potassium	12		EQS - no & moni - yes
CAS_7440-23-5 - Sodium	12		EQS - no & moni - yes
CAS_7440-38-2 - Arsenic and its compounds	306	yes	EQS - y & Moni - yes
CAS_7440-47-3 - Chromium and its compounds	390	yes	EQS - y & Moni - yes
CAS_7440-50-8 - Copper and its compounds	408	yes	EQS - y & Moni - yes
CAS_7440-66-6 - Zinc and its compounds	390	yes	EQS - y & Moni - yes
CAS_7440-70-2 - Calcium	12		EQS - no & moni - yes
CAS_83-32-9 - Acenaphthene	258		EQS - no & moni - yes
CAS_95-47-6 - O-xylene	150		EQS - no & moni - yes
EEA_33-08-9 - Chromium 3+	72		EQS - no & moni - yes
EEA_33-09-0 - Detergents	324	yes	EQS - y & Moni - yes
EEA_33-18-1 - Meta xylene + para xylene	150		EQS - no & moni - yes
EEA_33-29-4 - Surfactants (anionic)	216		EQS - no & moni - yes
EEA_33-38-5 - Polychlorinated biphenyls(7 PCB: 28,52,101,118,138,153,180)	282		EQS - no & moni - yes
EEA_33-64-7 - Total cyanide	264		EQS - no & moni - yes

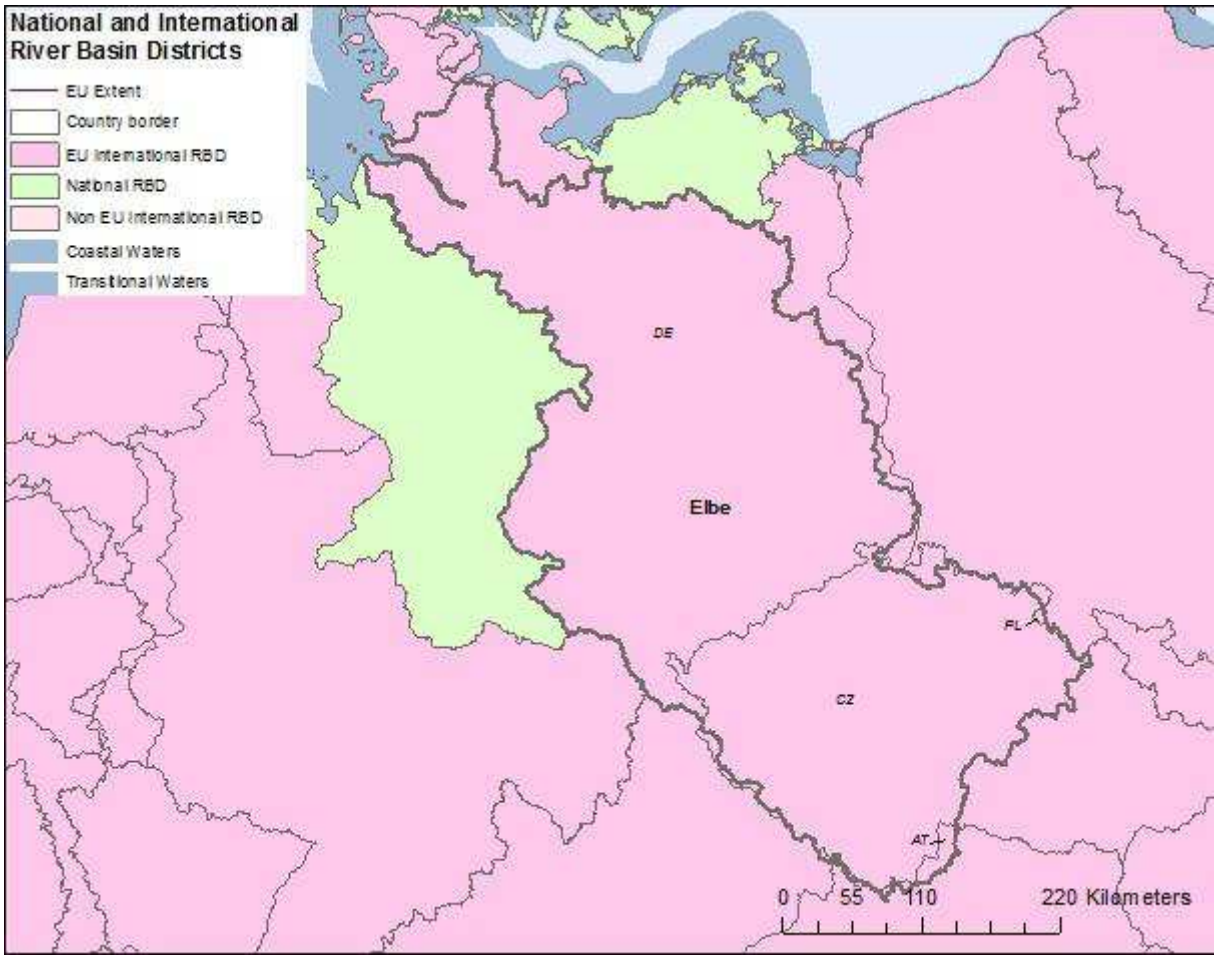
List of PS sampled (and number of samples taken) according to the consultants extract from WISE

CAS_104-40-5 - 4-nonylphenol	144
CAS_107-06-2 - 1,2-Dichloroethane	420
CAS_115-29-7 - Endosulfan	564
CAS_117-81-7 - Di(2-ethylhexyl)phthalate (DEHP)	72
CAS_118-74-1 - Hexachlorobenzene	582
CAS_12002-48-1 - Trichlorobenzenes (all isomers)	564
CAS_120-12-7 - Anthracene	576
CAS_122-34-9 - Simazine	486
CAS_127-18-4 - Tetrachloroethylene	492
CAS_140-66-9 - Octylphenol (4-(1,1',3,3'-tetramethylbutyl)-phenol)	144
CAS_1582-09-8 - Trifluralin	486
CAS_15972-60-8 - Alachlor	618
CAS_1912-24-9 - Atrazine	486
CAS_206-44-0 - Fluoranthene	432
CAS_2921-88-2 - Chlorpyrifos	486
CAS_330-54-1 - Diuron	486
CAS_34123-59-6 - Isoproturon	486
CAS_470-90-6 - Chlorfenvinphos	486
CAS_50-29-3 - DDT, p,p'	564
CAS_50-32-8 - Benzo(a)pyrene	426
CAS_56-23-5 - Carbon tetrachloride	492
CAS_608-73-1 - Hexachlorocyclohexane	570
CAS_608-93-5 - Pentachlorobenzene	576
CAS_67-66-3 - Trichloromethane	492
CAS_71-43-2 - Benzene	510
CAS_7439-92-1 - Lead and its compounds	654
CAS_7439-97-6 - Mercury and its compounds	582
CAS_7440-02-0 - Nickel and its compounds	636
CAS_7440-43-9 - Cadmium and its compounds	654
CAS_75-09-2 - Dichloromethane	492
CAS_79-01-6 - Trichloroethylene	420
CAS_87-68-3 - Hexachlorobutadiene	432
CAS_91-20-3 - Naphthalene	426
EEA_32-02-0 - Total cyclodiene pesticides (aldrin + dieldrin + endrin + isodrin)	564
EEA_32-03-1 - Total DDT (DDT, p,p' + DDT, o,p' + DDE, p,p' + DDD, p,p')	276

1.2. Elbe River Basin District

1.2.1. General Information

Map 1.2.1 Elbe River Basin District



Source: WISE reporting 2016

The Elbe International River Basin District (iRBD) is shared by Austria, the Czech Republic, Germany and Poland. The Elbe iRBD is allocated to cooperation Category 1, which means that an international agreement, a permanent co-operation body and an international River Basin Management Plan (iRBMP) under the WFD is in place.

This report provides information on the international coordination efforts of transboundary surface water bodies in the iRBD. Transboundary groundwater bodies have not been delineated and therefore information on groundwater bodies is not part of this report.

The iRBMP for the Elbe was published on 2 December 2015. The iRBMP can be downloaded on the website[32] of the International Commission for the Protection of the Elbe River (hereinafter referred to as "Elbe Commission").

The table below presents the size of the total catchment area and national shares within the iRBD (km^2; %).

Table 1.2.1 Member State share of the iRBD

Name of the International River Basin District	**Total Area** (km^2)	**EU Member States**	**EU RBD Code**	**National Area within iRBD** (km^2)	**National Area** (% of iRBD)
Elbe	150,826 (including coastal waters) 148,268 (excluding coastal waters)[33]	Austria	AT5000	921	0.62
		Czech Republic	CZ5000	49,933	33.68
		Germany	DE5000	97,175[34]	65.54
		Poland	PL5000	239	0.16

Source: iRBMP and International Commission for the Protection of the Elbe

1.2.2. Governance and public participation

Cooperation framework: International, bilateral and/or multilateral agreements in place covering certain cooperation aspects

The International Commission for the Protection of the Elbe River Agreement was signed in Magdeburg on 8 October 1990. The Contracting Parties to the Agreement are the Czech Republic and Germany. Austria and Poland are observers to the Agreement. The Agreement established the Elbe Commission.

There are three working groups under the Elbe Commission: (1) Implementation of the EU WFD in the Elbe River Basin; (2) Flood Protection; and (3) Accidental Water Pollution. The activities of the WFD working group are supported by teams of experts for surface waters, groundwater and data management.

In 2009 and 2010 three ad-hoc working group with the WFD group were established covering sediment management, maintaining surface waters used for navigation and water quantity

[32] http://www.ikse-mkol.org/en/ https://www.ikse-mkol.org/en/eu-directives/water-framework-directive/international-management-plan-for-the-elbe-river-basin-district/

[33] Without coastal waters (the coastal waters in the iRBD Elbe have an area of 2558 km2 and all of them lie in Germany).

[34] Without coastal waters (the coastal waters in the iRBD Elbe have an area of 2,558 km^2 and all of them lie in Germany).

management. The results of these working groups were integrated into the update of the iRBMP.

Joint activities within the iRBD

Development of an iRBMP and link to national RBMPs

The iRBMP Elbe summarizes the programmes of measures, which serve to achieve a good status and the other environmental objectives of surface waters and groundwater, and the results of previous work in the Elbe. The plan builds on the results of the updated report under Article 5 (2013), current water monitoring and significant water management issues.

Updating the plan, i.a. following international documents were used:

- Recommendations for the maintenance of surface waters used for navigation in order to improve the hydromorphological conditions (published in 2013) with general recommendations and specific proposals as well as examples of implemented maintenance measures and projects under construction;
- Proposals for good sediment management practice in the Elbe region – ICPER Sediment Management Concept (published in 2014) with recommendations for actions regarding hydromorphology, quality and navigation; and
- Recommendations in the field of water quantity management.

Areas of joint cooperation

The iRBMP provides information on public participation within the individual Member States and mentions that the international plan was made available online for consultation on the level of the Elbe Commission. In addition, the International Elbe Forum was held in 2015, an event that enabled public to learn more about the iRBMP, measures being implemented in the iRBD. Stakeholders were given the opportunity to present their comments on the draft iRBMP.

Sectors and observers involved within the development of the iRBMP

The Elbe Commission delegations and working groups are composed of representatives of national and regional authorities as well as scientific institutions in Germany, the Czech Republic, Poland and Austria, where appropriate. Apart from that, representatives of NGOs are involved in the work as acknowledged observers.

Existence of a transboundary accident warning system

Since 1991 the Elbe has an international warning and alarm plan. The plan provides information about the location, time, nature and extent of accidental water pollution in the iRBD. The plan was expanded in 2004 to include a predictive model - the Elbe alarm model -

intended for accidents in which a larger quantity of water-polluting chemicals reach the Elbe. The model calculates when the pollutant wave reaches certain cities on the Elbe, how high the pollutant concentration will be and when the pollutant concentration drops to such an extent that water use (removal of bank filtrate for drinking water, withdrawal for irrigation, as cooling water, etc.) is possible again.

1.2.3. Characterisation of the River Basin District

Coordination of the Article 5 assessment

According to the iRBMP, Article 5 analysis was updated in 2013 with an improved data set. The update was integrated directly into the iRBMP.

Delineation of water bodies and designation of heavily modified and artificial water bodies

Surface water bodies

The iRBMP states that the delineation of water bodies from the first management period was updated. Some water bodies are no longer designated, there are some new water bodies and some water bodies have been split up or merged. The total number of water bodies remained almost unchanged. There is no information regarding whether the delineation of transboundary surface water bodies has been coordinated in the iRBD. The iRBMP refers to the national RBMPs for further details.

Groundwater bodies

No transboundary groundwater bodies have been delineated. There are some groundwater bodies which are cross-border, but the flows are considered of local importance and are dealt with in bilateral agreements if needed. The working group on groundwater agreed on the delineation of groundwater bodies in 2004. The same approach was also used in the second cycle. The approach allows international comparability but is not further described in the plan.

Typology Coordination of surface water bodies

For the typology of surface water bodies, the Member States applied the criteria according to System A (according to Annex II WFD). They in addition applied the System B typology. The iRBMP states that although the practices vary across countries, the resulting typologies are in principle comparable. The Elbe iRBD lies completely in the ecoregions 9 "Central Mountains" and 14 "Central plain". Further details are listed in the relevant national management plans.

Coordination in the establishment of reference conditions for surface water bodies

The iRBMP does not provide information regarding the establishment of reference conditions. Based on the information reported to WISE, there are similarities in the quality elements used,

but the iRBMP does not mention whether there was a coordination among the Member States on this issue.

Coordination on Significant Water Management Issues

Joint significant water management issues have been identified and coordinated in the Elbe Commission. These are:

- improvement of the river continuity and structure;
- reduction of nutrients and other pollutants; and
- other issues on the national or regional level. Under other the following issues are listed: i) future water scarcity caused by abstraction, transfers and climate change, hydrological droughts; ii) improvement of good ecological status for small water bodies; iii) renaturation; and iv) reduction of pressures for surface water bodies used for drinking water abstraction, bathing waters and nature conservation.

1.2.4. Monitoring, assessment and classification of surface water ecological status

Monitoring of ecological status/potential

Joint monitoring programmes for surface waters and application of joint methods/joint surveys

Part of the surveillance monitoring in the Elbe is carried out by the Czech Republic and Germany in the context of the International Monitoring Programme Elbe[35]. The joint programme is coordinated by the Czech Republic and Germany. As of 2015, this programme comprises a total of 19 measuring points, of which nine are located on the main stream of the Elbe (4 in the Czech Republic and 5 in Germany) and 10 at significant tributaries (3 in the Czech Republic and seven in Germany).

The laboratories involved in the international monitoring programme work on the basis of European norms and standards (in particular EN ISO / IEC 17025: 2005). In addition, the analysis results for the parameters examined in the border profile Hrensko/Schmilka are continuously compared, and joint sampling and analyses are carried out.

[35] (https://www.ikse-mkol.org/en/themen/gewaesserguete/internationales-messnetz-und-internationales-messprogramm/internationales-messprogramm-elbe-2018/)

Sensitive quality elements monitored (excluding river basin specific pollutants)

According to the WFD and as explained in the CIS guidance on monitoring[36], for operational monitoring, Member States are required to monitor for those biological and hydromorphological quality elements most sensitive to the pressures to which the body or bodies are subject. The iRBMP mentions that quality elements need to be selected when these are the most sensitive to the pressures but does not provide further details.

Member States were requested to report to WISE which biological quality elements they considered to be sensitive for a given pressure. In WISE, the sensitive biological quality elements are listed for each pressure. The table below differentiates four biological quality elements, nine different pressures and four different water categories.

A relevant assessment parameter is whether there is a minimum agreement between the Member States sharing a border with each other on the sensitivity of biological quality elements. Such an agreement would be expressed by the fact that there is at least one biological quality element that is considered to be sensitive (for each pressure) in both Member States. Such a quality element can then be used as the least common denominator for comparable assessments of ecological status, provided that the intercalibration has been successful.

For rivers, the table below lists sensitive quality elements for each pressure. In all the Member States in the iRBD, there is an agreement on sensitive quality elements for nutrient (macrophytes and phytobenthos,), organic (benthic invertebrates) and morphological (benthic invertebrates) pressures. Chemical pressures were only reported by the Czech Republic and Germany and they share a common quality element, namely benthic invertebrates. For temperature and hydrological pressures, the Czech Republic and Germany share a common quality element (benthic invertebrates). For hydrological pressures, Austria and Czech Republic both use macrophytes and fish.

[36] See: https://circabc.europa.eu/sd/a/63f7715f-0f45-4955-b7cb-58ca305e42a8/Guidance%20No%207%20-%20Monitoring%20(WG%202.7).pdf

Table 1.2.2 Sensitivity of BQEs towards different pressure types for river water bodies

Member State	Phytoplankton	Other aquatic flora	Macrophytes	Phytobenthos	Benthic invertebrates	Fish
Assessment method mainly sensitive to nutrient pollution						
Austria			yes	yes		
Czech Republic	yes		yes	yes	yes	
Germany	yes		yes	yes	yes	
Poland	yes		yes	yes	yes	
Assessment method mainly sensitive to organic pollution						
Austria					yes	
Czech Republic				yes	yes	
Germany					yes	
Poland				yes	yes	
Assessment method mainly sensitive to chemical pollution						
Austria						
Czech Republic					yes	
Germany					yes	
Poland						
Assessment method mainly sensitive to elevated temperature						
Austria						yes
Czech Republic					yes	
Germany					yes	
Poland						
Assessment method mainly sensitive to altered habitats due to hydrological changes						
Austria			yes			yes
Czech Republic			yes		yes	yes
Germany					yes	
Poland						
Assessment method mainly sensitive to altered habitats due to morphological changes						
Austria			yes		yes	yes
Czech Republic			yes		yes	yes
Germany					yes	
Poland					yes	

Source: WISE electronic reporting 2016

Coordination of river basin specific pollutants and matrices monitored

The WFD requires Member States to identify and select river basin specific pollutants and their environmental quality standards at the national, river basin or water body level.

The iRBMP mentions that river basin specific pollutants should be identified but does not mention which pollutants were agreed for the international monitoring programme[37].

[37] Subsequent clarification by Germany indicates that information regarding the yearly international monitoring programmes are available on the ICPER website, with information on all monitored substances. See: https://www.ikse-mkol.org/themen/gewaesserguete/internationales-messnetz-und-internationales-messprogramm/dokumente-zum-thema-messnetz-und-messprogramme/

As part of the reporting to WISE regarding the assessment of ecological status, Member States were asked to report information regarding river basin specific pollutants at RBD level[38]. For the reporting to WISE, Member States could report pollutants using pre-defined codes from a list set by the European Commission, and they could report pollutants to a category "other". The "other" category is not uniform among the Member States and therefore the information reported for these pollutants cannot be compared within the iRBD.

The river basin specific pollutants reported by the Member States to WISE were evaluated. The summary of the evaluation concern three essential aspects:

4 which substances have been selected for the entire basin or parts of it;

5 whether the substances have an environmental quality standard and are monitored; and

6 whether the environmental quality standards are the same or in one or another way comparable (in the same range/order of magnitude, for the same matrix).

For environmental quality standards of river basin specific pollutants, different aspects have to be considered to make comparisons. They can only be compared for a given substance if the specific pollutant matrix (water, sediment, biota etc), the unit (mg/L, µg/L etc.), the scale at which the standard is applied (national, water body, river basin etc.), the category (rivers, lakes, coastal water, territorial water and transitional water) and the standard (AA-EQS[39], MAC-EQS[40]) are comparable. Therefore, there are many different approaches and dimensions for such a comparison.

This assessment covers selected aspects of the topic at the iRBD scale for reasons of practicability. The most important aspects are environmental quality standards for 1) AA-EQS, 2) for the matrix water and 3) setting of the standard at the national level. The relevant results are a quantitative description of the harmonisation and cooperation with respect to river basin specific pollutants.

A summary for the number of established environmental quality standards is given in the table below. The table below shows the number of Member States that have established an environmental quality standard for a certain river basin specific pollutant. This shows how

[38] Subsequent clarification by Germany indicates that they reported on river basin specific pollutants at the national level, i.e. they reported one list of pollutants without differentiating among the different RBDs.
[39] annual average environmental quality standard
[40] maximum allowable concentration environmental quality standard

many standards defined at the national level can be compared between how many countries and describes the extent of harmonization[41].

Table 1.2.3 Summary of the assessment of river basin specific pollutants for the Elbe basin

Number of Member States	Number of river basin specific pollutants with an environmental quality standard	
	River basin specific pollutant scale	
	National[42]	All[43]
1	91	88
2	35	37
3	3	6
4	0	3

Source: WISE electronic reporting 2016

There are four Member States in the Elbe iRBD. Table 1.2.3 shows that there is not one river basin specific pollutant with an environmental quality standard that is monitored in all four Member States in the Elbe. There are three pollutants with an environmental quality standard at the national level in at least three countries (that doesn't necessarily mean that the standards are the same or in the same order of magnitude). However, Germany and the Czech Republic – which cover approximately 99 % of the iRBD - have established environmental quality standards for 71 and 77 river basin specific pollutants, respectively (other chemical parameters for terminology reasons not included). Out of these 71/77 pollutants, there are 25 common pollutants which are considered to be relevant in both countries.

River basin specific pollutants are only useful and supportive for the assessment of ecological status if an environmental quality standard has been adopted and the pollutants are monitored. The information the Member States and Regions reported to WISE was assessed using the following reporting elements:

3) RBSPvalue: If a value is provided in WISE criterion "EQS-yes" is fulfilled

4) chemicalLastMonitored: If a value>=2010 is provided in WISE the criterion "Monitored: yes" is fulfilled

For each river basin specific pollutants, the criteria mentioned above were evaluated according to the scheme given in table below. A filter is applied, considering the following schema elements: a) chemicalSubstanceCode, b) chemicalMatrix c) chemicalPurpose, d) rbspCategoryRW.

[41] This analysis assumes a basin-wide view only, it does not show whether the pollutants are shared between neighbouring countries.

[42] National means only standards for the national scale are included in the analysis.

[43] All means that the analysis takes all scales into account (i.e. national regional (sub-national), local/municipality, international RBD, RBD, sub-unit, water body, other).

Table 1.2.4 shows how many river basin specific pollutants can be used for the assessment of ecological status. The number of pollutants that can be integrated into the assessment of ecological status ranges between seven in Austria and 76 in Germany. The information describes the role that river basin specific pollutants pay in the frame of the ecological assessment and whether the approaches are comparable. The results do not describe whether and how often theses pollutants have been used in the frame of status assessment.

Table 1.2.4 Synthesis of environmental quality standards and sampling of river basin specific pollutants with pre-defined codes in the WISE reporting[44]

Member State	Monitored: yes Environmental quality standard: yes	Monitored: no Environmental quality standard: yes	Monitored: yes Environmental quality standard: no	Substances (number and percentage) that can be used for the assessment of the ecological status
Austria	7	15	84	7 / 8 %
Czech Republic	67	4	24	67 / 74 %
Germany	76	1	159	76 / 32 %
Poland	20	2	24	20 / 45 %

Source: WISE electronic reporting 2016

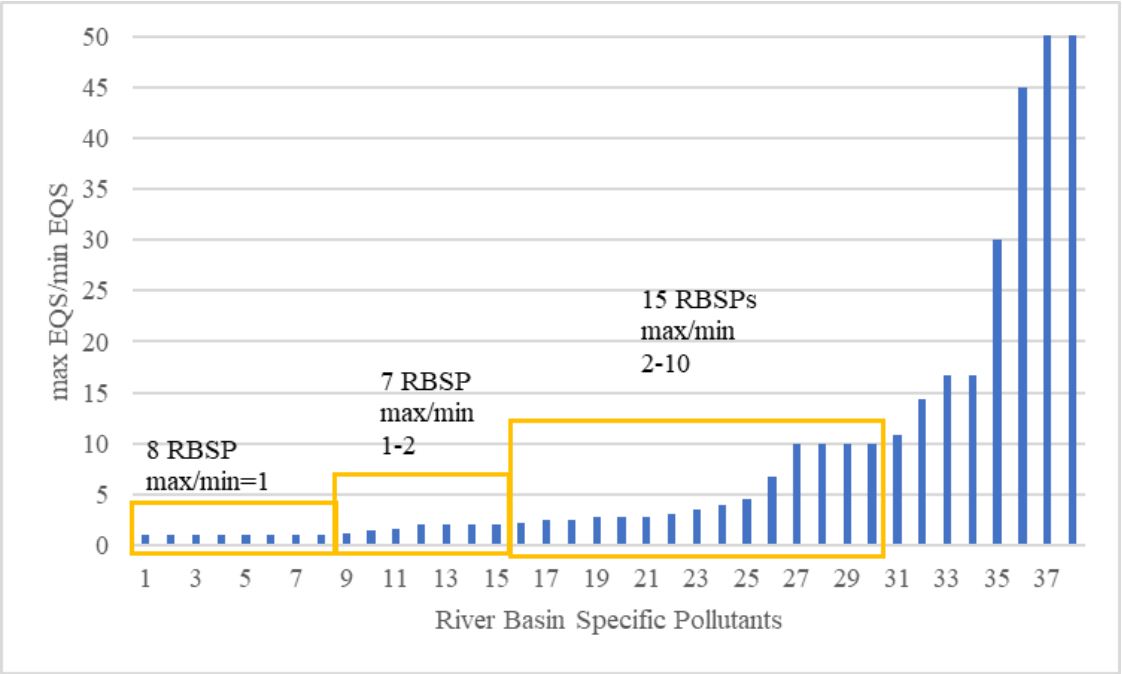
Environmental quality standards for river basin specific pollutants

A comparison between environmental quality standards is given in the figure below.

There is some agreement between the two predominant Member States (i.e. Germany and Czech Repbulic) in the iRBD. There are eight pollutants with the same environmental quality standard shared between the Czech Republic and Germany. For the majority of substances, the environmental quality standards differ by one order of magnitude or more. This makes it difficult to compare status between all the iRBD sharing Member States. The different standards used may also partly explain why some Member State identify certain substances as river basin specific pollutants while other Member States don't.

[44] Information regarding "other RBSP" is not included in the table.

Figure 1.2.1 Ratio between the maximum and the minimum environmental quality standard for river basin specific pollutants in the Elbe iRBD[45]



Source: WISE electronic reporting 2016

Status Classification

Use of monitoring results for classification – transboundary harmonization

The iRBMP states that ecological status assessment of transboundary surface water bodies is coordinated by the experts of the bilateral German-Czech boundary water commission and its standing committees for Transboundary Waters. Based on the monitoring results and the assessment results of the individual Member States, the final status assessment of the common transboundary water bodies was agreed. Further details are not provided.

Intercalibration exercise and Geographical Intercalibration Group (GIG)

The iRBMP does not mention whether the Member States participated in the intercalibration exercise.

[45] A ratio of one indicates that the Member States and Regions that have set a standard use the same value for this standard. The higher the ratio, the higher the differences in the standards used.

1.2.5. Monitoring, assessment and classification of surface water chemical status

Monitoring of chemical status in surface waters

As described under information on monitoring of ecological status, the Elbe iRBD has a joint monitoring programme between the Czech Republic and Germany. Joint sampling and analyses are carried out in the border profile Hrensko/Schmilka and in the context of joint field experiments and comparative tests.

Coordination of monitoring and assessment of chemical status

The monitoring of the chemical status within the transboundary monitoring network has been coordinated. In the background document related to monitoring it is stated that environmental quality standards for seven already regulated substances have been tightened after the revised EQS Directive entered into force. For 12 substances, environmental quality standards have been added. The EU Member States are required to integrate this Directive into the monitoring of water status by 2016. The preparation of the "Elbe 2015 International Monitoring Programme" had already begun to take account of the new requirements of the Directive.

An important aspect for chemical status assessment is whether the water samples have been taken with the frequency recommended as a general rule in the WFD[46]. Monthly samples should be analysed for WFD compliant assessment of chemical status at a given site. Other frequencies need a justification based on expert judgement or technical knowledge. If the analysis excludes all frequencies that are lower than 12/year, the number of samples decreases from ~100,052 to ~47,365. This means that 47 % of the samples of Priority Substances (reported to WISE) in the Elbe catchment can be used for WFD compliant assessment of chemical status without any further justification. All figures are listed in the table below.

Table 1.2.5 Percentage of Priority Substance samples (matrix water) that have been taken with the frequency recommended in the WFD (monthly samples)

Member State	Percentage of Priority Substance samples with a frequency ≥12/year	Samples usable for assessment of chemical status without any further explanation
Austria	67 % (out of 303)	204
Czech Republic	41 % (out of 30091)	12376
Germany	46 % (out of 64693)	30057
Poland	95 % (out of 4964)	4728

Source: WISE electronic reporting 2016

[46] Information reported to WISE did not differentiate between surveillance or operational monitoring. In the case of surveillance monitoring, water sampling has to been carried once a month for one year only within the management cycle. Operational monitoring requires monthly sampling every year of the management cycle.

The total number of samples (see table below) was calculated by combining the information of the WISE reporting elements "chemicalfrequency" and "chemicalCycle", as also illustrated in the reporting guidance under chapter 4.3.5.

The formula is: Number of samples (for each substance and each monitoring station calculated separately for the six years WFD period)=chemicalfrequency*6/chemicalcycle[47].

Some examples are listed below and this explains also how "half" samples can be the result of this calculation. The grand total for a given substance in a country or basin (as displayed in Table 1.2. 6) is then the sum of the number of samples for all relevant monitoring stations.

chemicalfrequency	chemicalcycle	Number of samples in six years
12	3	12*6/3=24
6	4	6*6/4=9
9	4	9*6/4=13,5

Table 1.2.6 Total Number of analysed samples for each Priority Substance for the period 2010-15[48]

Number of samples for Priority substances (period 2010-2015)				
Substance	**Austria**	**Czech Republic**	**Germany**	**Poland**
CAS_104-40-5 - 4-nonylphenol		379	147	72
CAS_107-06-2 - 1,2-Dichloroethane	6	728	1942	158
CAS_115-29-7 - Endosulfan	6	388	1486	96
CAS_117-81-7 - Di(2-ethylhexyl)phthalate (DEHP)		514	1637	72
CAS_118-74-1 - Hexachlorobenzene	5	760	2175	144
CAS_12002-48-1 - Trichlorobenzenes (all isomers)		560	1566	158
CAS_120-12-7 - Anthracene	12	959	2428	144
CAS_122-34-9 - Simazine	6	1106	1747	144
CAS_127-18-4 - Tetrachloroethylene	6	782	1977	158
CAS_140-66-9 - Octylphenol (4-(1,1',3,3'-tetramethylbutyl)-phenol)		590	1458	72
CAS_1582-09-8 - Trifluralin		914	1498	72
CAS_15972-60-8 - Alachlor	6	1137	1554	144
CAS_1912-24-9 - Atrazine	6	1106	1747	144
CAS_206-44-0 - Fluoranthene	12	1133	2668	144
CAS_2921-88-2 - Chlorpyrifos		725	1550	72
CAS_330-54-1 - Diuron	5	999	1589	144
CAS_34123-59-6 - Isoproturon	5	1053	1593	144
CAS_36643-28-4 - Tributyltin-cation		138	1656	72
CAS_470-90-6 - Chlorfenvinphos		743	1444	72
CAS_50-29-3 - DDT, p,p'		796	1993	144
CAS_50-32-8 - Benzo(a)pyrene	12	1133	2416	180
CAS_56-23-5 - Carbon tetrachloride	6	728	1944	158
CAS_608-73-1 -		754	1436	132

[47] If chemicalcycle is > 6y then it has been assumed that the substance has been measured in at least one year of the water management cycle

[48] All monitoring frequencies, all matrices included and all purposes included.

Number of samples for Priority substances (period 2010-2015)				
Substance	**Austria**	**Czech Republic**	**Germany**	**Poland**
Hexachlorocyclohexane				
CAS_608-93-5 - Pentachlorobenzene		754	2004	144
CAS_67-66-3 - Trichloromethane	6	782	1940	158
CAS_71-43-2 - Benzene		782	1845	158
CAS_7439-92-1 - Lead and its compounds	42	964	3220.2	155
CAS_7439-97-6 - Mercury and its compounds	42	1257	2101.2	155
CAS_7440-02-0 - Nickel and its compounds	42	1008	3126.2	155
CAS_7440-43-9 - Cadmium and its compounds	42	1028	3002.2	155
CAS_75-09-2 - Dichloromethane	6	728	1952	144
CAS_79-01-6 - Trichloroethylene	6	782	1977	144
CAS_85535-84-8 - Chloroalkanes C10-13	12	96	316	72
CAS_87-68-3 - Hexachlorobutadiene		734	2021	144
CAS_87-86-5 - Pentachlorophenol		590	955	144
CAS_91-20-3 - Naphthalene	12	983	2331	144
EEA_32-02-0 - Total cyclodiene pesticides (aldrin + dieldrin + endrin + isodrin)		754	1323	
EEA_32-03-1 - Total DDT (DDT, p,p' + DDT, o,p' + DDE, p,p' + DDD, p,p')		754	1479	180
EEA_32-04-2 - Brominated diphenylethers (congener numbers 28, 47, 99, 100, 153 and 154)			1329	72
EEA_32-23-5 - Total Benzo(b)fluor-anthene (CAS_205-99-2) + Benzo(k)fluor-anthene (CAS_207-08-9)			42	
EEA_32-24-6 - Total Benzo(g,h,i)-perylene (CAS_191-24-2) + Indeno(1,2,3-cd)-pyrene (CAS_193-39-5)			42	

Source: WISE electronic reporting 2016

Transboundary harmonisation of monitoring and assessment

The iRBMP states that chemical status assessment of transboundary surface water bodies is coordinated by the experts of the bilateral German-Czech boundary water commission and its standing committees for Transboundary Waters. Based on the monitoring results and the assessment results of the individual Member States, the final status assessment of the common transboundary water bodies was agreed. Further details are not provided.

1.2.6. Designation of heavily modified water bodies, artificial water bodies and definition of good ecological potential

Cooperation and joint activities regarding heavily modified water body designation

The iRBMP refers to the national RBMPs for the methods used for designation of heavily modified water bodies.

Cooperation and Joint methods and approaches for the determination of Good Ecological Potential (GEP)

The iRBMP states that good ecological potential in the Elbe iRBD has been developed based on Guidance Document No 4 "Identification and Designation of Heavily Modified and Artificial Water Bodies" and Guidance Document No 13 "Overall Approach to the Classification of Ecological Status and Ecological Potential". No further details are provided.

Information reported to WISE by the Member States indicate that the Czech Republic used the CIS Guidance approach, while Austria and Germany used the Hybrid CIS/Prague Approach. Poland did not report to WISE. All three Member States reported using macrophytes, phytobenthos, benthic invertebrates and fish in the assessment. Similar mitigation measures were reported.

1.2.7. Environmental Objectives and Exemptions

Article 4 (4) and 4 (5) are being applied in the iRBD. The iRBMP presents a table on the application of Article 4 (4) and Article 4 (5) in surface and groundwater bodies. According to the iRBMP, Article 4 (6) and 4 (7) could be applied during the second management period but haven't been so far. The iRBMP refers to the national RBMPs for further information. Information on international coordination is not included in the iRBMP.

1.2.8. Programme of measures

As mentioned in the chapter on characterisation, to support the development of the national PoMs the iRBD sharing countries agreed on common significant management issues. The iRBMP states that fundamental for the selection of measures for the second management period were the significant pressures, the status of the surface and groundwater bodies and environmental objectives. The cost-effectiveness of the individual measures is determined by cost-benefit analyses.

The planning and future implementation of the measures should also analyse their impact on the objectives of the other directives and the prioritization of the measures in terms of potential synergies. In principle, the water-related environmental directives and the Marine Strategy Framework Directive are expected to have strong synergy effects in the measures.

The iRBMP summarizes the national measures aimed at solving the significant water management issues, which were internationally coordinated. It provides table on the progress of measures implementation in the Austria, the Czech Republic and Germany. The measures listed in the iRBMP are part of the national programmes of measures (nPoM) and are implemented through national mechanisms within the Member States.

The summary chapter on the national programmes of measures does not describe joint activities agreed by the countries and information on measures is described separately for the Member States. The iRBMP does not describe how the iRBMP measures will be implemented through national and international mechanisms, i.e. there is no information on who is responsible for implementing the measures, the timeline for implementation or budget allocation. Limited information is included in the iRBMP. The iRBMP refers to the national RBMPs for further details.

Measures related to pollution from agriculture and other sectors

Joint identification of Pressures and Objectives

In Elbe iRBD, the significant pressures from nutrients from point sources and diffuse pollutants were identified as a significant transboundary water management issue. In order to achieve the objective of reducing nutrient pollution of surface waters and groundwater in the Elbe and the transitional and coastal waters, the discussion and coordination at the level of the international river basin Elbe was required[49].

National reporting to WISE indicates that the Czech Republic and Germany identified general management objectives regarding nutrients from agriculture for their national shares of the iRBD. In addition, both Member States reported to WISE that it has set quantitative targets for both nitrogen and phosphorus pollution for its share of the basin.

Measures to address from the agriculture and other sectors

Agriculture sector

Measures listed in the iRBMP include:

- Measures to reduce diffuse pollution of nutrients and pesticides from agriculture,
- Measures to reduce point source pollution of nutrients and pesticides from agriculture,
- The establishment of water protection strips to reduce inputs of nutrients and pesticides
- Other measures to reduce inputs of nutrients, pesticides and fines by erosion and runoff from agriculture.

[49] Subsequent clarification by the ICPER / Germany indicates that an international and German national nutrients' expert group has now also been established.

In order to enable a comparable grouping of measures in the national programme of measures, the European Commission introduced the concept of KTMs in 2012 to simplify reporting[50]. KTMs are groups of measures identified by Member States in the PoMs which target the same pressure or purpose. The individual measures included in the PoM (being part of the RBMP) are grouped into KTMs for the purpose of reporting. The same individual measure can be part of more than one KTM because it may be multi-purpose. Austria, the Czech Republic and Germany reported to WISE that they are applying KTM 2 – reduce nutrient pollution from agriculture and KTM 3 – reduce pesticides pollution from agriculture. Austria and Germany additionally reported applying KTM 12 – advisory services.

Other sectors

Measures planned for the remediation of contaminated sites are located both in surface and groundwater bodies. Improvements in wastewater treatment mainly concentrate in urban areas, such as Prague or Berlin, and are also partly planned in rural areas. The most commonly identified measures to reduce pollutant inputs from point sources are

- the connection of previously unconnected areas to municipal sewage treatment plants,
- other measures for the reduction of substance inputs through mixed and rainwater discharges,
- other measures for the reduction of inputs from municipal sewage discharges, and
- the optimization of the mode of operation and capacity adjustments of municipal sewage treatment plants as well as the expansion of municipal wastewater treatment plants to reduce phosphorus inputs.

Austria, the Czech Republic and Germany reported to WISE that they are implementing the following KTMs:

- KTM1 – Construction or upgrades of wastewater treatment plants;
- KTM4 – Remediation of contaminated sites (historical pollution including sediments, groundwater, soil);
- KTM15 – Measures for the phasing-out of emissions, discharges and losses of Priority Hazardous Substances or for the reduction of emissions, discharges and losses of Priority Substances;
- KTM16 – Upgrades or improvements of industrial wastewater treatment plants (including farms);
- KTM17 – Measures to reduce sediment from soil erosion and surface run-off; and

[50] The need for KTMs was borne out of the large differences in the level of detail reported in 2010 by the Member States. Some Member States reported 10-20 measures whilst others reported hundreds or even thousands.

- KTM21 – Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure.

The Czech Republic and Germany reported to WISE that they are implementing KTM23 – Natural water retention measures. Germany is also implementing KTM25 – Measures to counteract acidification.

Measures related to hydromorphological alterations

Joint identification of Pressures and Objectives

Improvement of the river continuity and water structure was identified as a transboundary significant water management issue in the iRBMP.

Austria, the Czech Republic and Germany reported addressing river continuity, other hydromorphological and sediment management pressures to WISE. Poland did not report. The Member States reported identifying general management objectives regarding river continuity to WISE.

Measures to address pressures

With regard to surface waters, the Elbe iRBD focuses on measures to reduce hydromorphological pressures. These include in particular measures to improve river continuity. In the 2009 iRBMP, priority stretches to increase river connectivity were defined based on fish population needs; this was adjusted in the Czech Republic and Germany for the second iRBMP. Beside the main stream of the Elbe, 50 other streams and rivers have been identified. Measures listed in the iRBMP include:

- Measures to initiate / allow a self-dynamic water body development including accompanying measures,
- Measures to improve habitats in the riparian area (e.g. woody development),
- Measures to improve habitats in the water development corridor, including alluvial development,
- Measures to adapt maintenance of water courses to the objectives of the WFD,
- Measures to vitalize the water courses (including sole, variance, substrate) within the existing profile,
- Measures for improving the habitat in the water by changing the course, shore or sole design including accompanying measures,
- Measures to improve sediment management,
- The connection of side waters, cut-off meanders / oxbow lakes (cross-linking), and
- Measures to increase the shallow water zones in the tidal Elbe.

Austria, Germany and the Czech Republic reported to WISE implementing KTM5 'Improving longitudinal continuity' and KTM6 'Improving hydromorphological conditions of water bodies other than longitudinal continuity'. Poland did not report to WISE.

1.2.9. Economic analysis and water pricing policies

An economic analysis has been undertaken and was updated in 2013 for the second management cycle. The economic analysis was done separately for the Czech Republic and Germany. It covers the economic importance of water use, a prognosis of water use until 2021 and recovery of the costs of water services. Water use is split into water abstraction (households and industry (including energy sector)) and agriculture and fishing, waste water discharge, energy sector (power stations), navigation, flood protection, coal mining. Cost recovery is addressing public supply and treatment.

1.2.10. Considerations specific to Protected Areas

Protected Areas are addressed in the iRBMP. The following types of protected areas are listed in the iRBMP for the Elbe: human consumption, bathing waters, nutrient-sensitive areas and Natura 2000 areas. A table shows the number of Protected Areas in each country.

1.2.11. Climate Change and droughts

The iRBMP includes a section on climate change under the chapter on economic analysis. The chapter describes the expected future climate change effects. According to the iRBMP, in the future adaptation strategies for climate change will play a role in the selection of measures and implementation in the medium and long term. Initial scientific results on the impacts of climate change in the Elbe iRBD have already been considered in the selection of measures for the present management plan. Details on this approach are not included in the iRBMP.

1.2.12. Recommendations

For the Elbe iRBD, important efforts have been made on international coordination between the Member States on a number of aspects. The following recommendations can be made to further improve cooperation:

- In general, the iRBMP should provide more details regarding international coordination efforts.
- Further efforts should be made to better harmonise the delineation, typology, monitoring and status assessment of water bodies.
- The use of exemptions and their justifications should be coordinated.
- The designation of heavily modified water bodies and the setting of good ecological potential should be coordinated.

- Coordination of river basin specific pollutants and setting of common environmental quality standards should be improved. The corresponding environmental quality standards do not match in many cases.
- The summary of the programme of measures should provide more details on the measures being implemented in the iRBD and how international coordination of measures is taking place.

Table: RBSPs that have been monitored between 2010-2015 (schema element: rbsplastmonitored) in water in the CZ Elbe RBD for which no EQS exists (or has been reported in WISE; rbspvalue=empty)

CAS_142363-53-9 - Alachlor ESA
CAS_14265-44-2 - Phosphate
CAS_14797-65-0 - Nitrite
CAS_14798-03-9 - Ammonium
CAS_152019-73-3 - Metolachlor OA
CAS_1698-60-8 - Chloridazon
CAS_1702-17-6 - Clopyralid
CAS_171118-09-5 - Metolachlor ESA
CAS_171262-17-2 - Alachlor OA
CAS_187022-11-3 - Acetochlor ESA
CAS_191-24-2 - Benzo(g,h,i)perylene
CAS_1918-00-9 - Dicamba
CAS_193-39-5 - Indeno(1,2,3-cd)pyrene
CAS_194992-44-4 - Acetochlor OA
CAS_205-99-2 - Benzo(b)fluoranthene
CAS_207-08-9 - Benzo(k)fluoranthene
CAS_30125-63-4 - Desethylterbuthylazin
CAS_32534-81-9 - Pentabromodiphenyle
CAS_34256-82-1 - Acetochlor
CAS_51218-45-2 - Metolachlor
CAS_5915-41-3 - Terbuthylazine
CAS_66753-07-9 - Hydroxyterbuthylazine
CAS_7287-19-6 - Prometryn
CAS_74-90-8 - Hydrogen cyanide

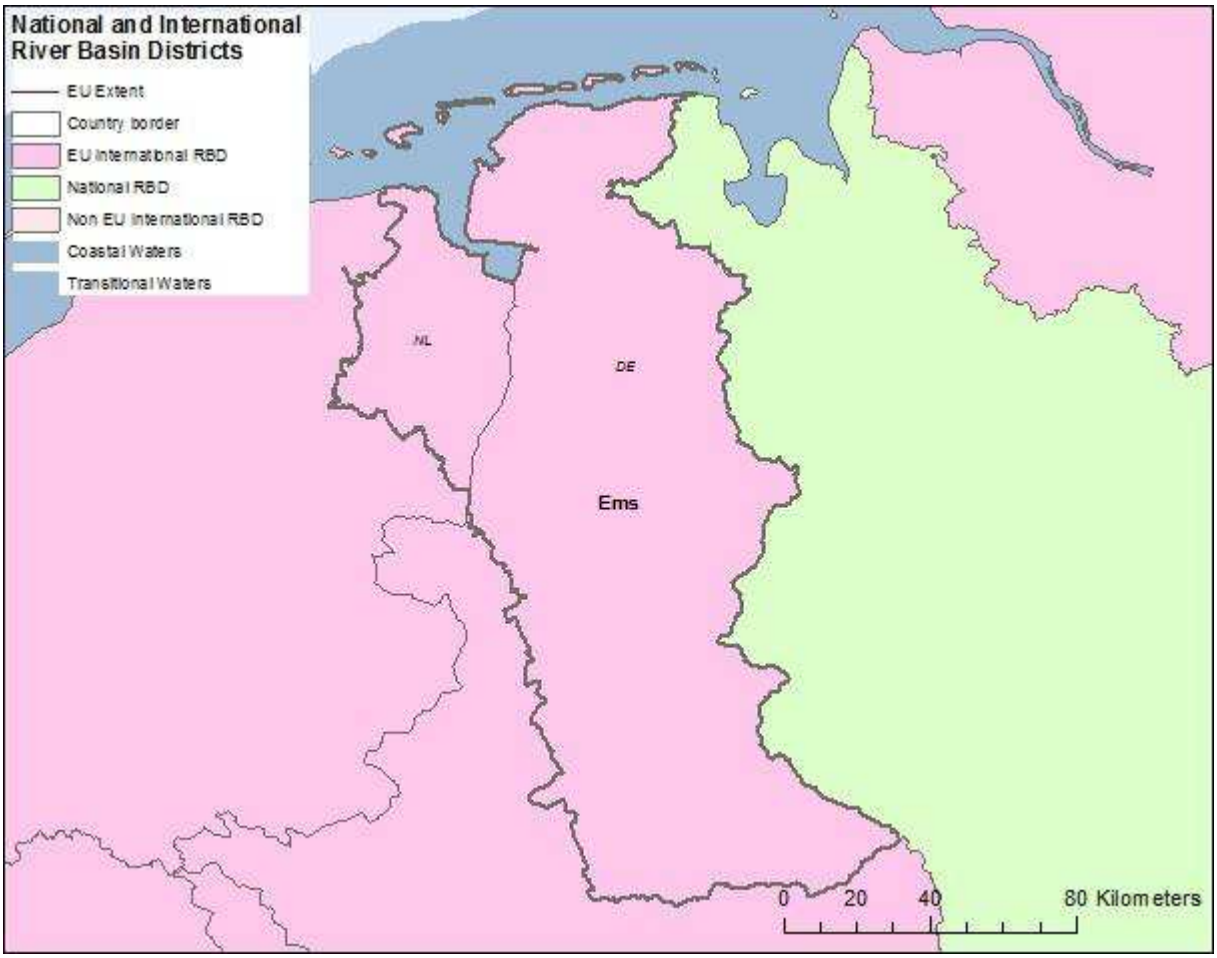
RBSPs that have an EQS but were nor monitored according to WISE schema elements (rbsplastmonitored and rbspvalue)

CAS_120-83-2 - 2,4-dichl
CAS_57-12-5 - Free cyani
CAS_7440-31-5 - Tin and
CAS_7783-06-4 - Hydrog

1.3. Ems River Basin District

1.3.1. General Information

Map 1.3.1 Ems River Basin District



Source: WISE reporting 2016

The Ems International River Basin District (iRBD) is shared by Germany and the Netherlands. The Ems iRBD is allocated to cooperation Category 1, which means that an international agreement, a permanent co-operation body and an international River Basin Management Plan (iRBMP) under the WFD is in place.

This report provides information on the international coordination efforts of transboundary surface water bodies in the iRBD. Only transitional and coastal surface waters are transboundary in this iRBD. Transboundary groundwater bodies have not been delineated and therefore information on groundwater bodies is not part of this report.

The iRBMP for the Ems was published on 22 December 2015. The iRBMP can be downloaded on the Ems cooperation website[51]. Germany[52] and the Netherlands[53] have made the iRBMP available on their national webpages.

The table below presents the size of the total catchment area and national shares within the iRBD (km^2; %). The table includes information reported to WISE and the information included in the iRBMP. The table shows that the information in the iRBMP and WISE slightly differ.

Table 1.3.1 Member State share of the iRBD

Name of the International River Basin District	Total Area – iRBMP (km^2)	EU Member States	EU RBD Code	National Area within iRBD – iRBMP (within 1 NM zone) (km^2)	National Area within iRBD – iRBMP (% of iRBD)
Ems	17,800	Germany	DE3000	15,008*	84 %
		Netherlands	NLEM	2,312*	13 %
		International Ems-Dollart	N/A	482	3 %

Source: WISE electronic reporting 2016 and iRBMP

** without the international Ems-Dollart region*

1.3.2. Governance and public participation

Cooperation framework: International, bilateral and/or multilateral agreements in place covering certain cooperation aspects

The agreement for international cooperation is not based on a specifically named agreement but is anchored in a Ministerial correspondence of both countries. The Ministers responsible for protection of the waters in the Ems basin in Germany and the Netherlands agreed to develop a common iRBMP for the Ems RBD.

The international cooperation between Germany and the Netherlands takes place within the 'International Steering Group Ems' (ISE). The group is responsible for overall harmonisation and general progress of work and the fundamental decisions on collaboration by representatives of the responsible Ministries are taken. In addition, experts from the Netherlands, from North Rhine-Westphalia and Lower Saxony work within the 'International Coordination Group Ems' (ICE). This group implements the underlying decisions of the Steering Group and arrives at specific agreements on joint implementation of the required

[51] www.ems-eems.de
[52] http://www.wasserblick.net/servlet/is/34780/
[53] https://www.rijksoverheid.nl/documenten/beleidsnota-s/2015/12/22/internationaal-deel-overstromingsrisicobeheerplan-eems

operational tasks. Working groups are in place according to thematic demand and tackle various themes of the WFD and technically support the International Coordination Group Ems.

In the Ems-Dollart region the international cooperation between Germany and the Netherlands takes place in the Subcommittee G of the Permanent German-Dutch Boundary Water Commission. The subcommittee G was founded in 1960 with the aim of coordinating water management issues in the Ems-Dollart region.

Joint activities within the iRBD

Development of an iRBMP and link to national RBMPs

The iRBMP Ems summarizes the RBMPs and programs of measures of Germany and the Netherlands, which serve to achieve a good status and the other environmental objectives of surface waters and groundwater and the results of previous work in the Ems. The plan builds on the results of the updated report under Article 5 (2013), current water monitoring and key water management issues.

Areas of joint cooperation

The iRBMP provides information on public participation within the individual Member States and mentions that the international plan was made available online for consultation. An active stakeholder involvement has been carried out for the update of the national plans. The results of this stakeholder involvement were used for the international coordination processes and the update of the iRBMP.

Sectors and observers involved within the development of the iRBMP

On the public consultation process within the Member States, the iRBMP mentions that trade unions and interest groups from the water sector, industry, environment and nature, agriculture, forestry, and fisheries participated in working groups and attended regional workshops and events. The Ems office received 15 position papers from interest groups on the draft iRBMP; a report was published indicating how the comments were addressed in the final iRBMP..

Existence of a transboundary accident warning system

In the area of the Tideems and the coastal waters of the iRBD Ems, a central accident management was set up to combat harmful substances and to inform the affected countries of impending or actual accidents or ship disasters. In the area of tidal and coastal waters, there is close cooperation between Germany and the Netherlands, including, for example, agreements on mutual assistance in the event of accidents. As accidents can have local and supra-regional impact, accident warning plans have been established at various governance levels.

1.3.3. Characterisation of the River Basin District

Coordination of the Article 5 assessment

According to the iRBMP, the pressures and impacts analysis was coordinated and updated in 2013, as well as the economic analysis. No further information is provided. The information reported by Germany and the Netherlands to WISE confirms the information in the iRBMP concerning the coordination of the Article 5 analysis.

For the second management period, a stand-alone Article 5 report was not prepared, but the Article 5 update was integrated directly into the iRBMP.

Delineation of water bodies and designation of heavily modified and artificial water bodies

The first iRBMP plan identified 537 surface water bodies in the Ems RBD. The 2015 update of the plan reduced the number to 517 surface water bodies. There were no changes in the number of coastal and transitional waters and lakes compared to the first management plan. Due to the more detailed coverage scale, there are minor changes in the geometric demarcation. The iRBMP states that partial geometry changes, divisions, or mergers of streams have been made for the following reasons:

- updating / revising the topographic data bases; and
- recent findings from the monitoring, which led to:
- changes in the water type,
- changes regarding water-related designation of artificial and significantly modified water bodies,
- section related differences in significant loads or
- changes related to water body status.

The iRBMP does not state whether delineation was carried out jointly between Germany and the Netherlands. GIS data on transboundary transitional and coastal water bodies were not reported to WISE so it is not possible to assess whether the Member States delineated transboundary water bodies similarly.

Typology Coordination of surface water bodies

For the typology of surface waters, Germany and the Netherlands both chose System B (Annex II WFD). For rivers, the description is based on physical and chemical factors that determine the characteristics of the water body and thus the structure and composition of the ecosystem. In the context of international coordination, an attempt was made to compare the Dutch types found in the catchment area with comparable German types. Due to similarities between hydromorphological conditions (catchment size, geology, soil substrates, etc.) and physico-chemical data (pH, conductivity, etc.), the Dutch and German types are comparable. .

A systematic comparison of the lake types is not possible due to the different delineation criteria and, according to the iRBMP, is not required.

For the classification of coastal water types, the criteria salinity and wave exposure are used both in Germany and in the Netherlands. Despite different thresholds regarding wave exposure, Dutch and German types are comparable.

Coordination in the establishment of reference conditions for surface water bodies

Correspondence with the Ems Committee indicates that reference conditions have been coordinated for the transboundary water bodies in the Ems-Dollart estuary by the Working Group "Water Quality" of the Subcommittee G of the Permanent German-Dutch Boundary Water Commission. Based on the information in the iRBMP and the information reported to WISE, there are similarities in the quality elements used, but the iRBMP does not mention whether there was coordination among the Member States on this issue. A comparison of the data reported to WISE shows that the Member States used partially different quality elements for defining reference conditions for the same surface water type (according to intercalibration classes).

Coordination on Significant Water Management Issues

Joint significant water management issues have been identified and coordinated in the Ems. These are:

- Nutrient and pollutant inputs from point sources and diffuse sources into surface waters and groundwater;
- hydromorphological alterations of surface waters; and
- lack of continuity of rivers.

In addition, the impacts of climate change must be considered in all planning. Requirements under other Directives such as the Natura 2000, the Flood Risk Management Directive and the Marine Strategy Framework Directive (MSFD) should also be integrated.

The information the Member States reported to WISE confirms the information in the iRBMP. Germany and the Netherlands reported that there was coordination on common visions and management objectives.

1.3.4. Monitoring, assessment and classification of surface water ecological status

Monitoring of ecological status/potential

Joint monitoring programmes for surface waters and application of joint methods/joint surveys

The iRBMP does not mention whether there is a joint monitoring programme for surface water bodies, and information on monitoring focuses on which national legislation governs the monitoring of surface water bodies in each Member State.

International monitoring sites are understood as being of transboundary/basin-wide relevance. The iRBMP presents information on the number of monitoring sites for each type of monitoring (surveillance, operational, reporting) in either Germany or the Netherlands.

Sensitive quality elements monitored (excluding river basin specific pollutants)

According to the WFD and as explained in the CIS guidance on monitoring[54], for operational monitoring, Member States are required to monitor for those biological and hydromorphological quality elements most sensitive to the pressures to which the body or bodies are subject. The iRBMP mentions that the assessment of ecological status in the catchment Ems-Dollart was coordinated jointly between Germany and the Netherlands in the working group "Water Quality" of Subcommittee G of the permanent German-Dutch Border Waters Commission and - as far as possible - harmonized. The quality elements phytoplankton, algae, macrozoobenthos, macrophytes and fish were used for the assessment. For the quality components fish (transitional waters) and macrozoobenthos (transitional and coastal waters) and macrophytes (transitional waters), consistent assessment results were obtained. The harmonization of the evaluation results for phytoplankton in coastal waters has not yet been achieved. Further coordination in relation to monitoring is planned.

Member States were requested to report to WISE which biological quality elements they considered to be sensitive for a given pressure. The table below differentiates four biological quality elements, nine different pressures and four different water categories.

An important assessment parameter is whether there is a minimum agreement between the iRBD sharing countries on the sensitivity of biological quality elements. Such an agreement would be expressed by the fact that there is at least one biological quality element in all riparian countries that is considered to be sensitive (for each pressure). Such a quality element can then be used as the least common denominator for comparable assessments of ecological status, provided that the intercalibration has been successful.

[54] See: https://circabc.europa.eu/sd/a/63f7715f-0f45-4955-b7cb-58ca305e42a8/Guidance%20No%207%20-%20Monitoring%20(WG%202.7).pdf

For rivers, the table below lists sensitive quality elements for each pressure. There is an agreement on sensitive quality elements for nutrients, organic pollution, hydrological and morphological pressures between Germany and the Netherlands but not for chemical and temperature pressures.

Table 1.3.2 Sensitivity of BQEs towards different pressure types for river water bodies

Member State	Phytoplankton	Other aquatic flora	Macrophytes	Phytobenthos	Benthic invertebrates	Fish
Assessment method mainly sensitive to nutrient pollution						
Germany	yes		yes	yes	yes	
Netherlands		yes	yes	yes		
Assessment method mainly sensitive to organic pollution						
Germany					yes	
Netherlands					yes	
Assessment method mainly sensitive to chemical pollution						
Germany					yes	yes
Netherlands						
Assessment method mainly sensitive to elevated temperature						
Germany					yes	yes
Netherlands						
Assessment method mainly sensitive to altered habitats due to hydrological changes						
Germany					yes	yes
Netherlands					yes	yes
Assessment method mainly sensitive to altered habitats due to morphological changes						
Germany					yes	yes
Netherlands					yes	yes

Source: WISE electronic reporting 2016

Coordination of river basin specific pollutants and matrices monitored

The WFD requires Member States to identify and select river basin specific pollutants and their environmental quality standards at the national, river basin or water body level.

The iRBMP provides a list of the river basin specific pollutants in the Ems and indicates in which Member State the environmental quality standards have been exceeded. The iRBMP mentions that in Germany environmental quality standards have been set for 162 pollutants in accordance with Annex 5 of the German Surface Water Ordinance 2011[55], while in the Netherlands the requirements are laid down in the decision on quality requirements and monitoring of waters (Besluit kwaliteits-iron and monitoring water - BKMW 2009). The international plan does not mention specifically whether the monitoring and assessment of river basin specific pollutants has been coordinated.

As part of the reporting to WISE regarding the assessment of ecological status, Member States were asked to report information regarding river basin specific pollutants at RBD

[55] Subsequent clarification by Germany is that this ordinance was amended in 2016 and now contains 67 pollutants.

level[56]. For the reporting to WISE, Member States could report pollutants using pre-defined codes from a list set by the European Commission, and they could report pollutants to a category "other". The "other" category is not uniform among the Member States and therefore the information reported for these pollutants cannot be compared within the iRBD.

The river basin specific pollutants reported by the Member States to WISE were evaluated. The summary of the evaluation concern three essential aspects:

7 which substances have been selected for the entire basin or parts of it;

8 whether the substances have an environmental quality standard and are monitored; and

9 whether the environmental quality standards are the same or in one or another way comparable (in the same range/order of magnitude, for the same matrix).

For environmental quality standards of river basin specific pollutants, different aspects have to be considered to make comparisons. They can only be compared for a given substance if the specific pollutant matrix (water, sediment, biota etc), the unit (mg/L, µg/L etc.), the scale at which the standard is applied (national, water body, river basin etc.), the category (rivers, lakes, coastal water, territorial water and transitional water) and the standard (AA-EQS[57], MAC-EQS[58]) are comparable. Therefore, there are many different approaches and dimensions for such a comparison.

This assessment covers selected aspects of the topic at the iRBD scale for reasons of practicability. The most important aspects are environmental quality standards for 1) AA-EQS, 2) for the matrix water and 3) the setting of the standard at national level. The relevant results are a quantitative description of the harmonisation and cooperation with respect to river basin specific pollutants.

A summary for the number of established environmental quality standards is given in the table below. The table below shows the number of Member States that have established an environmental quality standard for a certain river basin specific pollutant. This shows how

[56] Subsequent clarification by Germany indicates that they reported on river basin specific pollutants at the national level, i.e. they reported one list of pollutants without differentiating among the different RBDs.
[57] annual average environmental quality standard
[58] maximum allowable concentration environmental quality standard

many standards defined at the national level can be compared between how many countries and describes the extent of harmonization[59].

Table 1.3.3 Summary of the assessment of river basin specific pollutants for the Ems basin

Number of Member States	Number of river basin specific pollutants with an environmental quality standard	
	River basin specific pollutant scale	
	National[60]	All[61]
1	86	86
2	25	25

Source: WISE electronic reporting 2016

The table shows that 86 pollutants have an environmental quality standard for one Member State in the basin only. For these substances no comparisons of environmental quality standards can be made. 25 environmental quality standards can be compared between Germany and the Netherlands. Overall during the 2010-15 period the degree of harmonisation of river basin specific substances is adequate in terms of (basin-wide or bilateral) consensus on relevant substances (but also in terms of levels of environmental quality standards (see below).

River basin specific pollutants are only useful and supportive for the assessment of ecological status if an environmental quality standard has been adopted and the pollutants are monitored.

The information the Member States and Regions reported to WISE was assessed using the following reporting elements:

5) RBSPvalue: If a value is provided in WISE criterion “EQS-yes” is fulfilled

6) chemicalLastMonitored: If a value>=2010 is provided in WISE the criterion “Monitored: yes” is fulfilled

For each river basin specific pollutants, the criteria mentioned above were evaluated according to the scheme given in table below. A filter is applied, considering the following schema elements: a) chemicalSubstanceCode, b) chemicalMatrix c) chemicalPurpose, d) rbspCategoryRW.

[59] This analysis assumes a basin-wide view only, it does not show whether the pollutants are shared between neighbouring countries.

[60] National means only standards for the national scale are included in the analysis.

[61] All means that the analysis takes all scales into account (i.e. national regional (sub-national), local/municipality, international RBD, RBD, sub-unit, water body, other).

Table 1.3.4 shows how many river basin specific pollutants can be used for the assessment of ecological status. The number of pollutants that can be integrated into the assessment of ecological status ranges between 47 in the Netherlands and 76 in Germany. The information describes the role that river basin specific pollutants pay in the frame of the ecological assessment and whether the approaches are comparable. The results do not describe whether and how often theses pollutants have been used in the frame of status assessment.

Table 1.3.4 Synthesis of environmental quality standards and sampling of river basin specific pollutants with pre-defined codes in the WISE reporting[62]

Member State	Monitored: yes Environmental quality standard: yes	Monitored: no Environmental quality standard: yes	Monitored: yes Environmental quality standard: no	Substances (number and percentage) that can be used for the assessment of the ecological status
Germany	76	1	47	76 / 62 %
Netherlands	47	12	35	47 / 57 %

Source: WISE electronic reporting 2016

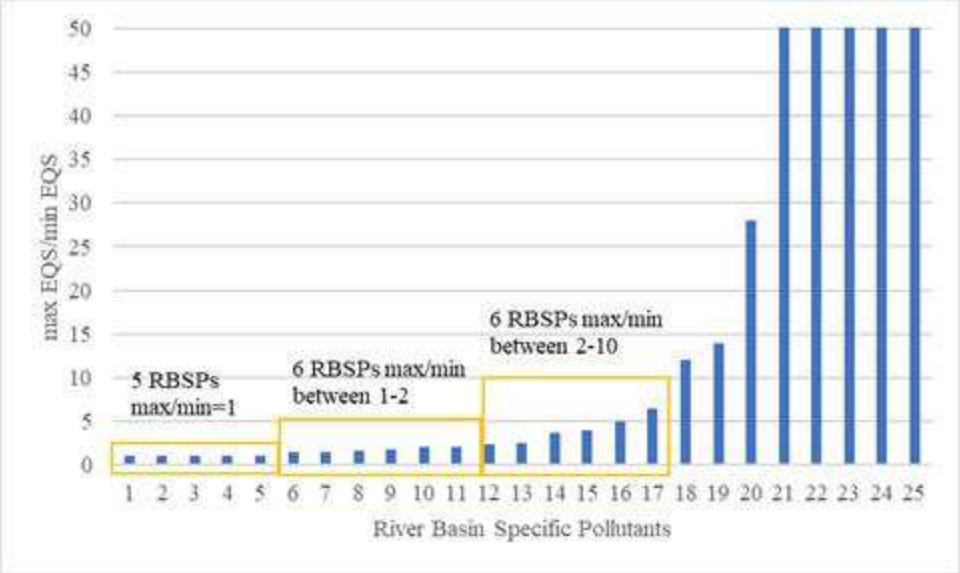
Environmental quality standards for river basin specific pollutants

A comparison between environmental quality standards is given in the figure below.

There is little agreement for the level of environmental quality standards for river basin specific pollutants between the two Member States. For about five substances, Germany and the Netherlands have set the same standard. For the other substances, the environmental quality standards differ by one order of magnitude or more. This makes it difficult to compare status between the two countries. The different standards used may also partly explain why one Member State identified a certain substance as river basin specific pollutants while the other does not.

[62] Information regarding "other RBSP" is not included in the table.

Figure 1.3.1 Ratio between the maximum and the minimum environmental quality standard for river basin specific pollutants in the Ems iRBD[63]



Source: WISE electronic reporting 2016

Status Classification

Use of monitoring results for classification – transboundary harmonization

The results of monitoring and status assessment in the Ems iRBD have been harmonised. In order to compare the credibility of the biological results across Europe, a three-level confidence level was introduced. In the assessment of the waters of the iRBD Ems, the overwhelming majority of the results were classified in the high confidence level, since the assessment is carried out in accordance with WFD-compliant or LAWA (Germany) recognized procedures. Most of the results of the second intercalibration phase were incorporated into the national evaluation systems. For the still open components and parameters, the national assessment procedures are used. The iRBMP states that this raises uncertainty as it is still possible that there are changes in the class boundaries or in evaluation criteria and these impacts the assessment of the monitoring results.

Ecological status/potential classification for water bodies that form the border between iRBD countries

Annex 1 presents maps for ecological status/potential according to biological quality element. For the Ems-Dollart coordination area, the status is the same on both sides of the border.

[63] A ratio of one indicates that the Member States and Regions that have set a standard use the same value for this standard. The higher the ratio, the higher the differences in the standards used.

Intercalibration exercise and Geographical Intercalibration Group (GIG)

Germany and the Netherlands have carried out two intercalibration exercises thus far. According to the iRBMP, macrophytes and pythobenthos are fully intercalibrated for rivers and lakes. Pythobenthos has been fully intercalibrated for very large rivers. Phytoplankton has been fully intercalibrated for lakes and partially for coastal waters. Benthic invertebrates have been fully intercalibrated for rivers and lakes and partially calibrated for coastal waters. Finally, fish have been fully intercalibrated for rivers and transitional waters and partially calibrated for lakes. Algae and Angiosperm have been partially calibrated for transitional and coastal waters. A third exercise should have been completed by the end of 2016 for the remaining quality components. At the time of publication of the iRBMP, the following quality elements had not been intercalibrated: - phytoplankton for very large rivers - macrophytes for very large rivers - benthic invertebrates for very large rivers and transitional waters - fish for very large rivers.

1.3.5. Monitoring, assessment and classification of surface water chemical status

Monitoring of chemical status in surface waters

The iRBMP provides little information regarding the monitoring of chemical status in the basin. It describes the changes that have taken place in the basin since the introduction of the new Environmental Quality Standards Directive in 2013, including that additional priority substances are now being monitored.

Coordination of monitoring and assessment of chemical status

The iRBMP presents information on the priority substances where environmental quality standards have been exceeded in the basin. For some priority substances, the standards have been exceeded in both Member. The iRBMP does not clarify whether the assessment of chemical status has been coordinated[64].

In the Ems all priority substances have been analysed. In Germany 41 substances have been analysed and in the Netherlands 38 substances have been analysed. An important aspect for chemical status assessment is whether the water samples have been taken with the frequency recommended as a general rule in the WFD[65]. Monthly samples should be analysed for WFD compliant assessment of chemical status at a given site. Other frequencies need a justification based on expert judgement or technical knowledge. If the analysis excludes all frequencies

[64] Subsequent clarification by the Member States indicate that the assessment of the chemical status has been coordinated between Germany and the Netherlands for the transboundary water bodies in the Ems-Dollart estuary. The Coordination took place in the Working Group "Water Quality" of the Subcommittee G of the Permanent German-Dutch Boundary Water Commission.

[65] Information reported to WISE did not differentiate between surveillance or operational monitoring. In the case of surveillance monitoring, water sampling has to been carried once a month for one year only within the management cycle. Operational monitoring requires monthly sampling every year of the management cycle.

that are lower than 12/year, the number of samples decreases from ~16,782 to ~10,810. This means that 78 % of the samples of Priority Substances (reported to WISE) in the Ems catchment can be used for WFD compliant assessment of chemical status without any further justification.

The total number of samples (see table below) was calculated by combining the information of the WISE reporting elements “chemicalfrequency” and “chemicalCycle”, as also illustrated in the reporting guidance under chapter 4.3.5.

Table 1.3.5 Percentage of Priority Substance samples (matrix water) that have been taken with the frequency recommended in the WFD (monthly samples)

Member State	Percentage of Priority Substance samples with a frequency≥12/year	Samples usable for assessment of chemical status without any further explanation
Germany	56 % (out of 13602)	7630
Netherlands	100 %	3180

Source: WISE electronic reporting 2016

The total number of samples (see table below) was calculated by combining the information of the WISE reporting elements “chemicalfrequency” and “chemicalCycle”, as also illustrated in the reporting guidance under chapter 4.3.5**.**

Table 1.3.6 Total Number of analysed samples for each Priority Substance for the period 2010-15

Number of samples for Priority substances (period 2010-2015)		
Substance	**Germany**	**Netherlands**
CAS_104-40-5 - 4-nonylphenol		72
CAS_107-06-2 - 1,2-Dichloroethane	310	84
CAS_115-29-7 - Endosulfan	446	84
CAS_117-81-7 - Di(2-ethylhexyl)phthalate (DEHP)	278	84
CAS_118-74-1 - Hexachlorobenzene	284	84
CAS_12002-48-1 - Trichlorobenzenes (all isomers)	918	84
CAS_120-12-7 - Anthracene	262	84
CAS_122-34-9 - Simazine	362	84
CAS_127-18-4 - Tetrachloroethylene	278	84
CAS_140-66-9 - Octylphenol (4-(1,1',3,3'-tetramethylbutyl)-phenol)	252	84
CAS_1582-09-8 - Trifluralin	348	84
CAS_15972-60-8 - Alachlor	328	84
CAS_1912-24-9 - Atrazine	362	84
CAS_206-44-0 - Fluoranthene	262	84
CAS_2921-88-2 - Chlorpyrifos	374	84
CAS_330-54-1 - Diuron	362	84
CAS_34123-59-6 - Isoproturon	374	84
CAS_36643-28-4 - Tributyltin-cation	356	84
CAS_470-90-6 - Chlorfenvinphos	348	84
CAS_50-29-3 - DDT, p,p'	194	84

Number of samples for Priority substances (period 2010-2015)		
CAS_50-32-8 - Benzo(a)pyrene	274	84
CAS_56-23-5 - Carbon tetrachloride	278	84
CAS_608-73-1 - Hexachlorocyclohexane	828	
CAS_608-93-5 - Pentachlorobenzene	188	84
CAS_67-66-3 - Trichloromethane	326	84
CAS_71-43-2 - Benzene	302	84
CAS_7439-92-1 - Lead and its compounds	440	84
CAS_7439-97-6 - Mercury and its compounds	310	84
CAS_7440-02-0 - Nickel and its compounds	330	84
CAS_7440-43-9 - Cadmium and its compounds	440	84
CAS_75-09-2 - Dichloromethane	338	84
CAS_79-01-6 - Trichloroethylene	278	84
CAS_85535-84-8 - Chloroalkanes C10-13	62	84
CAS_87-68-3 - Hexachlorobutadiene	274	84
CAS_87-86-5 - Pentachlorophenol	182	84
CAS_91-20-3 - Naphthalene	232	84
EEA_32-02-0 - Total cyclodiene pesticides (aldrin + dieldrin + endrin + isodrin)	684	84
EEA_32-03-1 - Total DDT (DDT, p,p' + DDT, o,p' + DDE, p,p' + DDD, p,p')	672	
EEA_32-04-2 - Brominated diphenylethers (congener numbers 28, 47, 99, 100, 153 and 154)	240	
EEA_32-23-5 - Total Benzo(b)fluor-anthene (CAS_205-99-2) + Benzo(k)fluor-anthene (CAS_207-08-9)	388	84
EEA_32-24-6 - Total Benzo(g,h,i)-perylene (CAS_191-24-2) + Indeno(1,2,3-cd)-pyrene (CAS_193-39-5)	388	84

Source: WISE electronic reporting 2016T

Transboundary harmonisation of monitoring and assessment

There is no information in the iRBMP whether chemical status classification for water bodies that form a border between countries has been coordinated [66]. Annex 1 of the iRBMP includes maps of the Ems iRBD, which shows that chemical status has been classified the same on both sides of the border.

1.3.6. Designation of heavily modified water bodies, artificial water bodies and definition of good ecological potential

Cooperation and joint activities regarding heavily modified water body designation

The iRBMP does not mention whether a joint method was used to designated heavily modified water bodies[67].

Cooperation and Joint methods and approaches for the determination of Good Ecological Potential (GEP)

According to the iRBMP, the methodological approaches to determine ecological potential differ in Germany (CIS-method with some elements of the Prague approach) and the Netherlands (Prague approach with some elements of the CIS guidance). The iRBMP states that if used consistently, however, both methods can lead to comparable results.

For determining highest and good ecological potential, uniform procedures for rivers and lakes were developed in Germany. Assessment methods using all quality elements were also developed for transitional waters. In the Netherlands, a similar procedure was already applied to the first management plan.

Both Member States use benthic invertebrates and fish; the Netherlands also uses phytoplankton and other aquatic flora. Mitigation measures reported to WISE by the Member States shows commonalities.

[66] Subsequent clarification by the Ems Committee indicates that the assessment of the chemical status has been coordinated between Germany and the Netherlands for the transboundary water bodies in the Ems-Dollart estuary. The Coordination took place in the Working Group "Water Quality" of the Subcommittee G of the Permanent German-Dutch Boundary Water Commission.

[67] Subsequent clarification from the Member States indicates that the designation of heavily modified water bodies has been coordinated between Germany and the Netherlands for the transboundary water bodies in the Ems-Dollart estuary. The Coordination took place in the Working Group "Water Quality" of the Subcommittee G of the Permanent German-Dutch Boundary Water Commission.

1.3.7. Environmental Objectives and Exemptions

According to the iRBMP, Article 4 (4) and 4 (6) are being applied in the iRBD. Article 4 (4) has been applied by both Germany and the Netherlands.

The iRBMP refers to national guidance on the application of exemptions. The iRBMP presents tables showing the number of exemptions applied in the national shares of the Basin. Annex 3.3 and 3.4 show the exemptions for transitional and coastal water bodies. Water bodies and exemptions are listed by Member State and it is not clear whether exemptions have been applied for transboundary water bodies[68].

Article 4 (5) and Article 4 (7) have not been applied in the Ems. The Netherland has applied Article 4 (6) in its coastal areas.

1.3.8. Programme of measures

As mentioned in the chapter on characterisation, to support the development of the national PoMs Germany and the Netherlands agreed on common significant management issues. The iRBMP states that the supplementary measures for the second management period are based on the transboundary significant water management issues identified for the Ems. For these transboundary management issues, such as the improvement of the water structure and continuity as well as the reduction of nutrient and pollutant inputs, measures were identified and priorities for their implementation agreed in cross-border coordinated processes.

Common management objectives were identified, namely:

- Reduction of eutrophication in coastal and inland water bodies;
- Reduction point and diffuse pollution;
- Reduction of salination effects in the sub-unit Ems South and on the national level;
- Reduction of the turbidity of the Tideems;
- Improvement of river morphology;
- Improvement of biological river continuity; and
- Protection of groundwater from pollution.

The measures listed in the iRBMP are part of the national programmes of measures (nPoM) and are implemented though national mechanisms within the Member States. The summary chapter on national POMs does not describe joint activities agreed by the countries and information on measures is described separately for Germany and the Netherlands. The iRBMP does not describe how the iRBMP measures will be implemented through national and international mechanisms, i.e. there is no information on who is responsible for

[68] Subsequent clarification by the Ems Committee indicates that the use of exemptions in the Ems-Dollart estuary was coordinated between Germany and the Netherlands.

implementing the measures, the timeline for implementation or budget allocation. The iRBMP refers to the national PoMs and RBMPs for further details.

1.3.9. Measures related to pollution from agriculture and other sectors

Joint identification of Pressures and Objectives

Water pollution from multiple sectors is addressed in the iRBMP. The chapter on significant water management issues in the iRBMP includes nutrient and pollutant inputs from point sources and diffuse sources into surface waters and groundwater. Joint management objectives have been defined for diffuse pollution:

- Reduction of eutrophication in coastal and inland water bodies;
- Reduction point and diffuse pollution;
- Protection of groundwater from pollution.

Neither the significant water management issue nor the joint management objectives mention a specific sector, but the pressures analysis for the iRBD indicates that pollution from multiple sectors is a significant issue. Results from a 2014 UBA project (in Germany) using the MONERIS model additionally shows that 80 % of the nitrogen in surface and groundwater bodies in the Ems can be attributed to agriculture land. The iRBMP states that pollution from sewage plants is still an issue but much more minor compared to agriculture inputs. Chemical pollution from mercury, tributyltin and PAHs, mainly based on historical uses, is an issue, as well as salt inputs from mining.

As regarding quantitative management objectives, information is provided in the iRBMP regarding reductions needed in the agriculture sector. The information in the iRBMP points not to a reduction goal per se but to an average annual total nitrogen concentration objective of 2.8 mg / l for all inland waters in the German part of the Ems. An assessment by the LAWA in 2014 indicates that at least for one monitoring point (in Herbrum) that there needs to be reduction by 48 % or 7,305 tonnes of nitrogen in order to achieve 2.8 mg total nitrogen/liter.

National reporting to WISE indicates that Germany and the Netherlands identified general management objectives regarding nutrients from agriculture for their national shares of the iRBD. In addition, Germany reported to WISE that it has set quantitative targets for both nitrogen and phosphorus pollution for its share of the basin.

Coordination on addressing pollution from agriculture

According to the iRBMP, the Member States coordinated with each other during the development of their national PoMs in the identification of measures to address the significant

water management issues of the basin. The iRBMP indicates a joint approach for selecting and prioritising measures but does not describe joint measures.

While the iRBMP states that measures were identified and prioritised for implementation at river basin level, the PoM summary chapter presents information on the number of measures being implemented in each Member State separately. The types of agriculture measures are summarised in general. Further details provided are Member State specific and reference is made to more information being available in the national plans; therefore, it is not known whether joint measures are planned.

Measures to address pressures

Agriculture sector

For the most part, both countries will implement similar measures to address agriculture pollution. According to the iRBMP, 1,465 measures are planned in the Ems iRBD, including measures to reduce 1) nutrient input by planting buffer strips; 2) reduce nutrient inputs and soil matter resulting from erosion and flooding; 3) surface runoff and 3) nutrient inputs from drainage. Drainage measures will focus on reducing phosphorus inputs, while buffer strips focus on reducing nutrient inputs and sedimentation. Buffer strips will also be planted to reduce pesticide pollution. Agriculture advice will be offered in Germany and the Netherlands. Conceptual measures are also being offered, for example agri-environment measures in targeted areas.

In order to enable a comparable grouping of measures in the national and international programme of measures, the European Commission introduced the concept of KTMs in 2012 to simplify reporting[69]. KTMs are groups of measures identified by Member States in the PoMs which target the same pressure or purpose. The individual measures included in the PoM (being part of the RBMP) are grouped into KTMs for the purpose of reporting. The same individual measure can be part of more than one KTM because it may be multi-purpose. Both Member States reported to WISE applying KTM 2 – reduce nutrient pollution from agriculture and KTM 3 -reduce pesticides pollution from agriculture. Germany additionally reported applying KTM 12 – advisory services.

Other sectors

Both Member States are implementing measures to address pollution from sources other than agriculture. Information from measures in the Netherlands is very limited in the iRBMP. The PoMs focuses on measures like construction of sewage treatment plans; the optimization of

[69] The need for KTMs was borne out of the large differences in the level of detail reported in 2010 by the Member States. Some Member States reported 10-20 measures whilst others reported hundreds or even thousands.

rainwater discharges; and the adaptation of the management of municipal sewage treatment plants. Further details are not provided.

Both Member States reported to WISE that they are implementing the following KTMs:

- KTM1 – Construction or upgrades of wastewater treatment plants;
- KTM4 – Remediation of contaminated sites (historical pollution including sediments, groundwater, soil);
- KTM15 – Measures for the phasing-out of emissions, discharges and losses of Priority Hazardous Substances or for the reduction of emissions, discharges and losses of Priority Substances;
- KTM17 – Measures to reduce sediment from soil erosion and surface run-off; and
- KTM21 – Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure.

In addition, Germany reported to WISE that it is implementing KTM16 – Upgrades or improvements of industrial wastewater treatment plants (including farms); KTM23 – Natural water retention measures; and KTM25 – Measures to counteract acidification.

The information reported in WISE and the information in the PoM are the same.

1.3.10. Measures related to hydromorphological alterations

Joint identification of Pressures and Objectives

There are two relevant transboundary significant water management issues identified in the iRBMP, namely hydromorphological alterations of surface waters and lack of continuity of rivers. Three relevant management objectives were defined in the iRBMP:

- Reduction of the turbidity of the Tideems;
- Improvement of river morphology;
- Improvement of river continuity

Turbidity of the River Tideems is associated with poor sediment management. The objective of improving river morphology focuses on creating/maintaining habitat to ensure good status for biological quality elements. Within the objective "Improve river continuity", the common objective is to create conditions for migratory fish and round-mouths that make it possible to preserve or restore self-reproduction. The iRBMP does not provide information regarding quantitative management objectives.

Both Germany and the Netherlands reported addressing river continuity, other hydromorphological and sediment management pressures to WISE. Both Member States reported identifying general management objectives regarding river continuity to WISE,

which is in line with the information provided in the iRBMP. Neither Member State reported identifying quantitative management objectives regarding river continuity in their national shares of the iRBD.

Coordination on addressing hydromorphological alterations

The Member States in the Ems have agreed to joint approach in the prioritisation of measures to address river continuity. Habitat requirements of 14 target species (fish and round mouths, sea and river necks, sea trout and eel) were evaluated to identify nationally significant migratory routes, the. The historical and current distribution of the species as well as their demands on spawning, nursery and feeding habitats were considered. The priority waterway network was subdivided into the following three categories: transregional hiking routes, connecting waters and spawning and nursery waters.

To identify locations where measures are most needed, an analysis of the existing transverse structures was carried in terms of the location, type and river continuity for fish species. Within the analysis, the necessary environmental conditions (e.g. water structure, water quality and ecological status) were considered and the impact of the transverse structures on these aspects was assessed.

Measures to address pressures

A total of 4,782 measures are planned to reduce the burden of runoff regulation and morphological changes and to improve river continuity. According to the programs of measures for the Ems, the focus of the measures is to improve the ecological status of surface waters and habitat conditions for aquatic communities should be improved. The following measures are foreseen:

- Measures to improve habitat along the bank (471 measures),
- Measures to improve the habitat by initiating / allowing natural water body development (424 measures),
- Habitat improvement measures in the water in the existing profile (465 measures),
- Measures to improve the habitat in the water by changing the course, shore and sole design (437 measures),
- Measures for the development and improvement of habitats (418 measures),
- Measures to adapt / optimize water conservation (336 measures),
- Measures to re-establish river continuity (745 measures)

The iRBMP does not describe joint measures between Germany and the Netherlands. The iRBMP describes multiple national projects to improve the status of transitional and coastal waters and to combat sediment turbidity.

The strategy for fish continuity in the iRBMP mentions that a previous project in the Netherlands identified all impasses along the priority fish corridors. 130 were identified and by 2015 fish ladders will have been built in 103 locations. Furthermore, from 2015-2021 fish ladders will be built at 21 locations.

Both Germany and the Netherlands reported to WISE implementing KTM5 ‘Improving longitudinal continuity’ and KTM6 ‘Improving hydromorphological conditions of water bodies other than longitudinal continuity’. Neither Member State reported to WISE the number of fish/continuity passes required to achieve the environmental objectives.

1.3.11. Economic analysis and water pricing policies

An economic analysis has been undertaken and was updated in 2013 for the second management cycle. The economic analysis covers the following topic: economic importance of water use (population, drinking water and sewage supply, industry, agriculture, energy, shipping, flood protection); update of the baseline scenarios (land use; population growth; economic growth; climate change; water use demand; agriculture; damns; shipping; floods); cost recovery of water uses, including environmental and resource costs; water pricing; and cost-effectiveness of measures.

A joint approach regarding the economic analysis and water pricing policies has not been applied in the Basin. Rather, each Member State undertook its own analysis and set its own water pricing policies. Annex 4 of the iRBMP presents detailed information regarding the economic analysis and water pricing policies of Germany and the Netherlands separately.

The iRBMP states that an evaluation by the European Commission of the 2004 economic analysis in the Ems found that the economic analysis carried out in the iRBD needed significant improvements. In order to address the Commission's recommendation, a much more detailed economic analysis was carried out for the second management plan. Overall, the update of the economic analysis for the Ems iRBD did not reveal significant changes in water uses compared to the first management plan. The developments predicted in the last economic analysis (population development, economic growth, water consumption in agriculture, industry and mining, etc.) have essentially occurred.

1.3.12. Considerations specific to Protected Areas

Protected Areas are addressed in the iRBMP. The following types of areas are found in the Ems: drinking water areas; bathing water areas; nitrate vulnerable zones; and bird and habitat areas. The iRBMP mentions that the inventory of protected areas was updated in 2013. The iRBMP provides a table of the protected areas in the Ems according to type, which is split according to Germany and the Netherlands. The iRBMP mentions that under bird and habitat protection areas, there is a transboundary protected area in the Ems-Dollart sub-catchment.

1.3.13. Climate Change and droughts

In the chapter on transboundary strategies to achieve environmental objectives, the iRBMP includes a section on climate change. The chapter describes the expected future climate change effects. The iRBMP mentions the need to take advantage of win-win measures that not only improve water management today but also help to increase the resilience of the water environment against future climate change effects. The need for adaptation measures is highlighted. The iRBMP states that measures in the Ems were assessed regarding their sensitivity to climate change impacts and measures were prioritised that would have a positive

effect on water management under a wide range of climate change effects. Details on this approach are not included in the iRBMP. Further information can be found in the national RBMPs.

1.3.14. Recommendations

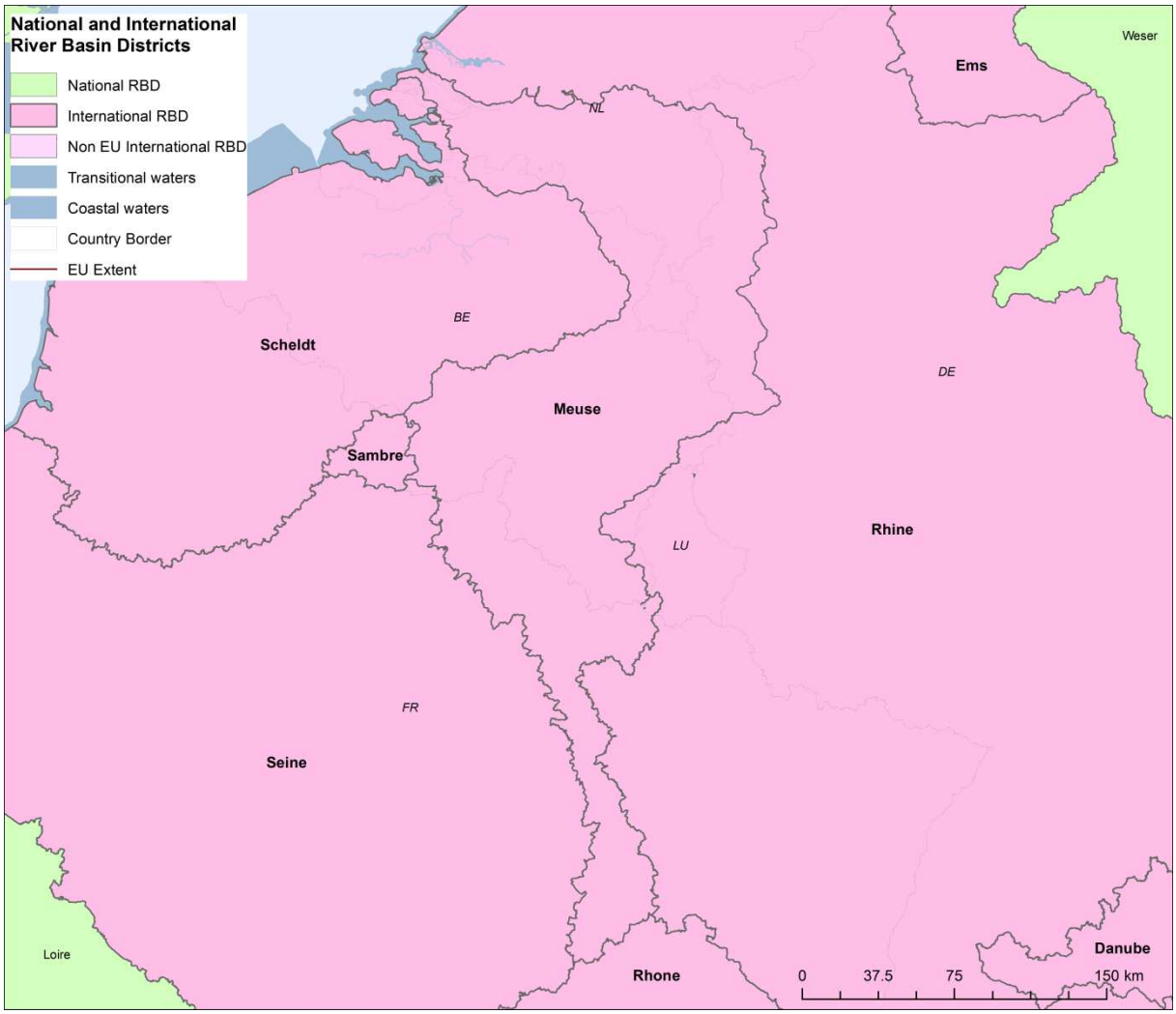
Coordination has taken place between the Member States on a number of aspects. For the Ems iRBD the following recommendations can be made to further improve cooperation:

- The next iRBMP should explain how heavily modified water body designation has been coordinated.
- The use of exemptions, their justification and coordination should be more transparent.
- There should be an agreement on sensitive quality elements for chemical and temperature pressures.
- Coordination of river basin specific pollutants and setting of common environmental quality standards should be improved. The corresponding environmental quality standards do not match in many cases.

1.4. Meuse River Basin District

1.4.1. General Information

Map 1.4.1 Meuse International River Basin District



Source: WISE reporting 2016

The Meuse International River Basin District (iRBD) is shared by Belgium (Flanders and Wallonia), Germany, France, Luxembourg and the Netherlands. The Meuse iRBD is allocated to cooperation Category 1, which means that an international agreement, a permanent co-operation body and international WFD RBMP is in place. The international RBMP for the Meuse was published on 8 December 2015 and can be downloaded on the Meuse Commission website[70].

The table below presents the size of the total catchment area and national shares within the iRBD (km^2; %).

[70] http://www.meuse-maas.be

Table 1.4.1 Member State share of the iRBD

Name of the International River Basin District	Total Area km^2	EU Member States	EU RBD Code	National Area within iRBD km^2	National Area within iRBD - %
Meuse	34,564.00	Belgium (Flanders)	BEMAAS_VL	1,601.00	4.6
		Belgium (Wallonia)	BEMEUSE_RW	12,300.00	35.58
		Germany	DE7000	3,977.00	11.5
		France	FRB1 and 2	8,919.00	25.8
		Luxembourg	LU001	72.00	0.21
		Netherlands	NLMS	7,500.00	22.27

Source: iRBMP and IMC

1.4.2. Governance and public participation

Cooperation framework: International, bilateral and/or multilateral agreements in place covering certain cooperation aspects

The International Meuse agreement (2002) governs international cooperation in the Meuse river basin district, including the implementation of the WFD. The agreement widened the role of the International Meuse Commission by assigning to it the task of coordinating the activities of its contracting parties in the implementation of the WFD. In particular, the Agreement stipulates that the International Meuse Commission has the remit of coordinating the elaboration of a single iRBMP for the entire district. It also refers to the coordination of the Article 5 analysis, of the monitoring programmes and of the programmes of measures.

The Meuse Commission is the foundation for WFD implementation. Working groups for the development of a joint river basin management plan were already established in the first river basin management cycle.

In addition to the Meuse agreement, multiple bilateral agreements are in place.

Joint activities within the iRBD

Development of an iRBMP and link to national RBMPs

According to the iRBMP, the national plans contributed to the development of the iRBMP. The international plan is based on the identified key water management issues of common interest, which were agreed during the review and update at the iRBD level. The international plan supplements the national plan. The iRBMP states that the international plan was developed progressively and is based on national and regional work, with a constant exchange of views to determine their compatibility and overall coherence. The international plan

highlights the coordination of national plans and efforts to harmonize them, focusing on key water management issues. In addition to multilateral coordination, the national RBMPs drawn up by the states and regions for their respective territories have been coordinated bilaterally or trilaterally with respect to transboundary sub-basins and / or specific issues (e.g. groundwater) where necessary.

Areas of joint cooperation

According to the iRBMP[71], public consultation is the responsibility of the individual Member States and Regions; however, the Member States and Regions did provide advice to one another during the development of the national RBMPs, which enabled the coordination of the national/regional Programme of Measures. In all Member States and Regions, public consultation on the international RBMP took place together with the national/regional plans.

Sectors and observers involved within the development of the iRBMP

The Meuse Commission currently has the following observers:

- Secretary General of Benelux;
- Union Wallonne des Entreprises (UWE), an organisation of private employers in Wallonia (Belgium) focussing on business development;
- Inter-Environnement Wallonie (IEW), an independent environmental NGO that brings together about 150 associations;
- RIWA – Meuse-Maas, an international association of drinking water companies in Belgium and the Netherlands that use the River Meuse as a source for their drinking water production;
- Minaraad (The Environment and Nature Council of Flanders), an advisory body of the Flemish Government; and
- Aluseau, an association that promotes, in the general interest, public authorities and services involved in water management.

The NGO sectors involved in the development of the iRBMP include local/regional administrations, industry, public and private water service providers and environmental NGOs.

Existence of a transboundary accident warning system

A task of the Meuse Commission is to coordinate on a transboundary accident warning system. The iRBMP refers to a warning and alarm system that focuses on pollution.

To avoid or limit the consequences of accidental contamination, a warning and alarm system Meuse was introduced. The Meuse warning and alarm system is based on 7 main warning

[71] iRBMP, p.30

posts, which provide information on occurred or possible water pollution that may affect the water quality or the use of water. The main warning posts are constantly online and use a web-based program for mutual communication. As a result, the national/regional relevant authorities are quickly informed and brought in contact with each other. The warning and alarm system sends out an alarm message when serious contaminants that could also cause consequences for the downstream parties, are emitted. A few years ago, the system was extended beyond solely a warning system. It now has an information section with inputs from the Meuse Member States about observed minor impairment of water quality. The functionality of the communication system between the main posts is tested on a monthly basis. In addition, an alert exercise takes place once a year, examining the warning system's broader operational readiness and communication with national and regional administrations. The results and experiences with the warning system are reported and discussed annually in the Meuse Commission plenary session

1.4.3. Characterisation of the River Basin District

Coordination of the Article 5 assessment

The pressures and impacts analysis was coordinated and updated in 2013, as well as the economic analysis. The results were integrated into the iRBMP.

Delineation of water bodies and designation of heavily modified and artificial water bodies

Surface water

Annex 3 of the iRBMP includes a map of the transboundary catchments in the basin. The iRBMP does not mention whether international coordination took place for water body delineation[72]. The 2005 Article 5 report notes that the delineation of water bodies was done within the individual Member States. .

There are no transboundary lakes in the iRBD.

To determine whether the delineation of surface water bodies by the Member States has resulted in the same outcome, the Member State reported GIS data for a stretch of river in the Meuse basin was assessed. As shown in the map, below delineation between Belgium and Netherlands has been coordinated. Both delineations by Belgium and Netherlands for the same water body match almost completely.

[72] The Meuse Commission subsequently noted that the Coordination of WFD obligations in the ‚Grensmaas' (Common Meuse) has been made in the Bilateral Dutch Flemish Meuse Commission.

Map 1.4.2 Comparison of the delineation of a river along the Belgian-Dutch border

Source: WISE electronic reporting 2016

The brown line refers to water body BEVL11_203 delineated by Belgium and the grey line refers NL91GM delineated by the Netherlands. The starting and end points of both delineations do not fully match, but most parts of the water body do.

Groundwater

Annex 4 of the iRBMP has a map of groundwater bodies and transboundary aquifers. The iRBMP mentions that there was international coordination in their delineation on a bilateral or trilateral basis within the WG Groundwater of the Meuse Commission.

The Member States did not report GIS data to WISE for transboundary groundwater bodies, as there are none designated as transboundary groundwater bodies in this river basin.

Typology Coordination of surface water bodies

Water body typology and its coordination at international level is not mentioned in the iRBMP. The 2005 Article 5 report states that all the Member States and Regions in the iRBD "System B" for rivers and lakes. A coordinated approach for typologies was limited to rivers. As there are no transboundary lakes in the iRBD, coordination on typology was not carried out.

The coordinated approach to the typology of rivers distinguishes between the main stream of the Meuse and the tributaries in the iRBD. As a first step towards coordinating the typologies of the tributaries, the typologies used in the individual Member States and Region were

merged. In a second step, the criteria and descriptors used in the typologies were compared. For the coordination of typologies, criteria and descriptors were assessed for their applicability. Finally, the types differentiated by the Member States and Regions were grouped into 14 different types on the basis of two descriptors: hydro-ecoregions and the size of the catchment area of the tributary. The 2005 report states that the typologies of Member State and Region are not uniform.

Another specific typology was developed for the Meuse river based on a subdivision of the geomorphological river sections. The typology does not correspond to the hydro-ecoregions, as the main stream has different substrate and runoff characteristics compared to the neighbouring areas in its floodplain. For this reason, the Meuse river has been classified as a different type in the Belgian and Dutch typologies. The sections are distinguished on the basis of the physical and geomorphological characteristics of the river and its watershed conditions. There is a common transboundary type between Belgium (Wallonia, Flanders) and the Netherlands.

The evidence from the GIS information indicates that typology differs for surface waterbodies at the border. For example, for the river stretch in Map 1.4.2 the Netherlands reported type RW-R-C1 - Central/Baltic, small, lowland, siliceous sand and Belgium (Flanders) report the type RW-R-L2 - Very large medium to high alkalinity (all GIGs) BE.

Coordination in the Establishment of reference conditions for surface water bodies

The iRBMP does not mention whether type-specific reference conditions were coordinated in the Meuse. A comparison of the data reported to WISE shows that the Member States used partially different quality elements for defining reference conditions for the same surface water type (according to intercalibration classes). There are similarities in the quality elements used, but the iRBMP does not mention whether there was a coordination among the Member States on this issue.

Coordination on Significant Water Management Issues

Joint significant water management issues have been identified and coordinated in the Meuse. These are:

- re-establish river continuity;
- ensure better harmony between hydropower and water protection goals;
- reduce pollution from point and diffuse sources;
- protect water bodies from nutrients and priority substances;
- water quantity in terms of low flows on the one hand and flooding on the other; and
- Consequences of climate change and possible adaptation measures.

1.4.4. Monitoring, assessment and classification of surface water ecological status

Monitoring of ecological status/potential

Joint monitoring programmes for surface waters and application of joint methods/joint surveys and interlaboratory tests

There is a joint monitoring programme for the Meuse river basin. This programme is called the Homogeneous Monitoring Network and is coordinated by the International Meuse Commission. It establishes joint methods and runs joint surveys for ecological surface water status.

Every three years, the Meuse Commission publishes a report with the most important results of the measured parameters per measuring station or measuring location. These are selected on the basis of important issues related to water management at the iRBD level. These key issues for water management are based on the water quality improvement programs agreed by the riparian countries. The published results concern a limited number of parameters that show the long-term development of water quality, especially in the Meuse main stream.

Out of the national / regional surveillance networks, 38 stations / sites were selected for the Homogeneous Monitoring Network. There are 38 Stations for Chemical and Physical/Chemical monitoring (16 on the main stream and 22 on the tributaries) and 36 stations for Biological monitoring (15 monitoring points on the main stream and 21 on the tributaries).

Sensitive Quality elements monitored (excluding river basin specific pollutants)

According to the WFD and as explained in the CIS guidance on monitoring[73], for operational monitoring, Member States are required to monitor for those biological and hydromorphological quality elements most sensitive to the pressures to which the body or bodies are subject.. The iRBMP does not provide information on which the most sensitive biological quality elements are for pressures in the iRBD and does not mention whether the Member States/Regions harmonised the selection of the most biological quality elements.

Member States and Regions reported to WISE which biological quality elements they considered to be sensitive for a given pressure. In WISE the sensitive biological quality elements are listed for each pressure.

An important assessment parameter is whether there is a minimum agreement between the Member States and Regions sharing a border with each other on the sensitivity of biological

[73] See: https://circabc.europa.eu/sd/a/63f7715f-0f45-4955-b7cb-58ca305e42a8/Guidance%20No%207%20-%20Monitoring%20(WG%202.7).pdf

quality elements. Such an agreement would be expressed by the fact that there is at least one biological quality element that is considered to be sensitive (for each pressure) in both Member States or Regions. Such a quality element can then be used as the least common denominator for comparable assessments of ecological status, provided that the intercalibration has been successful.

For rivers, the table below lists sensitive quality elements for each pressure. In all the Member States and Regions in the iRBD there is an agreement on sensitive quality elements for nutrients (macrophytes and phytobenthos), organic pollution (benthic invertebrates), hydrological (fish) and morphological pressures (benthic invertebrates and fish). In the case of chemical and temperature pressures, the Member States sharing a border share at least one quality element between them [74]. The Netherlands did not report quality elements for chemical and temperature pressures[75], so there is no agreement between the Netherlands and Germany and the Netherlands and Belgium (Flanders).

Table 1.4.2 Sensitivity of BQEs towards different pressure types for river water bodies

Member State	Phytoplankton	Other aquatic flora	Macrophytes	Phytobenthic	Benthic invertebrates	Fish
Assessment method mainly sensitive to nutrient pollution						
Belgium (Flanders)	yes		yes	yes	yes	yes
Belgium (Wallonia)	yes		yes	yes	yes	yes
France (FRB1)	yes		yes	yes		
France (FRB2)	yes		yes	yes		
Germany	yes		yes	yes	yes	
Luxembourg			yes	yes	yes	yes
Netherlands	no[76]	yes	yes	yes		
Assessment method mainly sensitive to organic pollution						
Belgium (Flanders)			yes	yes	yes	
Belgium (Wallonia)			yes	yes	yes	yes
France (FRB1)			yes	yes	yes	yes
France (FRB2)			yes	yes	yes	yes
Germany					yes	
Luxembourg				yes	yes	yes
Netherlands					yes	yes
Assessment method mainly sensitive to chemical pollution						
Belgium			yes	yes	yes	

[74] i.e. Belgium (Flanders) and Belgium (Wallonia) both use three quality elements for chemical and temperature pressures; Belgium (Wallonia) and France (FRB1 and FRB2) all use the same three quality elements; Belgium (Wallonia) and Luxembourg both use two quality elements; and Germany and Luxembourg both use one quality element that is the same.

[75] The Netherlands subsequently clarified that it had reported quality elements for chemical and temperature pressures.

[76] The Netherlands subsequently informed the Commission that, regardless the reported information, it should be "yes" for phytoplankton.

Member State	Phytoplankton	Other aquatic flora	Macrophytes	Phytobenthic	Benthic invertebrates	Fish
(Flanders)						
Belgium (Wallonia)			yes	yes	yes	yes
France (FRB1)				yes	yes	yes
France (FRB2)				yes	yes	
Germany					yes	yes
Luxembourg			yes	yes	yes	yes
Netherlands					no[77]	
Assessment method mainly sensitive to elevated temperature						
Belgium (Flanders)						
Belgium (Wallonia)			yes	yes	yes	yes
France (FRB1)						
France (FRB2)						
Germany					yes	yes
Luxembourg					yes	yes
Netherlands						
Assessment method mainly sensitive to altered habitats due to hydrological changes						
Belgium (Flanders)			yes	yes		yes
Belgium (Wallonia)			yes		yes	yes
France (FRB1)						yes
France (FRB2)						yes
Germany					yes	yes
Luxembourg			yes		yes	yes
Netherlands					yes	yes
Assessment method mainly sensitive to altered habitats due to morphological changes						
Belgium (Flanders)			yes	yes	yes	yes
Belgium (Wallonia)			yes		yes	yes
France (FRB1)					yes	yes
France (FRB2)					yes	yes
Germany					yes	yes
Luxembourg			yes		yes	yes
Netherlands					yes	yes

Source: WISE reporting 2016

Coordination of River Basin Specific Pollutants and matrices monitored

The WFD requires Member States to identify and select river basin specific pollutants and their environmental quality standards at the national, river basin or water body level. The iRBMP mentions a common list of four river basin specific pollutants that are relevant for the iRBD (Cu, Zn, Co and PCB's). Co has not been included on the list for the 2010-15 period. The other pollutants (Cu, Zn and PCB's) have been measured and analysed by the Member States and Regions within the framework of the Homogeneous Monitoring Network Meuse.

[77] The Netherlands subsequently informed the Commission that, regardless the reported information, it should be "yes" for benthic invertebrates.

As part of the reporting to WISE regarding the assessment of ecological status, Member States were asked to report information regarding river basin specific pollutants at RBD level[78]. For the reporting to WISE, Member States could report pollutants using pre-defined codes from a list set by the European Commission, and they could report pollutants to a category "other". The "other" category is not uniform among the Member States and therefore the information reported for these pollutants cannot be compared within the iRBD.

The river basin specific pollutants reported by the Member States to WISE were evaluated. The summary of the evaluation concern three essential aspects:

10 which substances have been selected for the entire basin or parts of it;

11 whether the substances have an environmental quality standard and are monitored; and

12 whether the environmental quality standards are the same or in one or another way comparable (in the same range/order of magnitude, for the same matrix).

For environmental quality standards of river basin specific pollutants, different aspects have to be considered to make comparisons. They can only be compared for a given substance if the specific pollutant matrix (water, sediment, biota etc), the unit (mg/L, µg/L etc.), the category (rivers, lakes, coastal water, territorial water and transitional water) and the standard (AA-EQS[79], MAC-EQS[80]) are comparable. Therefore, there are many different approaches and dimensions for such a comparison.

This assessment covers selected aspects of the topic at the iRBD scale for reasons of practicability. The most important aspects are environmental quality standards for 1) AA-EQS, 2) for the matrix water and 3) the setting of the standard at national level. The relevant results are a quantitative description of the coordination with respect to river basin specific pollutants.

A summary for the number of established environmental quality standards is given in the table below. The table shows the number of Member States and Regions that have established an environmental quality standard for a certain river basin specific pollutant. This shows how

[78] Subsequent clarification by Germany indicates that they reported on river basin specific pollutants at the national level, i.e. they reported one list of pollutants without differentiating among the different RBDs.
[79] annual average environmental quality standard
[80] maximum allowable concentration environmental quality standard

many standards defined at the national level can be compared between how many countries and describes the extent of harmonization[81].

Table 1.4.3 Summary of the assessment of river basin specific pollutants for the Meuse basin

Number of Member State and Regions	Number of river basin specific pollutants with an environmental quality standard	
	National[82]	All[83]
1	71	55
2	30	40
3	16	21
4	1	14
5	0	0
6	0	0

Source: WISE reporting 2016

There are six Member States and Regions in the Meuse iRBD. Table 1.4.3 shows that there is not one river basin specific pollutant with an environmental quality standard that is monitored in all six Member State or Region in the Meuse. There is only one specific pollutant with an environmental quality standard defined at the national level in four out of the five Member States and Regions. This means that there are few specific pollutants with quality standards set at the same geographical scale that are comparable in the iRBD.

River basin specific pollutants are only useful and supportive for the assessment of ecological status if an environmental quality standard has been adopted and the pollutants are monitored. The information the Member States and Regions reported to WISE was assessed using the following reporting elements:

7) RBSPvalue: If a value is provided in WISE criterion “EQS-yes” is fulfilled

8) chemicalLastMonitored: If a value>=2010 is provided in WISE the criterion “Monitored: yes” is fulfilled

For each river basin specific pollutants, the criteria mentioned above were evaluated according to the scheme given in table below. A filter is applied, considering the following schema elements: a) chemicalSubstanceCode, b) chemicalMatrix c) chemicalPurpose, d) rbspCategoryRW.

[81] This analysis assumes a basin-wide view only, it does not show whether the pollutants are shared between neighbouring countries.
[82] National means only standards for the national scale are included in the analysis.
[83] All means that the analysis takes all scales into account (i.e. national regional (sub-national), local/municipality, international RBD, RBD, sub-unit, water body, other).

Table 1.4.4 shows how many river basin specific pollutants can be used for the assessment of ecological status. The number of pollutants that can be integrated into the assessment of ecological status ranges between eight (Belgium (Wallonia)) and 74 (Germany). Luxembourg and the Netherlands have a comprehensive set of pollutants that have been be used for status assessment while France has a short list of such status indicators. This information describes the role that river basin specific pollutants pay in the frame of the ecological assessment and whether the approaches are comparable. The results do not describe whether and how often theses pollutants have been used in the frame of status assessment.

Table 1.4.4 Synthesis of environmental quality standards and sampling of river basin specific pollutants with pre-defined codes in the WISE reporting[84]

Member State or Region	Monitored: yes Environmental quality standard: yes	Monitored: no Environmental quality standard: yes	Monitored: yes Environmental quality standard: no	Substances (number of percentage) that can be used for the assessment of ecological status
Belgium (Flanders)	62	2	0	100 %
Belgium (Wallonia)	28 (52)[85]	28	19	30 % (100 %)
France	9	0	115	7 %
Germany	74	3	93	44 %
Luxembourg	37	0	0	100 %
Netherlands	42	17	53	44 %

Source: WISE reporting 2016

Substances where it was reported (Belgium (Wallonia)) that they were monitored but there is no EQS for them:

CAS_14797-65-0 – Nitrite,CAS_14798-03-9 – Ammonium,CAS_15545-48-9 - Chlortoluron,CAS_1634-04-4 - MTBE,CAS_16984-48-8 - Fluoride,CAS_172960-62-2 - Metazachlor ESA,CAS_2008-58-4 - 2,6-dichlorobenzamide, CAS_21087-64-9 - Metribuzin, CAS_314-40-9 - Bromacil,CAS_5915-41-3 - Terbuthylazine,CAS_6190-65-4 - Desethylatrazine,CAS_7429-90-5 - Aluminium and its compounds,CAS_7439-89-6 - Iron and its compounds,CAS_7439-96-5 - Manganese and its compounds,CAS_7440-23-5 - Sodium,CAS_7440-36-0 - Antimony,CAS_7440-42-8 - Boron,CAS_7782-49-2 - Selenium and its compounds,CAS_94-75-7 - 2,4-dichlorophenoxyacetic acid, 2-4 D,

Substances where it was reported for Belgium (Wallonia) that they were monitored AND and EQS exists:

[84] Information regarding "other RBSP" is not included in the table.

[85] Wallonia informed the Commission of an error in the reported information, and so this would be 52, which would make the percentage in the last column 100%.

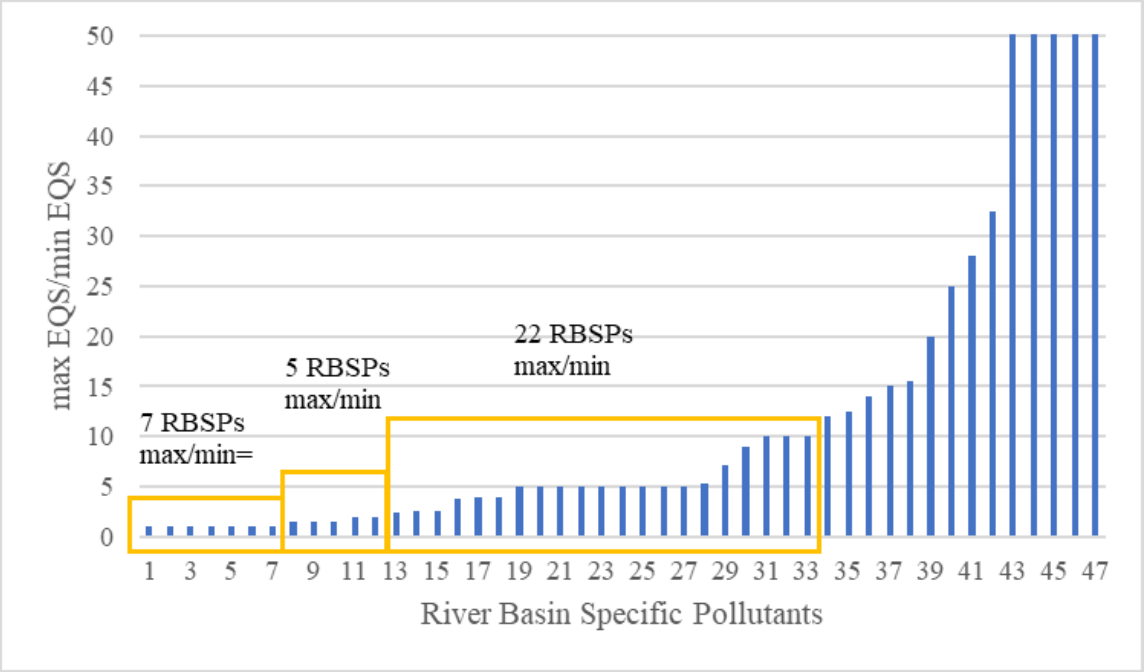
CAS_25057-89-0 - Bentazone,CAS_7440-38-2 - Arsenic and its compounds,CAS_7440-47-3 - Chromium and its compounds,CAS_7440-50-8 - Copper and its compounds,CAS_7440-66-6 - Zinc and its compounds,CAS_94-74-6 - MCPA,EEA_33-64-7 - Total cyanide

Environmental quality standards for river basin specific pollutants

A comparison between environmental quality standards is given in the figure below.

There is limited agreement between the Member States and Regions. For about one in seven substances, all Member States that have set a standard use the same value (and for most of these substances, the standard is shared by only two Member States). For about one third of the substances, the environmental quality standards differ by one order of magnitude or more. This makes it difficult to compare status between the Member States and Regions. The different standards used may also partly explain why some Member State identify certain substances as river basin specific pollutants while other Member States do not.

Figure 1.4.1 Ratio between the maximum and the minimum environmental quality standard for river basin specific pollutants in the Meuse iRBD[86]



Source: WISE electronic reporting 2016

[86] A ratio of one indicates that the Member States and Regions that have set a standard use the same value for this standard. The higher the ratio, the higher the differences in the standards used.

Status Classification

Use of monitoring results for classification – transboundary harmonization

According to the international RBMP, for the surface water bodies at the borders bilateral coordination has been carried out with a view to assessing consistency of good ecological status/good ecological potential or at least to examination and explain any differences. The iRBMP further states if there are differences in the assessment of water bodies at the borders, these can be either because on different pressure situations on both sides of the border or because of different valuation methods. Member States and regions have exchanged views and reported to the Meuse Commission on this issue.

Annex 8 of the iRBMP presents a table with the status of water bodies at the borders and the designation by each of the Member States or Regions. The table shows that there are differences in the status of adjacent water bodies. Some of the adjacent water bodies have the same status across the border, but for many of the adjacent water bodies the status is different among the Member States and Regions. For these adjacent water bodies, a bilateral exchange of information has been organized with the aim to come to more coherent assessment or to analyse and explain these differences.

Ecological status/potential classification for water bodies that form the border between iRBD countries

Using the same stretch of the river as for the assessment of coordination on water body delineation (see Map 1.4.2), it was assessed whether the status of the water body is the same on both sides of the border. The status of the water body was reported differently in Belgium and Netherlands. The Meuse Commission has subsequently clarified that these differences have been noted, analysed and explained.

Intercalibration exercise and Geographical Intercalibration Group (GIG)

The iRBMP does not mention intercalibration.

1.4.5. Monitoring, assessment and classification of surface water chemical status

Monitoring of chemical status in surface waters

There is a joint monitoring programme coordinated by the International Meuse Commission. The programme is based on common methodologies and results are comparable across the iRBD.

Out of the national / regional surveillance networks, 38 stations / sites were selected for the Homogeneous Monitoring Network of the International Meuse Commission. The choice of stations is based on their representativeness and relevance at the iRBD level. Every three years, the Commission publishes a report with the most important results of the measured parameters per measuring station or measuring location. These are selected on the basis of important issues related to water management at the iRBD level. These key issues for water management are based on the water quality improvement programs agreed by the rivals. The published results concern a limited number of parameters that show the long-term development of water quality, especially at the Meuse main stream.

Coordination of monitoring and assessment of chemical status

In 2009 the Member States and Regions produced a list of relevant substances (5 Priority substances, four River basin specific pollutants) of transboundary importance for which multilateral coordination of the programs of measures was considered necessary. The criteria for including a substance in this list were that at least two Meuse Commission Contracting Parties had indicated that their standards had been exceeded, the presence of an anthropogenic source and that the reduction programs required bilateral or multilateral coordination. The examination of this list for the Meuse relevant substances has shown that Diuron no longer met the selection criteria. However, cobalt met the criteria and today represents a substance relevant to the Meuse catchment area. All commonly selected Priority Substances have been included in chemical monitoring during the 2010-2015 management cycle.

The catchment of the Meuse is part of five Member States and differentiates seven different RBDs. For each national RBD, the number of analysed samples is listed in the table below. This analysis refers to the samples taken in the period from 2010-2015.

An important aspect for chemical status assessment is whether the water samples have been taken with the frequency recommended as a general rule in the WFD[87]. Monthly samples should be analysed for WFD compliant assessment of chemical status at a given site. Other

[87] Information reported to WISE did not differentiate between surveillance or operational monitoring. In the case of surveillance monitoring, water sampling has to been carried once a month for one year only within the management cycle. Operational monitoring requires monthly sampling every year of the management cycle.

frequencies need a justification based on expert judgement or technical knowledge. If the analysis excludes all frequencies that are lower than 12/year, the number of samples decreases from ~45 144 to ~21 890. About half of the samples (reported to WISE) in the Meuse catchment are WFD compliant without any further justification.

Table 1.4.5 Percentage of Priority Substance samples that have been taken with a WFD compliant frequency (monthly samples)

Member State	Percentage of Priority Substance samples with a frequency ≥12/year
Belgium (Flanders)	28 %
Belgium (Wallonia)	33 %
France	38 % (FRB1) and 79 % (FRB2)
Germany	50 %
Luxembourg	100 %
Netherlands	93 %
Meuse	48 %

Source: WISE electronic reporting 2016

The total number of samples (see table below) was calculated by combining the information of the number of samples (see table below) was calculated by combining the information of the WISE reporting elements “chemicalfrequency” and “chemicalCycle”, as also illustrated in the reporting guidance under chapter 4.3.5. “chemicalCycle”, as also illustrated in the reporting guidance under chapter 4.3.5.

Table 1.4.6 Total Number of analysed samples for each Priority Substance and each national iRBD share for the period 2010-15[88]

	BEMAAS_VL	BEMEUSE_RW	DE7000	FRB1	FRB2	LU001	NLMS	Meuse
CAS_104-40-5 - 4-nonylphenol		194		330	36	78		**638**
CAS_107-06-2 - 1,2-Dichloroethane	33	194	102	533	48	78	84	**1072**
CAS_115-29-7 - Endosulfan	148	194	296	372	36	78	84	**1208**
CAS_117-81-7 - Di(2-ethylhexyl)phthalate (DEHP)	51	200	30	330	48	78	84	**821**
CAS_118-74-1 - Hexachlorobenzene	72	34	184	372	48	78	84	**872**
CAS_12002-48-1 - Trichlorobenzenes (all isomers)	45	194	264	330	36	78	12	**959**
CAS_120-12-7 - Anthracene	69	200	118	372	48	78	84	**969**
CAS_122-34-9 - Simazine	132	264	154	372	48	78	84	**1132**
CAS_127-18-4 - Tetrachloroethylene	45	234	102	575	48	78	84	**1166**
CAS_140-66-9 - Octylphenol (4-(1,1',3,3'-tetramethylbutyl)-phenol)		194	104	330	48	78	84	**838**
CAS_1582-09-8 - Trifluralin	135	194	128	372	48	78	84	**1039**
CAS_15972-60-8 - Alachlor	132	194	90	372	48	78	84	**998**
CAS_1912-24-9 - Atrazine	132	264	154	372	48	78	84	**1132**
CAS_206-44-0 - Fluoranthene	69	224	124	372	48	78	84	**999**
CAS_2921-88-2 - Chlorpyrifos	141	194	126	372	48	78	84	**1043**
CAS_330-54-1 - Diuron	123	264	142	372	48	78	84	**1111**
CAS_34123-59-6 - Isoproturon	132	264	154	372	48	78	84	**1132**
CAS_36643-28-4 - Tributyltin-cation	56	200	92	330	48	78	84	**888**
CAS_470-90-6 - Chlorfenvinphos	86	194	126	372	48	78	84	**988**
CAS_50-29-3 - DDT, p,p'	72	194	154	372	48	78	84	**1002**
CAS_50-32-8 - Benzo(a)pyrene	69	271	130	588	48	78	84	**1268**
CAS_56-23-5 - Carbon tetrachloride	45	194	102	533	48	78	84	**1084**
CAS_608-73-1 - Hexachlorocyclohexane	137	200	592	372	36	78		**1415**
CAS_608-93-5 - Pentachlorobenzene	72	200	166	588	48	78	84	**1236**
CAS_67-66-3 - Trichloromethane	45	194	102	533	48	78	84	**1084**
CAS_71-43-2 - Benzene	45	234	132	533	48	78	84	**1154**
CAS_7439-92-1 - Lead and its compounds	247	264	292	546	48	78	156	**1631**
CAS_7439-97-6 - Mercury and its compounds	248	95	212	342	48	78	84	**1107**
CAS_7440-02-0 - Nickel and its compounds	247	258	276	630	48	78	162	**1699**
CAS_7440-43-9 - Cadmium and its compounds	247	264	400	630	48	78	156	**1823**
CAS_75-09-2 - Dichloromethane	75	194	102	317	48	78	84	**898**
CAS_79-01-6 - Trichloroethylene	45	234	102	575	48	78	84	**1166**
CAS_85535-84-8 - Chloroalkanes C10-13		200		330	48	78	12	**668**
CAS_87-68-3 - Hexachlorobutadiene		34	92	636	48	78	84	**972**
CAS_87-86-5 - Pentachlorophenol	93	194	54	348	48	78	84	**899**
CAS_91-20-3 - Naphthalene	69	194	118	372	48	78	84	**963**
EEA_32-02-0 - Total cyclodiene pesticides (aldrin + dieldrin +	72	194	760	372	36	78	84	**1596**
EEA_32-03-1 - Total DDT (DDT, p,p' + DDT, o,p' + DDE, p,p' +	72	194	592	372	36	78		**1344**
EEA_32-04-2 - Brominated diphenylethers (congener numbers 28, 47, 99, 100		206	330	330	36	78		**980**
EEA_32-23-5 - Total Benzo(b)fluor-anthene (CAS_205-99-2)	69	200	236	372	36	78	84	**1075**
EEA_32-24-6 - Total Benzo(g,h,i)-perylene (CAS_191-24-2) +	69	200	236	372	36	78	84	**1075**
Grand Total	**3639**	**8306**	**7670**	**17285**	**1860**	**3198**	**3186**	**45144**

Source: WISE electronic reporting 2016

Transboundary harmonisation of monitoring and assessment

For the surface water bodies at the borders, bilateral coordination has been carried out with a view to assuring coherency or at least examining and explaining any differences in status assessment. The tables in Annexes 9 of the iRBMP show the chemical status of surface water bodies at the boundaries (catchment area> 10 km²). If there are differences in the assessment of water bodies at the borders, they may be due either to different load situations on both sides of the border, to different valuation methods which may differ on both sides of the border or

[88] All monitoring frequencies, all matrices included and all purposes included.

by results ‘near to’ class borders in the assessment methods. The Member States and Regions have exchanged views and reported to the Meuse Commission in this regard.

1.4.6. Monitoring, assessment and classification of groundwater quantitative and chemical status

The iRBMP states that the Member States and Regions exchanged information regarding the monitoring of groundwater bodies being part of transboundary aquifers. According to the iRBMP, for groundwater bodies belonging to transboundary aquifers, bi- and trilateral coordination for status assessment took place between the iRBD sharing countries and regions concerned. Particular attention was paid to the assessment of adjacent groundwater bodies whose status has been assessed differently on both sides of the border. Differences in assessment on each side are explained by differences in the characteristics and extent of groundwater bodies.

1.4.7. Designation of heavily modified water bodies, artificial water bodies and definition of good ecological potential

Cooperation and joint activities regarding heavily modified water body designation

The iRBMP does not mention whether a joint method was used to designate heavily modified water bodies. As such, it is not possible to state what coordination and/or joint method on heavily modified water bodies designation was applied and whether it was for the entire iRBD and/or the main river in the iRBD.

Cooperation and Joint methods and approaches for the determination of Good Ecological Potential (GEP)

The iRBMP states that bilateral coordination was undertaken to ensure coherence in defining water status for water bodies in the Meuse iRBD. The iRBMP mentions that if there were differences in the designation of good ecological potential, it was a result of either differences in pressures on either side of the iRBD or difference in methodologies.

Member States and Regions were requested to report to WISE regarding their approach for determining good ecological potential. The information reported to WISE shows that Member States used different approaches. Belgium (Flanders), France and the Netherlands used a hybrid CIS/Prague approach. Germany and Luxembourg used the CIS approach, while Belgium (Wallonia) used the mitigation measures (Prague) approach. Phytoplankton was used by all the Member States except Germany and Luxembourg. Belgium (Flanders) and Luxembourg used Macrophytes. Belgium (Flanders), Belgium (Wallonia), France and Luxembourg used Phytobenthos. All the Member States and Regions except for France used Benthic invertebrates and Fish.

1.4.8. Environmental Objectives and Exemptions

Annex 15 of the iRBMP presents a table with the exemptions applied per Member States and Region. 66 % of the surface water bodies in the iRBD have applied Article 4 (4). France and Germany are also applying Article 4 (5) in three water bodies. 45 % of the groundwater bodies in the iRBD have applied Article 4 (4). Belgium (Wallonia) and Germany are also applying Article 4 (5). Article 4 (6) and Article 4(7) have not been applied.

According to the iRBMP, for surface waterbodies at the borders bi- and trilateral coordination between the Member States and Regions took place to ensure coherence on the status of water bodies and information was exchanged on achieving objectives. The chapter on exemptions in the iRBMP mentions which justifications for the application on exemptions are being used in the iRBMP but does not provide specific details on exemption coordination.

All the Member States in the Meuse basin except for Germany reported to WISE that exemptions in surface water bodies related to Art 4 (4) and Art 4 (5) were coordinated for surface water bodies. The Meuse Commission indicates that there is coordination between the Netherlands and Germany in terms of groundwater management and monitoring. The monitoring programme aims at analysing the (transboundary) impacts of groundwater abstractions, which are the reason why exemptions related to Art 4 (5) are used in Germany.

1.4.9. Programme of measures

As mentioned in the chapter on characterisation, to support the development of the national PoMs the Member States[89] and Regions agreed on common significant management issues. According to the iRBMP, measure selection was coordinated. An annex to the international plan presents a table that defines "common measures" categorized according to the different significant water management issues. National measures being taken within the different Member States and Regions are appropriately organized within this framework. All joint significant water management issues have been addressed by measures.

A joint programme on improving river continuity for migratory fish is mentioned. According to the iRBMP, the Master plan for migratory fish details the implementation of measures within the basin, including joint activities.

[89] Luxembourg subsequently clarified that the same information was reported for the RBD Rhine and Meuse even though some of the measures will not be relevant for the RBD Meuse (e.g. SWW 1.1). All measures are however relevant for the RBD Rhine

Coordination on addressing water scarcity and droughts

Joint identification of Pressures and Objectives

The iRBMP chapter on pressures refers to periods of low water levels, a situation which could be exacerbated by climate change. Water abstraction, especially for drinking water, could be negatively affected as a result. Water quantity in general has been mentioned as a significant water management issue, both in terms of low flows and in terms of flooding.

Belgium (Flanders) reported to WISE that water abstraction was a pressure for surface waters in its share of the basin due to industrial purposes and drinking water supply. Water abstraction was not reported by the other Member States and Regions.

Measures related to abstractions and water scarcity

As low water levels were mentioned in the pressures chapter of the iRBMP, the Meuse Commission is currently working on a joint document on water scarcity to provide a first framework on developing a strategy on dealing with water scarcity in the basin. As it is still in development, information on whether the Member States in the basin are adhering to the joint strategy is not available.

All the Member States and Regions have identified measures to address water use efficiency in their share of the basin. Within the iRBD, the measure category "Economic measures for water use efficiency" is linked to the water management issue of "water scarcity and sustainable water management"[90]. The Annex on measures shows that each Member State has chosen to implement different but coherent measures within their share of the Basin. These are[91]:

- Belgium (Flanders): Develop a water scarcity strategy; Sensitive the sector to ensure sustainable water use or the use of alternative water sources; Protection of water retention areas
- Belgium (Wallonia): Improvement of the understanding of climate change impacts on water management; Development of a long-term Strategy for the Communication and Sensitization of all water sector stakeholders; Finalize and Implement the Regional water management plan
- Germany: Increase natural retention; Increase water abstraction charges
- France: Use rainwater
- Luxembourg: No measures were included in the Annex[92]

[90] iRBMP, Annex 16
[91] ibid
[92] Subsequent clarification by the Member State indicates that such measures can be found in the national RBMP and PoM.

- Netherlands: More in-depth exploration of pricing for freshwater supplies to promote sustainable water use; By embedding the three-step strategy of "containment, storage, outflow" in national water policy, water management authorities explicitly focus on the conservation and use of on-land water as much as possible in the design and management of the water system; In the cycle of drinking water, sewerage and sewage treatment, the cooperation is intensified in order to further increase cost-effectiveness; Encouraging citizens to decouple rainwater drainage from the sewerage system to make wastewater treatment more efficient; Organization of an information campaign to increase the awareness of water and the value of water; As part of the delta program Freshwater (Deltaprogramma Zoetwater), an implementation program for measures in the main water system has been prepared for 2015 to 2028, in the regional water system and measures for some utilization functions. It aims to secure fresh water reservoirs and counteract salinization as well as retention and conservation where there is insufficient supply. There is also a research program added. In addition, a program with promising measures was created in the medium and longer term; In the event of water shortage or imminent water shortage, the three-step strategy is crucial for the distribution of available surface water. Based on this, depending on the amount of water available, the intake of water in certain sectors is reduced or even completely stopped; Examine the effects of climate change; Development of the delta program for high sandy soils (Deltaprogramma Hoge Zandgronden) for the fresh water supply; Implementation of the delta program agrarian water management (Deltaprogramma Agrarisch Waterbeheer).

In order to enable a comparable grouping of measures in the national and international programme of measures, the European Commission introduced the concept of KTMs in 2012 to simplify reporting[93]. KTMs are groups of measures identified by Member States in the PoMs which target the same pressure or purpose. The individual measures included in the PoM (being part of the RBMP) are grouped into KTMs for the purpose of reporting. The same individual measure can be part of more than one KTM because it may be multi-purpose.

Belgium (Flanders) and Luxembourg are implementing KTM7 – Improvements in flow regime and/or establishment of ecological flows and KTM8 – Water efficiency, technical measures for irrigation, industry, energy and households.

[93] The need for KTMs was borne out of the large differences in the level of detail reported in 2010 by the Member States. Some Member States reported 10-20 measures whilst others reported hundreds or even thousands.

Coordination on addressing pollution from agriculture

Joint identification of Pressures and Objectives

Nutrient pollution from agriculture is addressed in the iRBMP. The chapter on transboundary significant water management issues in the iRBMP includes point source and diffuse pollution from agriculture as significant issue for both surface and groundwater bodies. A joint management objective has beendefined in the iRBMP, namely taking measures to reduce the inputs of nutrients – nitrogen, phosphorus and organic material – to prevent eutrophication and the use of oxygen in the waters.National reporting to WISE indicates that Belgium (Flanders), Germany and the Netherlands identified general management objectives regarding nutrients from agriculture for their national shares of the iRBD, while Belgium (Wallonia), France and Luxembourg did not.

The iRBMP describes a basin-wide assessment regarding the potential status achievement of transitional, coastal and marine waters by 2021 and 2027 and how the concentrations of total nutrient pollution in the Meuse main stream and selected tributaries influence these waters. The analysis shows that through already implemented and planned measures will lead to a reduction in total nutrient concentration by 2021 between 1-5 % and by 2027 between 2-18 % in comparison to 2012 values.

Germany reported to WISE that it has set quantitative targets for both nitrogen and phosphorus pollution for its share of the basin.

Measures to address pollution from agriculture

Two measure categories are included in the iRBMP:

- Combating point and diffuse pollution linked to agriculture in surface waters
- Combating diffuse pollution of nitrate and pesticides in groundwaters

For surface waters, the measures to be implemented are as follows:

- Belgium (Flanders) - Agri-environment measures to reduce nutrient emission; Efficient phosphorus and nitrate fertilization; Improve feed efficiency; Information and farm advice within the Manure Action Plan
- Belgium (Wallonia): Monitoring access of livestock to rivers; Development of a participatory pilot study in the agriculture sector in order to achieve good status in WBs; Implementation and Evaluation of measures in the Plan for sustainable use of inputs in agriculture; Stricter controls for the implementation of the plan for sustainable use of inputs in agriculture; Support the improved exchange of manure

among farmers; Address erosion from agriculture fields and its resulting sedimentation of rivers; Creation of buffer strips (under the RDP programme); Reduce nutrient inputs from agriculture through improved livestock feeding; supporting organic farming; developing ecological important agriculture parcels

- Germany: Reduce impacts of diffuse sources (agriculture not specifically mentioned); Creation of water buffer strips; Agriculture advisory programme
- France: Reduce fertilizer spreading and erosion through implementing requirements greater than the Nitrates Directive; Intercropping; Water buffer strips; Permanent crops
- Luxembourg: No agriculture related measures[94]
- Netherlands: Compliance with the phosphate entry limit is ensured by: continuing the authorization of pig and poultry keeping, by introducing compulsory manure processing, by introducing a system of responsible growth of dairy cattle farming. Improving the cleaning efficiency of wastewater treatment plants Reduction of pollution of surface waters by farmers: rules for the use of (mineral) fertilizers and pesticides so that as little as possible gets into the surface water. Implementation of the Delta Program for Agricultural Water Management (Deltaprogramma Agrarisch Waterbeheer)

For groundwater bodies, the measures to be implemented are as follows:

- Belgium (Flanders): Nutrients: see measures for surface waters. Pesticides: Addressing the excessive introduction of pesticides into soil and GWBs through the designation of sensitive areas, Banning use of persistent pesticides
- Belgium (Wallonia): Development of a participatory pilot study in the agriculture sector in order to achieve good status in WBs; Implementation and Evaluation of measures in the Plan for sustainable use of inputs in agriculture; Stricter controls for the implementation of the plan for sustainable use of inputs in agriculture; Support the improved exchange of manure among farmers; Address erosion from agriculture fields and its resulting sedimentation of rivers; Creation of buffer strips (under the RDP programme); Reduce nutrient inputs from agriculture through improved livestock feeding; supporting organic farming; Implementation of the Walloon Pesticide Reduction Program Pesticides - warning systems
- Germany: Reduction of diffuse source pollution (agriculture not specifically mentioned); Promoting catch crop cultivation; Intensified agricultural advice
- France: Limiting the transmission of inputs and erosion beyond the requirements of the Nitrates Directive; Intercropping; Creation of water buffer strips; Greening of the areas with permanent crops; Limiting the input of pesticides from agriculture and / or

[94] Subsequent clarification by the Member State indicates that such measures can be found in the national RBMP and PoM.

using alternative practices; Organic farming; Increase or maintain green areas; Limit the diffuse or point source pollution of pesticides from non-agricultural use and / or use alternative practice

- Netherlands: All actions required under the WFD and the Groundwater Directive will be based on existing policies based on the Dutch Soil Protection Act (Wet Bodembescherming) to effectively eliminate contaminants from contaminated soils or address existing accumulations of contaminants. Research + Measures to protect the groundwater supply; Approach to nutrients, pesticides and "new substances" ("emerging substances"). Preparation of a communication protocol.

All Member States reported using KTM 2 – Measures to address nutrient pollution and KTM 3 – Measures to address pesticides. Germany, France and Luxembourg additionally reported using KTM 12 on advisory services.

Coordination on addressing pollution from sectors other than agriculture

Joint identification of Pressures and Objectives

The iRBMP[95] includes pollution from sectors other than agriculture as a transboundary significant water management issue. A joint management objective has been defined in the iRBMP, namely to take measures to reduce the emissions to surface waters for Meuse relevant substances and for priority substances to the levels as defined by the respective parties. All the Member States and Regions reported to WISE that chemical pollution is an issue.

Measures related to pollution from sectors other than agriculture

The following "joint measures" are included in the Annex[96]:

- Combating point and diffuse pollution in surface waters
- Combating diffuse pollution in groundwaters.

The following measures are being implemented to address pollution from sectors other than agriculture[97]:

- Belgium (Flanders): Further development of collective and individual sewage; Further optimization of the rehabilitation infrastructure and increase of the sewage treatment plant; Authorizations, revision of sectoral discharge conditions Implementation of the

[95] iRBMP, chapter 2
[96] iRBMP, Annex 16
[97] ibid

reduction program for dangerous substances; Erosion control measures; Sustainable rehabilitation of contaminated watercourses

- Belgium (Wallonia): Continuation of the construction of collective treatment plants; Improvement of the sewage collection and the degree of connection to the sewage system; Compliance with residential property standards in areas with independent treatment; Establishment of a service for the supervision and improvement of independent reprocessing; Revision of environmental permits depending on the environmental objectives assigned to water bodies; Testing other than IPPC industrial companies; Improvement of knowledge on industrial discharges; Improvement of computers tools in connection with the monitoring of industrial discharges; Sensitization of industrial operators; Reduction of emissions of so-called priority substances by supplementing environmental permits with environmental quality standards parameters
- Germany: Improvement of rainwater disposal; Optimization of wastewater treatment plants, collecting sewage disposal; Optimization of wastewater treatment plants (if necessary: addition of a 4th purification stage for the elimination of micropollutants (medicines, etc.) Survey of wastewater discharge; Reduction of impurities from the industry
- France: Overall study and leading renovation project; Improvement of management and treatment of rainwater; Rainwater seepage; Collecting rainwater; Establishment / improvement of sewage treatment plants; Installation / renovation of the collection and pipeline network; Establishment / refurbishment of non-collective sewage treatment plants; Reduction of contamination from industry and trade; Adapting the collection and processing of industrial discharges; Clean techniques; Revision of the emission limit values; Reduction or elimination of conventional contaminants; Control of contamination by micropollutants from industry and trade;
- Luxembourg: Improvement of rainfall management, Reduction (legislation and awareness) of discharges at source[98]
- Netherlands: Improving the cleaning efficiency of wastewater treatment plants; Point sources: The type and quantity of waste to be discharged into surface waters are regulated by a licensing system. It is working on a circulation-specific concept for dealing with drugs and other micropollutants. Gradual reduction of the use of micro-plastics in cosmetics in the Netherlands as well as specific purification of waste water from healthcare facilities. Drinking water companies and water boards are investigating ways to eliminate medicines from the water cycle, in addition to researching the effects of sources and the approach to sources. Further elimination of eutrophic / contaminated sludge; Proceeding against the discharge of mixing systems

[98] Subsequent clarification by the Member State indicates that additional measures can be found in the national RBMP and PoM.

and other uncleaned discharges; Continued decoupling of the paved surface of the canal system; Preparation of a communication protocol

All the Member States and Regions reported KTM to WISE. The following measures were reported to be implemented by all Member States and Regions:

- KTM1 – Construction or upgrades of wastewater treatment plants;
- KTM4 – Remediation of contaminated sites (historical pollution including sediments, groundwater, soil).

In addition, all the Member States except Luxembourg reported that they are implementing KTM15 – Measures for the phasing-out of emissions, discharges and losses of Priority Hazardous Substances or for the reduction of emissions, discharges and losses of Priority Substances. Belgium (Flanders and Wallonia), Germany and France reported applying KTM16 – Upgrades or improvements of industrial wastewater treatment plants (including farms).

All the Member States except France reported that they are implementing KTM17 – Measures to reduce sediment from soil erosion and surface run-off; All the Member States except Belgium (Wallonia) reported that they are implementing KTM21 – Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure. Luxembourg reported applying KTM22 – Measures to prevent or control the input of pollution from forestry.

All the Member States and Regions except for Belgium (Wallonia) and the Netherlands reported applying KTM23 – Natural water retention measures. Belgium (Flanders) and Germany reported applying KTM25 – Measures to counteract acidification.

Coordination on addressing hydromorphological alterations

Joint identification of Pressures and Objectives

One of the transboundary significant water management issues identified in the iRBMP is to re-establish river continuity. The description of the significant water management issue describes two objectives: (1) restoration of river continuity for fish migration and (2) ensuring that hydropower and water protection are in symbiosis. The iRBMP mentions the need for natural transport of sediment in the context of natural river continuity but it does not describe the need for sediment management in the objectives section.

All Member States and Regions in the basin reported addressing river continuity and other hydromorphological pressures to WISE. Germany and the Netherlands also reported sediment management.

All Member States and Regions reported identifying general management objectives regarding river continuity to WISE, which is in line with the information provided in the iRBMP. In addition, all the Member States and Regions with the exception of the Netherlands reported identifying quantitative management objectives regarding river continuity in their national shares of the iRBD.

Measures related to hydromorphological alterations

Within the Masterplan Fish migration, the Member States and Regions in the Meuse coordinate to implement measures to improve hydromorphology of rivers, such as removal of technical infrastructure, constructing fish passes and the installing (protective) rakes (Rechen) at the inlet of hydroelectric power plants to protect migrating fish. They also coordinated on an inventory of the types of migrating fish, their need for habitat and the barriers to migration. In addition, they have coordinated on the restoration and protection of wetlands and reconnecting old reaches of the rivers. The iRBMP also refers to a cooperation programme between the Netherlands, Germany and Belgium (Wallonia) on breeding fish to ensure that salmon numbers are maintained.

The following "joint measures" are included in the Annex:

- Re-establishment and restoration of water bodies, and
- Improving ecological continuity and continuity of power plants.

The national measures to be implemented are as follows:

- Belgium (Flanders): Control program for invasive plants; addressing barriers to migratory fish; Integrated bank management; Restoration of water structure
- Belgium (Wallonia)[99]: Restoration of continuity with tributaries and longitudinal continuity of rivers; Restoration and management of alluvial forests along the rivers; Achieve the objectives in the Natura 2000 areas; Establishment of links between dependent terrestrial ecosystems and groundwater; Enable wetlands to regulate diffuse pollution; Maintaining minimum ecological flows in flowing waters; Hydropower use while preserving aquatic ecosystems
- Germany: Reduction of hydromorphological alterations river restoration measures (e.g. removal of bank construction, re-connection of old arms, introduction of deadwood, etc.); Ecological water maintenance; Improvement of river continuity
- France: Restoration of rivers; Renaturation of watercourses; Improving the ecological continuity of rivers; Land management of wetlands; Restoration of wetlands; Organic farming

[99] Belgium (Wallonia) subsequently clarified that the measures listed in the iRBMP are not the same as those listed in the national RBMP for the MEuse

- Luxembourg: Reduction of hydraulic and hydrological pressures, stakeholder involvement[100]
- Netherlands: Remeandering; Application of side troughs; Construction of fish ladders; Changes to in water level; Connection of wetlands; Creation of special areas for flora, fauna and fish; Implementation of active landscape management; The Maaswerken program creates new nature (Maas 1100 ha, Zandmaas 700 ha)

In addition, Annex 17 provides a table detailing the objectives, the problems and measures to improve river continuity for fish migration. These measures are presented at basin-level. They focus on migration pathways and spawning habitats. Such measures include:

- Restriction of fishing activities;
- Project "de Kier";
- Fish ladders;
- Fish management systems;
- Optimization of reservoir management;
- Optimization of low water management (reservoir management);
- Ecological water development and water restoration;
- Priority sewage disposal / remediation of water sediment with respect to migratory habitat rehabilitation of migratory fish habitat;
- Sediment management (measures to reduce unnatural sediment pollution); and
- Restoration of meanders and erosion sedimentation, ecological water body development.

All Member States and Regions reported implementing KTM5 – Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams) and KTM6 – Improving hydromorphological conditions of water bodies other than longitudinal continuity.

1.4.10. Economic analysis and water pricing policies

An economic analysis has been undertaken and is part of the iRBMP. According to the iRBMP, the economic analysis took place within the Member States and Regions, focussing on cost recovery and cost-efficiency of measures and a joint approach was not taken. It states that the Member States and Regions exchanged information on water uses during the update of the Article 5 Characterisation report. The iRBMP provides limited information on the economic analysis.

[100] Subsequent clarification by the Member State indicates that additional measures can be found in the national RBMP and PoM.

1.4.11. Considerations specific to Protected Areas

Protected Areas are addressed in the iRBMP. The iRBMP mentions that a Protected Areas inventory was carried by each Member State and Region. The iRBMP does not summarize the national PA inventories. The iRBMP mentions that there is one transboundary Natura 2000 area in the Meuse. This area is management through a bilateral agreement between the two Member States. Within this Protected Area, both Belgium (Flanders) and the Netherlands have undertaken individual flood protection improvements, however, these national activities were coordinated with each other.

1.4.12. Climate Change and droughts

The iRBMP states that the Meuse Commission undertook an inventory on currently running initiatives and activities of the Rhine Commission, the Danube Commission and individual Member States and Regions to obtain an overview on the need for coordination and information exchange regarding climate change and the need for adaptation measures. The iRBMP states that adaptation measures are necessary, and to this end a work programme was developed in December 2014 to increase information exchange on national and international activities on climate change impacts in the RBD and potential future adaptation measures. The Meuse Commission is working on a joint report on water scarcity that will help to develop a first framework for a future approach to dealing with exceptional low water events in the Meuse catchment area.

1.4.13. Recommendations

For the Meuse iRBD, important efforts have been made on international coordination between the Member States on a number of aspects.

The following recommendations can be made to further improve cooperation:

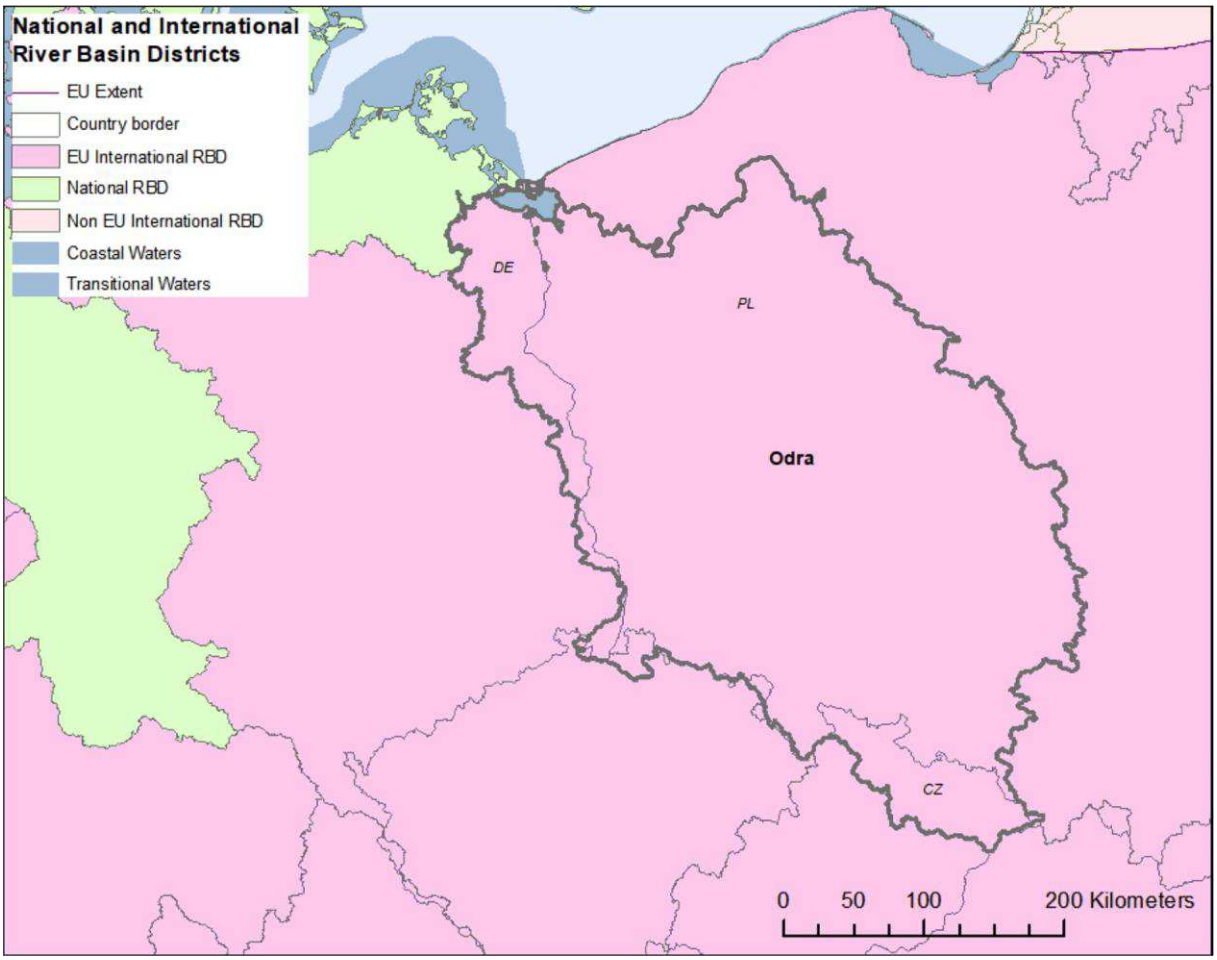
- While bilateral coordination has been carried out for status assessment, the status of a number of water bodies remains different on either side of the border. Efforts should be made to further coordinate and harmonise assessment methods.
- Coordination of river basin specific pollutants and setting of common environmental quality standards should be improved. Few substances are relevant for more than one Member State and the corresponding environmental quality standards do not match in a number of cases.
- The iRBMP should better clarify how chemical monitoring is carried out in the iRBD, taking into account the requirements for WFD compliance in terms of the monitoring frequency.

- The approach for the designation of heavily modified water bodies and the definition of good ecological potential should be further harmonised and clearly outlined in the iRBMP.
- The iRBMP should provide clear information on the measures taken by each Member State, particularly with regard to diffuse sources of pollution.

1.5. Odra River Basin District

1.5.1. General Information

Map 1.5.1 Odra International River Basin District



Source: ICPO 2018

The Odra International River Basin District (iRBD) is shared by the Czech Republic, Germany and Poland. The Odra iRBD is allocated to cooperation Category 1, which means that an international agreement, a permanent co-operation body and international WFD RBMP is in place. The iRBMP can be downloaded on the Odra Commission website[101].

The table below presents the size of the total catchment area and national shares within the iRBD (km^2; %). The table includes information reported to WISE and the information included in the iRBMP[102]. The table shows that the information in the iRBMP and WISE slightly differ.

[101] http://www.mkoo.pl
[102] iRBMP p.8

Table 1.5.1 Member State share of the iRBD

Name of the International River Basin District	Total Area - (km^2)	EU Member States in iRBD	EU RBD Code	National Area within iRBD – (km^2)	National Area within iRBD - (%)
Odra	124,115	Czech Republic	CZ6000	7,240	5.36
		Germany	DE6000	9,705	7.16
		Poland	PL6000	107,170	87.48

Source: iRBMP

1.5.2. Governance and public participation

Cooperation framework: International, bilateral and/or multilateral agreements in place covering certain cooperation aspects

The International Commission for the Protection of the Odra River (ICPO) was established on the basis of a Convention, which entered into force in 1999 prior to the entry into force of the WFD. Following the adoption of the WFD, the Odra Commission added additional key objectives and tasks to the mandates of their Working Groups, namely: 1) provide for precautions against the risk of flood damage and achieve a sustained reduction thereof; 2) coordinate the implementation of the WFD in the Odra river basin and 3) coordinate implementation of the Flood Directive in the Odra river basin. The Odra Commission has a number of work groups/experts groups that aid in the implementation of the WFD, namely: Steering Group WFD (G1), Working Group Accidental pollution (G3), Working Group Data management (G5), Sub-working Group Monitoring (GM) and Sub-working Group Planning in Management of Waters/RBMP (GP)). Mandates of ICPO working groups G2 and G4 do not contain tasks connected to the implementation strategy of WFD in Odra iRBD. The groups have regular meetings, the frequency of which differs from annually to several times per year.

Prior to the entry into force of the Odra Convention, bilateral agreements between the Odra countries were in place. The main agreement governing river basin management in the basin now is the Odra Convention.

The following bilateral agreements are in place:

- Agreement of 19 May 1992 between the Republic of Poland and the Federal Republic of Germany on cooperation in the scope of transboundary water management (Dz. U. of 1997, No. 11)
- Agreement of 21 March 1958 between the Government of the Polish Peoples Republic and the Czechoslovak Republic on transboundary water management, which was

replaced by the agreement of 5 October 2015 between the Government of the Polish Republic and Czech Republic

- Agreement of 12 December 1995 between the Federal Republic of Germany and the Czech Republic on cooperation in the scope of transboundary water management (BGBl. 1997 Teil II)

Joint activities within the iRBD

Development of an iRBMP and link to national RBMPs

The development of the iRBMP has mainly influenced the development of the national programme of measures through the commonly identified water management issues. In 2013 the Odra Commision developed a Strategy to define and address common significant water management issues in the basin. The focus of the Strategy was on transboundary issues, namely morphological changes to surface water bodies and maintenance and restoration of river continuity; water abstraction and canalisation; and significant pollutants input including nutrients. The Strategy contains approaches for the cooperation of these issues, as well as proposes measures for the PoM. The iRBMP states that the content of the Strategy contributed to the update of the identification of water management issues at national level as well as the update of the RBMPs.

Areas of joint cooperation

Within the auspices of the Odra Commission, the Member States in the Odra have cooperated on the development and public consultation of the international RBMP, namely through a common public participation on the international plan, including consultation with stakeholders and financial resources for joint cooperation.

Sectors and observers involved within the development of the iRBMP

The iRBMP states that each of the Member States in the iRBD undertook measures to ensure active participation by stakeholders. To this end, national and/or regional working groups were created to enable active participation in the implementation process of the WFD. Interest Groups were also invited to participate. Stakeholders can apply to the Odra Commission as observers following agreed procedures. Four NGOs (BUND, WWF Germany, WWF Poland, Kammerunion Elbe/Odra) are observers to the Commission and mainly participate in the working groups for WFD and FD implementation.

Existence of a transboundary accident warning system

Working group G3 on “Accidental pollution” of the Odra Commission address accidental pollution in the basin and developed measures to protect water bodies from pollution. The accidental pollution plan for the Odra aims to provide an overview of the most important aspects of preventing and addressing accidents to reduce impacts. The plan presents an

overview of the main legislation in the Member States, maps of protected areas, potential sources of accidental pollution and recommendations for prevention.

Part of the accidental pollution plan is the international accident warning system plan for the Odra, which details with transboundary accidents. The system is in place to enable the Member States to inform each other of pollution events. The plan includes measures to address accidents through national level measures.

1.5.3. Characterisation of the River Basin District

Coordination of the Article 5 assessment

The Odra Commission published a common Article 5 report in 2005 and it was updated for the second cycle.

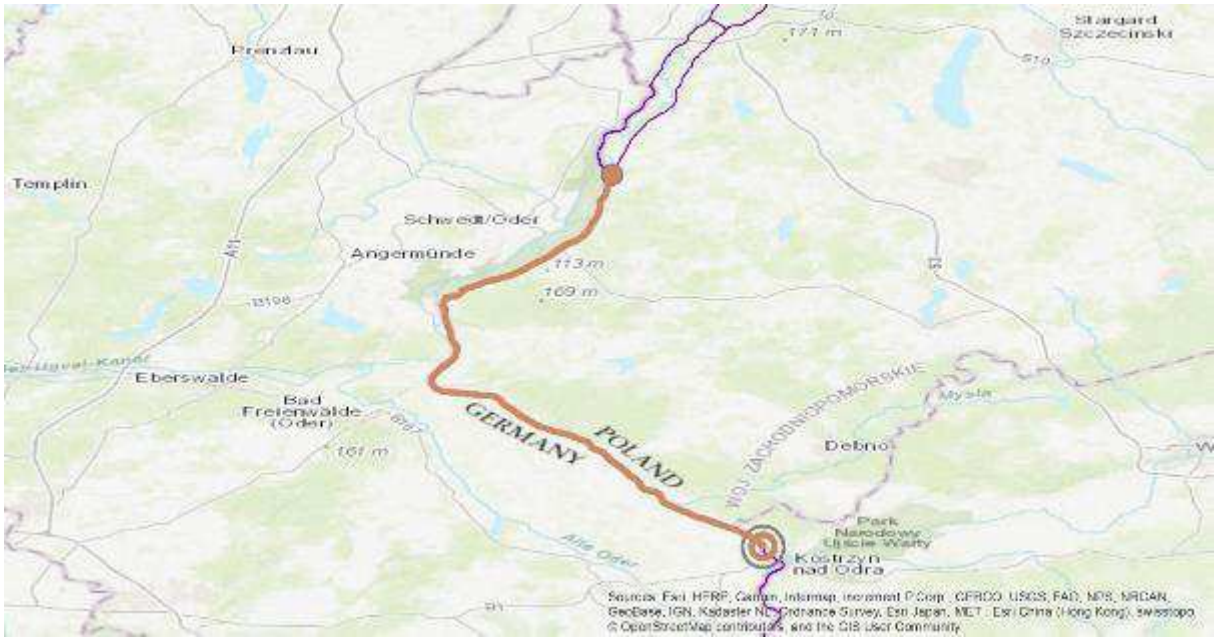
Delineation of water bodies and designation of heavily modified and artificial water bodies

Surface water

The iRBMP state that significant progress regarding international coordination for the common delineation of the border-forming bodies of water (categories and status) has been made in the Odra compared to the first management plan. However, a consistent delineation could not be agreed on for all water bodies. As such, some water bodies will continue to be presented in a cartographically differentiated manner.

To determine whether the delineation of surface water bodies by the Member States has resulted in the same outcome, the Member State reported GIS data for a stretch of river in the Odra basin was assessed. The Map below shows an example where delineation matches between the two Member States.

Map 1.5.2 Assessment if delineation of surface water body has been taken place as indicated in WISE



Source: WISE electronic reporting 2016

The brown line refers to water body DERW_DEBB6-2 delineated by Germany and the grey line refers PLRW60002119199 delineated by Poland. The starting and end points of both delineations match so only the German delineation is visible.

Groundwater

No transboundary groundwater bodies were delineated in the Odra iRBD.

Typology Coordination of surface water bodies

The iRBMP states that within the context of the intercalibration work that was carried out by the Odra Commission, typology differences were discussed but differences in typology among the Member States still remain. The iRBMP does not state whether the Member States used System A or System B for typology classification.

Coordination in the Establishment of reference conditions for surface water bodies

The iRBMP presents a summary for each individual Member States describing the approach taken to establish reference conditions. A comparison of the data reported to WISE shows that the ICPO Member States used partially different quality elements for defining reference conditions for the same surface water type (according to intercalibration classes). There are

overlaps in the quality elements used, but the iRBMP does not mention whether there was a coordination among the Member States on this issue[103].

Coordination on Significant Water Management Issues

Joint significant water management issues of transboundary importance for the Odra River Basin have been identified, namely:

- Morphological alterations to surface water bodies, and
- Water pollution of surface water bodies

However, in the background document from 2013 "Strategy to joint address common significant water management issues in the Odra" water abstraction and canalization was mentioned as significant water management issue. This water management issue is not mentioned in the second iRBMP, as the strategy concludes that the issue of water abstraction and canalisation is only a significant water management issue in some areas of regional importance in the international Odra River Basin.

1.5.4. Monitoring, assessment and classification of surface water ecological status

Monitoring of ecological status/potential

Joint monitoring programmes for surface waters and application of joint methods/joint surveys and interlaboratory tests

According to the iRBMP, the national methodologies of the Member States in the iRBD Odra for ecological water monitoring are not uniformly designed so that they can better consider the respective natural conditions, the different forms of water pollution, as well as specific techniques of data acquisition and analysis.

The iRBMP states that surveillance and operational monitoring was carried out. It presents two separate tables showing the number of surveillance and operational monitoring sites per sub-catchment of the Odra. How many of these sites are relevant for international monitoring is not stated[104].

[103] Subsequent clarifications from the ICPO indicate that while reference conditions are derived from national methods based on the REFCOND Guidance Document No 10, slightly national differences are acceptable due to the calibration process. This issue was discussed within the working group GM.

[104] Subsequent clarification by the Member States indicates that while there is no international monitoring programme, some of the monitoring sites are relevant to get an international overview on the status of water quality. Therefore ,these sites are used in the ICPO geo-portal (http://geoportal.mkoo.pl/IKSO/client/gisclient/index.html?&applicationId=2402)

Sensitive Quality elements (excluding river basin specific pollutants)

According to the WFD and as explained in the CIS guidance on monitoring[105], for operational monitoring, Member States are required to monitor for those biological and hydromorphological quality elements most sensitive to the pressures to which the body or bodies are subject. .

According to the iRBMP, in the Polish share of the Odra benthic invertebrates are used to assess ecological status. The biological quality element is the greatest reason why a surface water body was classified as less than good. Phytobenthos is also mentioned. The situation is similar in the Czech Republic, where benthic invertebrates is the biological quality element leading most often to a classification of less than good. Information on sensitive biological quality elements in Germany is only presented for coastal waters (Stettiner Haffs) in the iRBMP. The main source for less than good status is phytoplankton, followed by macrophytes and benthic invertebrates. The iRBMP does not mention which biological quality elements are used for assessing status for lakes and rivers in Germany.

Member States were requested to report to WISE which biological quality elements they considered to be sensitive for a given pressure. The table below differentiates four biological quality elements, nine different pressures and four different water categories.

An important assessment parameter is whether there is a minimum agreement between the Member States sharing a border with each other on the sensitivity of biological quality elements. Such an agreement would be expressed by the fact that there is at least one biological quality element that is considered to be sensitive (for each pressure) in the border-sharing Member States. Such a quality element can then be used as the least common denominator for comparable assessments of ecological status, provided that the intercalibration has been successful.

For rivers, the table below lists sensitive quality elements for each pressure. There is a full agreement between all three riparian countries on sensitive quality elements for nutrients (other aquatic flora; both sub-elements Macrophytes and Phytobenthos), organic pollution (benthic invertebrates) and morphological pressures (benthic invertebrates and fish). For chemical, temperature and hydrological pressures there is no consensus for at least one biological quality element.

[105] See: https://circabc.europa.eu/sd/a/63f7715f-0f45-4955-b7cb-58ca305e42a8/Guidance%20No%207%20-%20Monitoring%20(WG%202.7).pdf

Table 1.5.2 Sensitivity of biological quality elements towards different pressure types for river water bodies

Member State	Phy-toplankton	Other aquatic flora	Macrophytes	Phy-tobenthos	Benthic invertebrates	Fish
Assessment method mainly sensitive to nutrient pollution						
Czech Republic	yes		yes	yes		
Germany	yes		yes	yes	yes	
Poland	yes		yes	yes	yes	
Assessment method mainly sensitive to organic pollution						
Czech Republic				yes	yes	
Germany			yes		yes	
Poland				yes	yes	
Assessment method mainly sensitive to chemical pollution						
Czech Republic					yes	
Germany					yes	yes
Poland						
Assessment method mainly sensitive to elevated temperature						
Czech Republic						
Germany					yes	yes
Poland						
Assessment method mainly sensitive to altered habitats due to hydrological changes						
Czech Republic					yes	
Germany					yes	yes
Poland						yes
Assessment method mainly sensitive to altered habitats due to morphological changes						
Czech Republic					yes	yes
Germany					yes	yes
Poland					yes	yes

Source: WISE electronic reporting 2016

Coordination of River Basin Specific Pollutants (RBSPs) and matrices monitored

There are three Member States in the Odra iRBD. Table 1.5.3 shows that three pollutants have an environmental quality standard in all riparian countries. 36 environmental quality standards can be compared between in two riparian countries, 22 out of these 36 are between Czech Republic and Germany. This means that there are few specific pollutants with quality standards set at the same geographical scale that are comparable in the iRBD.

Table 1.5.3 Summary of the assessment of selected and relevant river basin specific pollutants for the Odra basin

Number of Member States	Number of river basin specific pollutants with an environmental quality standard	
	River basin specific pollutant scale	
	National[106]	All[107]
1	91	91
2	36	36
3	3	3

Source: WISE electronic reporting 2016

River basin specific pollutants are only useful and supportive for the assessment of ecological status if an environmental quality standard has been adopted and the pollutants are monitored. The information the Member States and Regions reported to WISE was assessed using the following reporting elements:

1) RBSPvalue: If a value is provided in WISE criterion "EQS-yes" is fulfilled

2) chemicalLastMonitored: If a value>=2010 is provided in WISE the criterion "Monitored: yes" is fulfilled

For each river basin specific pollutants, the criteria mentioned above were evaluated according to the scheme given in table below. A filter is applied, considering the following schema elements: a) chemicalSubstanceCode, b) chemicalMatrix c) chemicalPurpose, d) rbspCategoryRW.

Table 1.5.4 shows how many river basin specific pollutants can be used for the assessment of ecological status. The number of pollutants that can be integrated into the assessment of ecological status ranges between 21 for Poland and 71 for Germany.

[106] National means only standards for the national scale are included in the analysis.

[107] All means that the analysis takes all scales into account (i.e. national regional (sub-national), local/municipality, international RBD, RBD, sub-unit, water body, other).

Table 1.5.4 Synthesis of environmental quality standards and sampling of river basin specific pollutants with pre-defined codes in the WISE reporting[108]

Member State	Monitored: yes Environmental quality standard: yes	Monitored: no Environmental quality standard: yes	Monitored: yes Environmental quality standard: no	Substances (number and percentage) that can be used for the assessment of the ecological status
Czech Republic	66	71	21	66 / 73 %
Germany	71	6	58	71 / 55 %
Poland	21	3	24	21 / 47 %

Source: WISE electronic reporting 2016

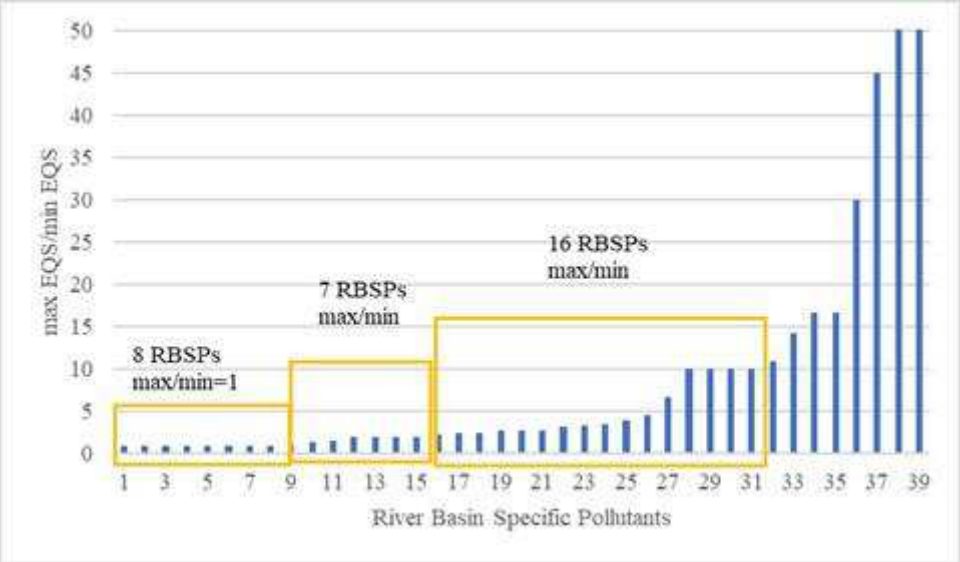
Environmental quality standards for river basin specific pollutants

A comparison between environmental quality standards is given in the figure below.

There is limited agreement between the Member States. There are no substances with the same environmental quality standard in all three Member States. There are eight (out of 39) pollutants with the same environmental quality standard but this standard is shared between Germany and Czech Republic. For most of the substances, the environmental quality standards differ by one order of magnitude or more. This makes it difficult to compare status between the all the Member States sharing the iRBD. The different standards used may also partly explain why some Member State identify certain substances as river basin specific pollutants while other Member States do not.

[108] Information regarding "other RBSP" is not included in the table.

Figure 1.5.1 Ratio between the minimum and the maximum environmental quality standard for river basin specific pollutants in the Odra iRBD[109]



Source: WISE electronic reporting 2016

Status Classification

Use of monitoring results for classification – transboundary harmonization

The results of the classification of surface water bodies sharing or cross the border were brought together and harmonised. A number of measures were taken in the iRBD to achieve comparable valuation results:

- Description of all methods used in the iRBD Odra for assessing the ecological status, including derivation of the references and the respective class boundaries;
- Conducted a two-day workshop on individual biological quality components. Here, the national procedures with regard to the investigation technique (field survey), the taxonomic work-up as well as the calculation procedure were explained in more detail; and
- Tabulation of the basic characteristics and results of the ecological and chemical assessment of transboundary and border-forming bodies of water in the iRBD Odra;

The chapter on assessment of transboundary water bodies indicates that 33 border water bodies, of which 30 rivers, two lakes and one coastal or transitional waters, were identified in the iRBD. 15 water bodies were assigned the same ecological status / potential, 15 water bodies differed in the assessment by one class, two water bodies by two classes.

[109] A ratio of one indicates that the Member States that have set a standard use the same value for this standard. The higher the ratio, the higher the differences in the standards used.

Intercalibration exercise and Geographical Intercalibration Group (GIG)

According to the iRBMP, the Odra belongs to the following GIGs: Baltic Sea, Central Europe / Baltic and Eastern Europe. The national class boundaries of good ecological status are compared in the GIGs in complex procedures and adjusted as necessary.

1.5.5. Monitoring, assessment and classification of surface water chemical status

Monitoring of chemical status in surface waters

Joint monitoring programme for surface waters and application of joint methods/joint surveys and interlaboratory tests

The iRBMP states that monitoring is carried out by the individual Member States.

Coordination of monitoring and assessment of chemical status

The iRBMP states that monitoring and status classification is carried out at national level but that in general a coordination to harmonise the national approaches has taken place. For the first management plan, chemical status was assessed using the Environmental Quality Standards (EQS) for priority and priority hazardous substances in accordance with the Directive 2008/105 / EC on Environmental Quality Standards (UQN. The adoption of the new Directive on EQS has changed the number of priority substances and, in some cases, changes have been made to the relevant environmental quality standards and assessment methods. To update the management plan, the chemical status of Germany and the Czech Republic was assessed in accordance with the requirements of Directive 2013/39 / EU.

The chapter on establishing an inventory of substances in line with the EQS Directive states that since the definition of "relevant" varies among the Member States in the Odra, it was agreed that for the selection and identification of relevant substances in iRBD, data and information collected under the monitoring programs and the results of the chemical assessment of surface water bodies for the period 2010 to 2012 would be used. In some cases, data on the use of pesticides and on emissions from point sources of pollutants collected under the European Pollutant Release and Transfer Register (E-PRTR) was considered. The result of the identification of the relevant priority substances and of the pollutants in the Odra is presented in the Plan.

An important aspect for chemical status assessment is whether the water samples have been taken with the frequency recommended as a general rule in the WFD[110]. Monthly samples should be analysed for WFD compliant assessment of chemical status at a given site. Other

[110] Information reported to WISE did not differentiate between surveillance or operational monitoring. In the case of surveillance monitoring, water sampling has to been carried once a month for one year only within the management cycle. Operational monitoring requires monthly sampling every year of the management cycle.

frequencies need a justification based on expert judgement or technical knowledge. Table 1.5.5 and Table 1.5.6 show that almost all Priority substances have been analysed in all three riparian countries. The total number of samples and the share of samples (reported to WISE) that can be used for WFD compliant assessment of chemical status are similar in the three countries. All these figures indicate that the assessment of chemical status yields comparable results.

Table 1.5.5 Percentage of Priority Substance samples (matrix water) that have been taken with the frequency recommended in the WFD (monthly samples)

Member State	Percentage of Priority Substance samples with a frequency >12/year
Czech Republic	50 % (out of 15 700 samples)
Germany	66 % (out of 17 300 samples)
Poland	59 % (out of 16 100 samples)

Source: WISE electronic reporting 2016

The total number of samples (see table below) was calculated by combining the information of the WISE reporting elements "chemicalfrequency" and "chemicalCycle", as also illustrated in the reporting guidance under chapter 4.3.5.

Table 1.5.6 Total Number of analysed samples for each Priority Substance and each national iRBD share for the period 2010-15[111]

Number of samples for Priority substances (period 2010-2015)			
	Czech Republic	**Germany**	**Poland**
CAS_104-40-5 - 4-nonylphenol	174	12	339
CAS_107-06-2 - 1,2-Dichloroethane	432	391	506.5
CAS_115-29-7 - Endosulfan	120	498	382.5
CAS_117-81-7 - Di(2-ethylhexyl)phthalate (DEHP)	342	498	339
CAS_118-74-1 - Hexachlorobenzene	466	603	384.5
CAS_12002-48-1 - Trichlorobenzenes (all isomers)	490	319	528.5
CAS_120-12-7 - Anthracene	492	515	339
CAS_122-34-9 - Simazine	466	499	339
CAS_127-18-4 - Tetrachloroethylene	462	399	528.4
CAS_140-66-9 - Octylphenol (4-(1,1',3,3'-tetramethylbutyl)-phenol)	396	498	339
CAS_1582-09-8 - Trifluralin	466	426	339
CAS_15972-60-8 - Alachlor	466	498	339
CAS_1912-24-9 - Atrazine	466	499	339
CAS_206-44-0 - Fluoranthene	498	619	382.5
CAS_2921-88-2 - Chlorpyrifos	234	426	339
CAS_330-54-1 - Diuron	294	458	339
CAS_34123-59-6 - Isoproturon	312	458	405

[111] All monitoring frequencies, all matrices included and all purposes included.

Number of samples for Priority substances (period 2010-2015)			
	Czech Republic	**Germany**	**Poland**
CAS_36643-28-4 - Tributyltin-cation	72	407	363
CAS_470-90-6 - Chlorfenvinphos	398	426	339
CAS_50-29-3 - DDT, p,p'	430	603	405
CAS_50-32-8 - Benzo(a)pyrene	498	619	598.9
CAS_56-23-5 - Carbon tetrachloride	402	392	494
CAS_608-73-1 - Hexachlorocyclohexane	460	425	479
CAS_608-93-5 - Pentachlorobenzene	460	499	339
CAS_67-66-3 - Trichloromethane	522	392	536.5
CAS_71-43-2 - Benzene	522	392	528.5
CAS_7439-92-1 - Lead and its compounds	546	600.2	600.2
CAS_7439-97-6 - Mercury and its compounds	495	111.2	585.1
CAS_7440-02-0 - Nickel and its compounds	612	598.2	601.7
CAS_7440-43-9 - Cadmium and its compounds	510	600.2	675.2
CAS_75-09-2 - Dichloromethane	462	392	339
CAS_79-01-6 - Trichloroethylene	462	399	485.4
CAS_85535-84-8 - Chloroalkanes C10-13	60	138	339
CAS_87-68-3 - Hexachlorobutadiene	466	603	365
CAS_87-86-5 - Pentachlorophenol	396	221	341
CAS_91-20-3 - Naphthalene	522	515	339
EEA_32-02-0 - Total cyclodiene pesticides (aldrin + dieldrin + endrin + isodrin)	382	425	
EEA_32-03-1 - Total DDT (DDT, p,p' + DDT, o,p' + DDE, p,p' + DDD, p,p')	400	529	487.1
EEA_32-04-2 - Brominated diphenylethers (congener numbers 28, 47, 99, 100, 153 and 154)		413	339
EEA_32-23-5 - Total Benzo(b)fluor-anthene (CAS_205-99-2) + Benzo(k)fluor-anthene (CAS_207-08-9)			
EEA_32-24-6 - Total Benzo(g,h,i)-perylene (CAS_191-24-2) + Indeno(1,2,3-cd)-pyrene (CAS_193-39-5)			

Source: WISE electronic reporting 2016

Transboundary harmonisation of monitoring and assessment

The iRBMP states that results of the classification of surface water bodies sharing or crossing the border were brought together and harmonised. To achieve comparable valuation results, an exercise was carried out that tabulated the basic characteristics and results of the chemical assessment of transboundary and border-forming bodies of water in the iRBD Odra.

1.5.6. Designation of heavily modified water bodies, artificial water bodies and definition of good ecological potential

Cooperation and joint activities regarding heavily modified water body designation

According to the iRBMP, significant progress has been made compared to the first management plan with regard to the location and designation of water bodies as heavily modified and the assessment of status. However, due to the differences in methodologies, the

iRBMP indicates that a common delineation and/or designation could not be achieved for all transboundary water bodies and the remaining differences appear in the maps for the iRBD.

This information can be confirmed by the assessment of the GIS data reported to WISE by the Member States. Map Map 1.5.2 shows a stretch of river that was designated as heavily modified by Poland but as a natural water body by Germany.

Cooperation and Joint methods and approaches for the determination of Good Ecological Potential

According to the iRBMP, each ICPO Member State has its own methodologies for determining good ecological potential but that the approaches were coordinated through a two-day workshop to minimize differences.

Member States were requested to report to WISE on their approach for defining good ecological potential. Poland reported that the approach used for the definition of good ecological potential followed the Common Implementation Strategy Guidance approach. The Czech Republic reporting using the CIS Guidance Approach, while Germany reported using a Hybrid CIS/Prague Approach. Germany and the Czech Republic both use fish and benthic invertebrates; the Czech Republic also uses Phytoplankton and Macrophytes. Both Member States offer similar mitigation measures.

1.5.7. Environmental Objectives and Exemptions

Exemptions have been applied at national level and there is no joint methodology in the iRBD. The iRBMP indicates that Art. 4 (4) has been applied in 73 % of the rivers in the iRBD and 79 % of the lakes. Art 4(5) has been applied in Poland (1 % of rivers) and the Czech Republic (53 % of rivers and 5 % of lakes); it has not been applied in Germany. Art. 4 (7) has not been applied in the iRBD.

All three Member States reported to WISE that exemptions have not been coordinated for surface water bodies.

1.5.8. Programme of Measures

Following the decision of the Odra Commission Heads of Delegation and the WFD Steering Group in 2011-2012, sub-working groups developed appropriate strategies for the joint resolution of the key water management issues in the Odra. These strategies identified the problem areas in the Odra in preparation for the establishment of the second RBMP for the 2015-2021 period. The strategies include a common approach to addressing issues as well as proposals under the programs of measures. The result of this work is the 2013 background document on the Strategy to address common water management issues detailing joint

measures. This information informed the development of national PoMs. Furthermore, the iRBMP has a dedicated sub-chapter on the measures the Member States will carry out to address the transboundary significant water management issues.

One joint measure (since 2009) was described in the iRBMP. A joint study "Modelling of nutrient emissions for the International Odra River Basin District from point discharges and various diffuse sources for historical, current and future nutrient emissions" was undertaken and finalized in 2014. In addition, the 2013 Strategy mentions a long-term cooperation between Germany and Poland (since the 1990s but still ongoing) on protection of sturgeon in the Odra basin.

All joint significant water management issues have been addressed by measures in the strategy document. All pressures have been addressed, including water abstraction and canalisation, despite this joint significant water management issue not being described in the iRBMP.

The measures the Member States will undertake to address the joint significant water management issues in the ICPO strategy paper will be addressed at national level. It is not foreseen that measures will be implemented through international mechanisms. The Odra Commission discussed in its working groups which measures to prioritise in the basin, and the measures presented in the iRBMP at national level for each Member State is consistent with the Strategy.

Coordination on addressing pollution from agriculture and other sectors

Joint identification of Pressures and Objectives

Nutrient pollution from agriculture and pollutants from other sectors are addressed in the iRBMP. The iRBMP defines water pollution as one of the main management objectives identified at international level. The transboundary management objective identified in the iRBMP is "Significant pollution of surface waters through inputs". Within this objective, the aim is to:

- Reduce nutrient and pollutant loading of surface waters, as well as in the transitional and coastal waters of the Szczecin Lagoon through appropriate measures to achieve the environmental objectives; and
- Identify reduction targets, considering the requirements of the Marine Strategy Framework Directive and measures for the future reduction of nutrient inputs considering the outcomes of the Odra Commission’s Modelling project.

- The information in the chapter does not specify further the objectives in terms of which sectors are targeted; as such, it has been assumed that these management objectives address pollution from all sectors.

The iRBMP does provide information regarding quantitative management objectives within the Odra, either at national or international level.

The 2013 Strategy highlights that measures will be taken at national level but also describes common measures to take. These measures include support measures and technical measures in the agriculture sector.

Measures to address pollution from agriculture

The 2013 strategy document summarises and combines national measures into a so-called "Catalogue". It is clearly indicated that the national measures are not always harmonized for the international level. It is highlighted that more details are found in the respective national plans. Joint measures are mentioned in the iRBMP but are not described in detail.

The 2013 Strategy defines measures to be taken at two "levels": 1) Monitoring and Planning level and 2) Implementation level. Relevant measures for the agriculture sector include:

Common Monitoring and Planning level

- Strategy for nutrient pollution: Standardization of methodological procedures for identification and quantification of diffuse pollution sources; Conduct modelling of quantification and localization of Nitrogen and phosphorus inputs into surface waters including their transport in the water network. This activity is being addressed in the project "Modelling of nutrient inputs from point to point and various diffuse sources for the International River Basin District Odra for historical, current and future nutrient emissions" using MONERIS.
- Assessment of transboundary water bodies
- Common public consultation to increase acceptance of measures
- Implementation level
- Enforcement of good agricultural practice also outside the nutrient vulnerable zones in the International iRBD, in accordance with Directive 91/676 / EC;
- Minimization of nutrient surpluses when fertilizing agricultural land, including establishing binding rules and their control for fertilization on slopes and in the vicinity of surface water bodies;
- Implement measures to reduce soil erosion and nitrate leaching into surface waters and groundwater; and

- Minimization of water erosion in the catchment area, in particular on agricultural land, by means of biotechnical and organizational erosion-reducing measures.

The Odra Commission discussed in its working groups which measures to prioritise in the basin, and the measures presented in the iRBMP at national level for each Member State is consistent with the Strategy.

In order to enable a comparable grouping of measures in the national and international programme of measures, the European Commission introduced the concept of KTMs in 2012 to simplify reporting[112]. KTMs are groups of measures identified by Member States in the PoMs which target the same pressure or purpose. The individual measures included in the PoM (being part of the RBMP) are grouped into KTMs for the purpose of reporting. The same individual measure can be part of more than one KTM because it may be multi-purpose.

All Member States reported applying KTM2 – Reduce nutrient pollution from agriculture and KTM 3 - Reduce Pesticides pollution from Agriculture. In addition, Germany reported applying KTM12 - Advisory Services

Measures related to pollution from sectors other than agriculture

Relevant measures to address pollution from other sources than agriculture include:

- Increasing the capacity and efficiency of existing wastewater treatment plants.
- Increase in the number of inhabitants connected to the sewage system.
- Expansion of sewage networks and new sewage treatment plants to achieve at least European standards.
- Long-term successive increase in the effectiveness of phosphorus and nitrogen elimination to the level of the best available technology.
- Supporting the development of biological treatment infrastructure for wastewater treatment in small settlements <2000 persons.
- Proposals for applying the best available technologies for the treatment of industrial wastewater.
- Preventing or reducing the consequences of accidental pollution of waters, even in the case of floods and especially droughts.
- Targeted reduction of priority substances and successively eliminate emissions, discharges or losses into surface waters and the groundwater.
- Support measures to reduce the impact mining has on water status.

[112] The need for KTMs was borne out of the large differences in the level of detail reported in 2010 by the Member States. Some Member States reported 10-20 measures whilst others reported hundreds or even thousands.

- Introduce procedures for eliminating pollution of surface waters through intensive and semi-intensive fish farming on the condition that their sustainable development is ensured.
- Restriction of the use of selected substances (for example phosphorus in detergents and dishwashing detergents).

All ICPO Member States reported KTMs to WISE. The table below shows which KTMs reported by each Member State or Region.

All Member States reported to WISE that they are implementing the following KTMs:

- KTM1 – Construction or upgrades of wastewater treatment plants;
- KTM4 – Remediation of contaminated sites (historical pollution including sediments, groundwater, soil);
- KTM15 – Measures for the phasing-out of emissions, discharges and losses of Priority Hazardous Substances or for the reduction of emissions, discharges and losses of Priority Substances;
- KTM21 – Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure.

In addition, Germany and the Czech Republic reporting applying:

- KTM16 – Upgrades or improvements of industrial wastewater treatment plants (including farms)
- KTM17 – Measures to reduce sediment from soil erosion and surface run-off; and
- KTM23 – Natural water retention measures.

Germany and Poland also reported applying KTM25 – Measures to counteract acidification.

Coordination on addressing hydromorphological alterations Measures related to hydromorphological alterations

Joint identification of Pressures and Objectives

River continuity and other hydromorphological issues are addressed in the iRBMP. Sediment management is not addressed. In the iRBMP, under the identified water management issue "morphological alterations to surface waterbodies", the following joint objectives were set for the iRBD:

- Developing requirements for the restoration of linear continuity and the creation of natural aquatic structures for aquatic organisms in the Odra and suitable tributaries;
- Restoration of adequate habitats with suitable spawning grounds and nursery areas for fish and round mouths in the Odra and suitable tributaries;

- Coordinated and compatible water management development and maintenance of the water management objectives; and
- Development and maintenance of the waterways, considering the management objectives.

Quantitative targets for river continuity are not described in the iRBMP. The iRBMP did not indicate the number of fish/continuity passes required to achieve the environmental objectives. The Czech Republic and Germany both reported to WISE that they identified general management objectives regarding river continuity. The Czech Republic reported to WISE that it established quantitative targets for river continuity.

Measures to address hydromorphological alterations

The 2013 Strategy details the problem analysis of river continuity issues within each Member State, focussing however on the three main transboundary rivers within the basin. The Strategy follows with an analysis of the necessary measures for re-establishing river continuity through the national programmes within each Member State, followed by a prioritisation of locations and measures. For the international level rivers that act as migration corridors are especially prioritized. A strategy was developed based on a previous Polish study, the methodology of which has been applied for the whole basin. The iRBMP itself provides limited information regarding international cooperation on river continuity and other hydromorphological measures.

The joint Strategy helped to define priority locations for measures to restore river continuity. How this was taken up at national level is not clear as the iRBMP refers to the national plans for the implementation of measures.

The 2013 strategy document includes a list of measures to address hydromorphological pressures. National measures presented in the iRBMP point to measures like:

- Measures to ensure minimum ecological flow
- Shortening reservoirs
- Measures to restore natural water flows
- Measures to promote natural retention, for example relocation of dikes and dams
- Measures to improve the hydrology of lakes
- Measures to reduce the impact of coastal infrastructure
- Measures to re-establish river continuity on water bodies with dam infrastructure
- Measures to initiate natural water development
- Measures to improve the structure of surface waters
- Measures to improve the morphology of lakes
- Measures to reduce the impact of structures for navigation
- Measures to reduce other hydromorphological pressures

All Member States reported to WISE that they are implementing KTM5 – Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams) and KTM6 – Improving hydromorphological conditions of water bodies other than longitudinal continuity KTMs.

The Strategy does not present joint measures to address river continuity.

1.5.9. Economic analysis and water pricing policies

An economic analysis in the Odra was first undertaken by the Odra Commission in 2005 for the River Basin Districts Analysis (Art.5 Report). In frame of the ICPO, the sub-working Group "Economic Analysis" within the Working Group WFD G1 was responsible for coordinating the exchange of data and information pertaining to economic issues within the area of water management in the International Odra Basin for the first management cycle. At the end of 2012, the Odra Commission decided to close this sub-working Group. When developing the second iRBMP, this task was assigned to the experts within the Working Group WFD G1.

The economic analysis chapter covers the following subjects:

- Economic significance of water uses;
- Development forecast for water uses by 2021;
- Cost recovery of water services, including environmental and resource costs;
- Assessment of the most cost-effective measure selection; and
- Economic justifications for exemptions.

The iRBMP states that details of the economic analysis can be found in the national plans.

The chapter on water uses focuses on those relevant in the international context: water abstraction for public drinking water and sewage systems; water abstraction from industry; water abstraction from agriculture; power stations; flood protection; and navigation.

The information is presented in tables indicating the information for each Member State. Industrial water use for mining is presented according to basin region, whereas water use for power stations and navigation is presented according to Member State. Cost recovery information focuses on public supply and also covers industry and agriculture. Information regarding cost-effectiveness analysis of measures indicates that this was not done in a separate process but that such issues are integrated within measure selection in general within each Member State. As there are no joint measures being carried out in the basin, a joint cost-effectiveness analysis was not carried out.

1.5.10. Considerations specific to Protected Areas

The iRBMP presents an overview of the Protected Areas in the iRBD. Details regarding the definitions of the types of Protected Areas in the inventory can be found in the national plan. The iRBMP provides a table of the Protected Areas in the Odra for each Member State.

1.5.11. Climate Change and droughts

The iRBMP has a specific chapter dedicated to climate change. Therein, it states that climate change is not a significant issue for the current cycle and hence no measures to address climate change have been developed. The plan mentions that actions will likely need to be included in the next management cycle.

1.5.12. Recommendations

For the Odra iRBD, important efforts have been made on international coordination between the Member States on a number of aspects.

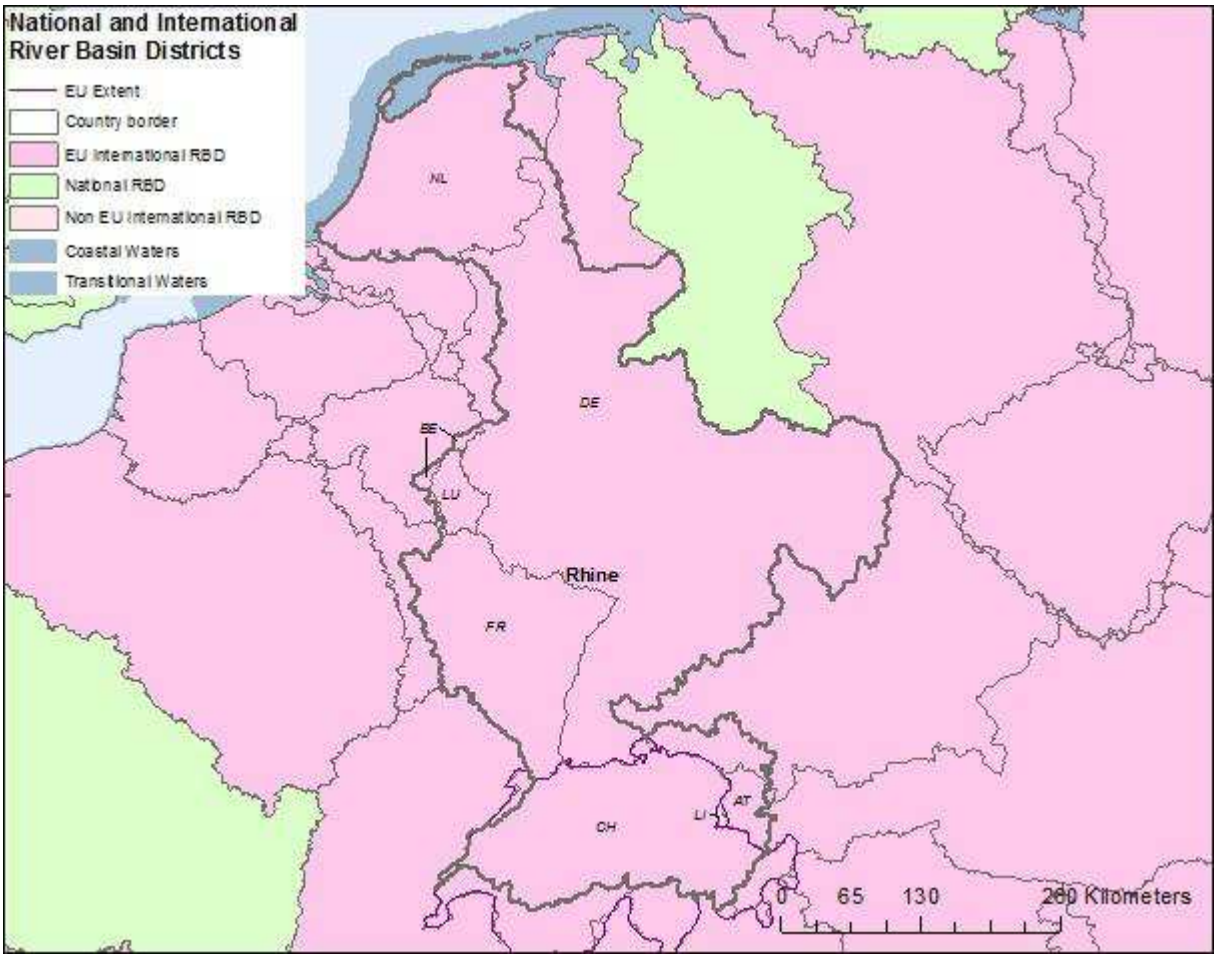
The following recommendations can be made to further improve cooperation:

- The iRBMP should better outline how typology was coordinated.
- The Member States should consider setting up joint monitoring for transboundary water bodies.
- The common understanding on sensitive biological quality elements in relation to different pressures should be improved.
- River basin specific pollutants and comparable environmental quality standards should be coordinated.
- The approach for the designation of heavily modified water bodies and defining good ecological potential should be further harmonised.
- More detailed quantitative information on measures should be provided in the iRBMP in order to impove transparency in terms of the actions taken to achieve the WFD objectives.
- A joint methodology for setting exemptions on transboundary water bodies should be developed.

1.6. Rhine River Basin District

1.6.1. General Information

Map 1.6.1 Rhine International River Basin District



Source: WISE reporting 2016

The Rhine International River Basin District (iRBD) is shared by Austria, Belgium, France, Germany, Italy, Liechtenstein, Luxembourg, the Netherlands and Switzerland. France, Germany, Luxembourg, Netherlands and Switzerland, together with the European Union, are Contracting Parties to the Convention on the Protection of the Rhine. The Convention is the legal basis for the International Commission for the Protection of the Rhine (ICPR). To expand international coordination in the basin to cover all iRBD sharing countries, a Coordinating Committee was established that also includes Austria, Liechtenstein, Belgium (Wallonia) and Italy. The Coordinating Committee is tasked with the implementation of the WFD in the Rhine. The International River Basin District Management Plan for the Rhine (iRBMP) was elaborated in the frame of the Coordinating Committee.

The Rhine iRBD is allocated to cooperation Category 1, which means that an international agreement, a permanent co-operation body and an international WFD RBMP is in place. The international RBMP for the Rhine was published in December 2015. The iRBMP can be downloaded on the Rhine Commission website[113] and on the national pages from Germany[114], the Netherlands[115], Luxembourg[116] and Belgium (Wallonia)[117].

Although geographically Italy is part of the iRBD, in practice and due to the small share in the catchment, it does not participate in the work of the Coordinating Committee Rhine. Italy assigned its share of the Rhine basin to the ITB Po River Basin District and designated it as a Category 2 basin. Italy reported to WISE information for the entire Po River Basin District and not just the share of its national district within the Rhine. As the information Italy reported to WISE is not Rhine specific, it was not included in this report.

The table below presents the size of the total catchment area and national shares within the iRBD (km2; %). The table includes information reported to WISE and the information included in the iRBMP.

Table 1.6.1 Member State share of the iRBD

Name of the International River Basin District	**Total Area -** (km^2)	**EU Member States**	**EU RBD Code**	**National Area within iRBD -** (km^2)	**National Area within iRBD -** (% of iRBD)
Rhine	197,270	Austria	AT2000	2,370	1.2
		Belgium (Wallonia)	BERHIN_RW	800	.4
		France	FRC	23,830	12.1
		Germany	DE2000	105,420	53.4
		Italy	ITB	100	.1
		Liechtenstein	LI-1	200	.1
		Luxembourg	LU000	2,520	1.3
		Netherlands	NLRN	34,100	17.3
		Switzerland		27,930	14.2

Source: iRBMP

[113] https://www.iksr.org/en/water-framework-directive/river-basin-management-plan-2015/
[114] http://www.wasserblick.net/servlet/is/34780/
[115] https://www.rijksoverheid.nl/documenten/beleidsnota-s/2015/12/22/internationaal-gecoordineerd-stroomgebiedbeheerplan-rijn
[116] https://eau.public.lu/directive_cadre_eau/directive_cadre_eau/2015-2021_2e_cycle/index.html
[117] http://eau.wallonie.be

1.6.2. Governance and public participation

Cooperation framework: International, bilateral and/or multilateral agreements in place covering certain cooperation aspects

The Convention on the Protection of the Rhine is the main international agreement governing the Rhine River Basin. Before the Rhine Convention, which was signed in 1999, the Treaty of Bern (1963) was in place as cooperation basis in the Rhine River Basin. The ICPR is the governing body addressing water management in the basin.

The Commission predates the signing of the WFD and FD. In order to coordinate implementation of EU directives in the international Rhine catchment, a common working platform, the Coordinating Committee Rhine was created within the Commission, integrating states in the Rhine catchment (Liechtenstein, Austria and Belgium (Wallonia)) which are not contracting parties to the Commission. In January 2001, the ministers in charge of the Rhine adopted the programme "Rhine 2020", the "Programme on the Sustainable Development of the Rhine". Among others, the programme "Rhine 2020" supports the implementation of the EU-WFD and embraces the Action Plan on Floods. Switzerland is not bound by the WFD but does support EU Member States in their coordination and harmonisation work within the framework of conventions under international law and national Swiss law. Under the framework of the Rhine Commission, three Working Groups are in place under which several Expert Groups are operative.

In addition, there are multiple bilateral/multilateral agreements in place besides the overall international agreement.

Joint activities within the iRBD

Development of an iRBMP and link to national RBMPs

As in 2009, the iRBMP for (Part A) was drafted jointly by the representatives of all states concerned within the Rhine Commission and the Coordination Committee in charge of implementing the WFD. With respect to surface water bodies, the document again focusses on the main stream of the Rhine and major tributaries, such as Neckar, Main, and Moselle with catchment areas above 2,500 km². For some of the surface waters (e.g. Moselle) reference is made to sub-catchment transboundary management plans or to the national management plans (parts B).

Areas of joint cooperation

According to the iRBMP, consultation at international level consisted of making the international documents available on the Rhine Commission's website and communicating them to the observers in the Rhine Commission (see 1.2.3) and the general public. A reaction

was formulated on the received statements and published on the Rhine Commission's website[118]. Further public consultation outreach was done at the national level.

Sectors and observers involved within the development of the iRBMP

In the Rhine there are three types of observers:

- States which are interested in the Commission's work. Belgium, Liechtenstein and Austria have an observer status to the ICPR and enjoy the same rights in the Rhine Coordination Committee as the parties to the ICPR convention.
- Intergovernmental organisations whose work is related to the Convention. These include for the development of the iRBMP the International Commissions for the Protection of the Moselle and the Saar, the International Water Protection Commission for Lake Constance, the Central Commission for the Navigation of the Rhine and the International Commission for the Meuse.
- NGOs, as far as their areas of interest or tasks are concerned[119].

The NGO sectors involved in the development of the iRBMP include industry, hydropower, navigation, public and private water service providers, research, flooding, environmental NGOs and a sportfishing organisation.

Existence of a transboundary accident warning system

In 1986, the Rhine Commission introduced a Warning and Alarm Plan to avert danger due to water pollution and to detect and prosecute the originators of pollution incidents (discharges, accidents in industry or navigation).

Seven international main warning centres collect and distribute reports. When assessing an alarm, the international main warning centres and the competent authorities have a flow time model, a set of guidance values for "alarm-relevant" concentrations and loads, lists of experts, substance data banks and further means at their disposal. Within the Rhine Plan, the reports are shared on upstream (search reports) and downstream (information or warning) with standardised forms in three languages (German, French, Dutch).

The International Main Alert Centres issue warnings beyond the information reports in cases of water pollution incidents if the amounts or concentrations concerned may detrimentally impact the water quality of the Rhine or drinking water supply along the Rhine and/or are liable to raise great public interest. In general, during the period under review, there was about one warning per year. Some sub-basins in the Rhine river basin district (e.g. the International Commissions for the Protection of Moselle and Saar) have their own warning and alarm plans in place which are detailed in the national and/or international reports.

[118] https://www.iksr.org/de/wasserrahmenrichtlinie/bewirtschaftungsplan/
[119] For a complete list please see https://www.iksr.org/en/international-cooperation/about-us/observers/

1.6.3. Characterisation of the River Basin District

Coordination of the Article 5 assessment

The Member States in the Rhine coordinated in 2004 for the Art. 5 assessment report. This report was updated and its results were integrated into the second river basin management cycle.

Delineation of water bodies and designation of heavily modified and artificial water bodies

Surface water

The iRBMP includes a map of surface water bodies in the Rhine. The methodology for surface water body delineation is not described in the 2015 iRBMP; rather, the plan refers to the 2004 Art. 5 report.

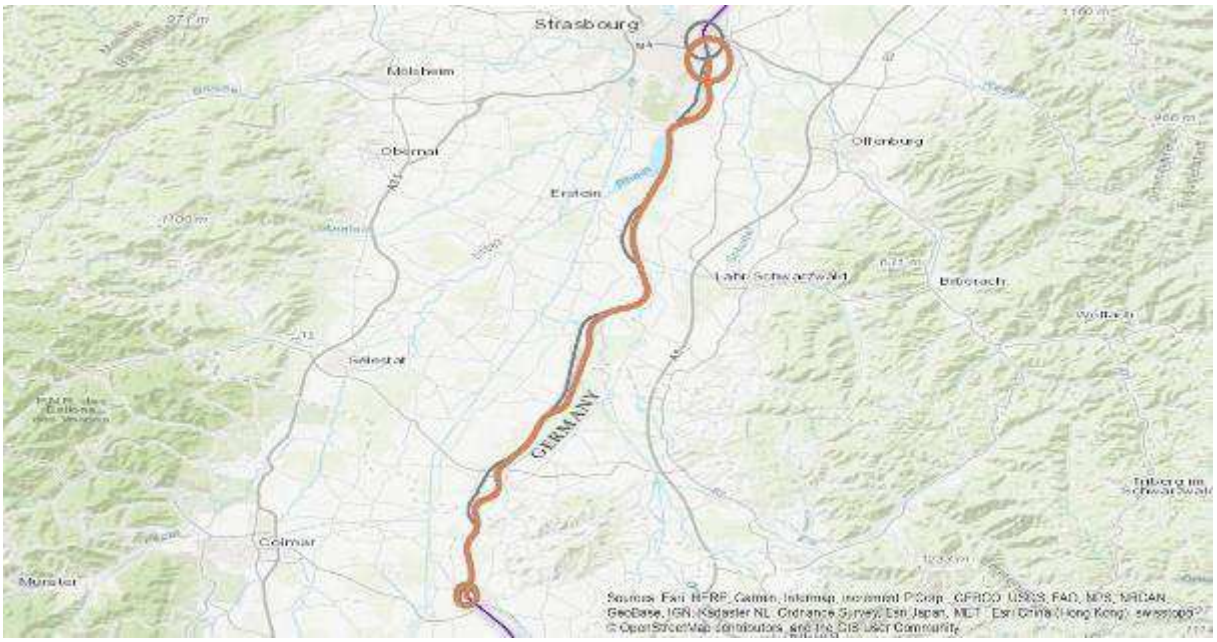
The international plan focuses on a specific sub-set of water bodies in the international basin. Common criteria were developed in the first river basin management cycle for the identification of which surface water bodies are of basin-wide importance, namely:

- Rivers were included that are mostly within the Rhine or tributaries with catchment areas >2,500 km^2;
- Lake Constance and IJssel; and
- Transitional and coastal water in the lower part of the Delta Rhine.

Delineation of surface water bodies followed the criteria from the CIS guidance document "Identification of water bodies". The 2004 report mentions that the criteria were evaluated and weighted differently within the Member States, which has led to differences in the number and size of surface water bodies delineated at national level.

During the assessment of the iRBMP, the GIS data reported to WISE by the Member States was analysed to determine whether the national approaches for the delineation of surface water bodies resulted in a comparable outcome. As shown in the following maps, the national approaches used for delineation have resulted in similar but not the same delineation for rivers in the iRBD.

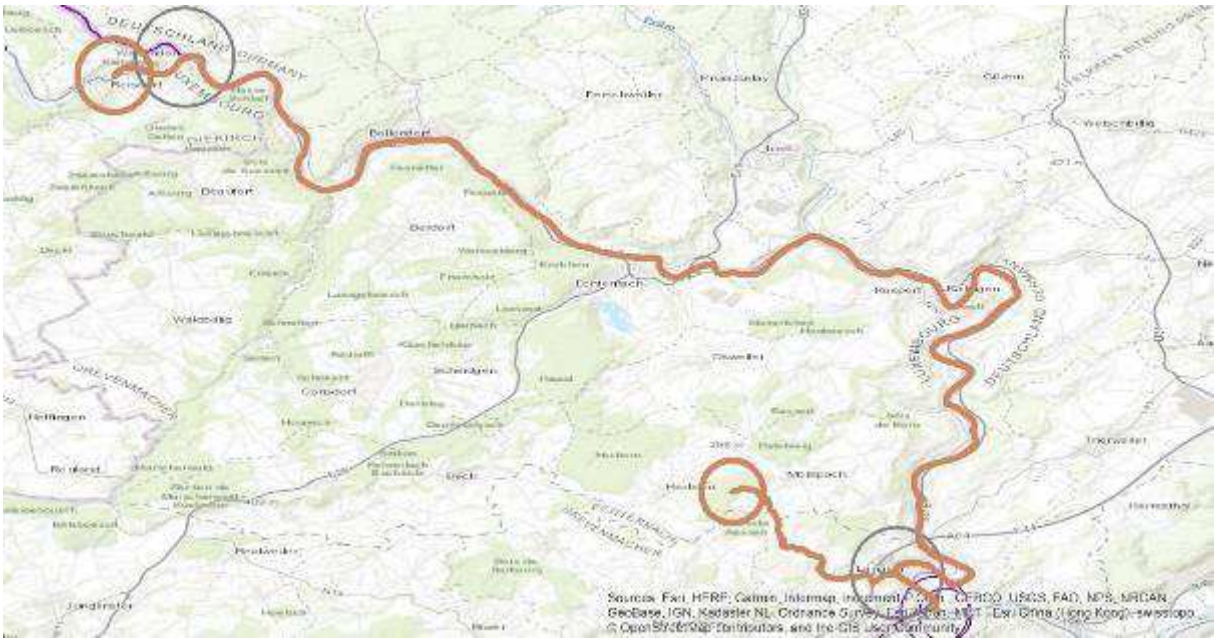
Map 1.6.2 Comparison of the delineation of a river along the French-German border



Source: WISE electronic reporting 2016

The brown line refers to water body DERW_DEBW_3-O delineated by Germany and the grey line refers FRCR2 delineated by the France. The starting and end points of both delineations match.

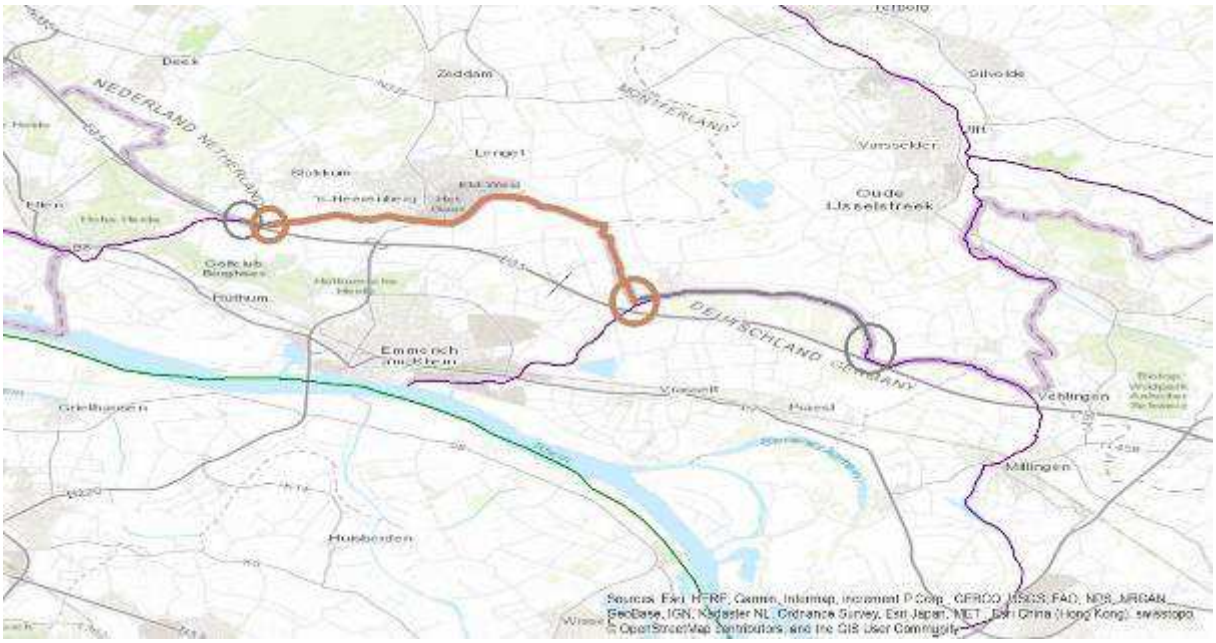
Map 1.6.3 Comparison of the delineation of a river along the Luxembourg-German border



Source: WISE electronic reporting 2016

The brown line refers to water body LUII-1-A and LUII-1-Bdelineated by the Luxembourg and the grey line refers DERW_DERP_2620 delineated by Germany (Rhineland-Palatinate). The end points of both delineations match but Luxembourg additionally delineated a tributary.

Map 1.6.4 Comparison of the delineation of a river along the Dutch-German border



Source: WISE electronic reporting 2016

The grey line refers to water body NL07_0001 delineated by the Netherlands and the brown line refers DERW_DENW279982_20_28 delineated by the Germany. The end points of both delineations show that the Dutch delineation of the water body is longer than the German one[120].

Groundwater

Groundwater delineation was carried out separately in the Member States using different approaches, which has led to difference in the sizes of the groundwater bodies. However, the 2004 report mentions that the delineation of transboundary water bodies was coordinated between the relevant Member States and indicates that this coordination is apparent in the groundwater body map for the Rhine.

Typology Coordination of surface water bodies

Typology was coordinated in the Rhine (see iRBMP Rhine, map K 4). The Rhine catchment area spreads over five of the System A ecoregions:

[120] Subsequent clarification by The Netherlands indicates that there were some issues with reporting, so the differences in delineation may be a result of an error.

- Eco-region 4 (Alps, altitude > 800 m),
- Eco-regions 8 and 9 (western and central high hills, altitude 200 – 800 m) and
- Eco-regions 13 and 14 (western and central lowlands, altitude < 200 m).

Water bodies of basin-wide importance (i.e. those with catchments >2,500 km^2) were classified using a common approach developed within the ICPR. For the Rhine main stream, the sectioning of the river into 19 parts was done through a top-down process using abiotic criteria. For each part of the river, so-called "Passports" or files were created, where reference conditions are used as a basis. The typology of the main stream of the Rhine is extensively presented in a separate report which also includes the profiles of the different types of river sections[121].

For surface water bodies not considered of basin-wide importance, the Member States in the Rhine have chosen System B to describe the types of surface water bodies. The parameters for the comparison of types and possibly their combination into a type were applied in a comparable manner in the Member States, e.g. sub-ecoregions (Austria, France, Germany), dominant sediment substratum (France, Germany, Netherlands) and finally the size of waters (all) on the basis of the obligatory parameters of System A of the WFD (ecoregion, altitude, geology). The different size classes specified by the Member States (size of the catchment area and water body width were used) were then jointly harmonised.

Coordination in the Establishment of reference conditions for surface water bodies

Type-specific reference conditions were developed at a national level for the different types of water bodies.

Coordination on Significant Water Management Issues

Joint significant water management issues have been identified and coordinated in the Rhine. Unchanged since 2009, the issues are:

- "Restoration" of biological river continuity, increased habitat diversity;
- Reduction of diffuse inputs interfering with surface waters and groundwater (nutrients, pesticides, metals, dangerous substances from historical contamination and others)
- Further reduction of classical pollution of industrial and municipal point sources
- Harmonisation of water uses (navigation, energy production, flood protection, regional land use and others) with environmental objectives.

When addressing the four major management issues, effects of climate change and changes in the discharge regime of the Rhine, including more frequent flood events, longer lasting phases of low water, and rising water temperatures, must be taken into account.

[121] https://www.iksr.org/de/dokumentearchiv/fachberichte/fachberichte-einzeldarstellung/news/detail/News/147-entwicklung-einer-abschnitts-typologie-fuer-den-natuerlichen-rheinstrom/

1.6.4. Monitoring, assessment and classification of surface water ecological status

Monitoring of ecological status/potential

A joint biological monitoring programme has been in place in the Rhine since 1990. A surveillance monitoring network to assess ecological status of surface water bodies was established in 2006. The joint monitoring network covers the surface water bodies of basin-wide importance (i.e. Rhine main stream, large tributaries, large lakes, the Delta area and canals important for navigation). During 2012 and 2013, the surveillance monitoring programme was conducted for the second cycle of the WFD. A joint operational monitoring programme is not described in the iRBMP.

Sensitive quality elements monitored (excluding river basin specific pollutants)

According to the WFD and as explained in the CIS guidance on monitoring[122], for operational monitoring, Member States are required to monitor for those biological and hydromorphological quality elements most sensitive to the pressures to which the body or bodies are subject. The iRBMP mentions that a co-ordinated investigation of the biological quality elements was carried out for the main stream of the Rhine. Detailed information is provided for the following biological quality elements:

- Phytoplankton: Not all of the Member States in the Rhine have set ecological objectives for phytoplankton[123]. The joint monitoring programme analysed phytoplankton for the entire stretch of the Rhine main stream, focussing on nutrient pollution pressures. According to the iRBMP, phytoplankton is the most important biological quality element indicating eutrophication in transitional and coastal waters.

- Macrophytes: This element is used to assess nutrient pollution, hydrological and morphological pressures in the iRBD. No reference condition for macrophytes have been described for the Rhine by the time the second iRBMP was published.

- Phytobenthos: This element is used to assess nutrient, saline and acidity pressures in all surface water body types in the iRBD.

- Benthic invertebrates: This element is used to assess nutrients and morphological pressures. The occurrence of invasive species was also included in the analysis of this quality element.

[122] See: https://circabc.europa.eu/sd/a/63f7715f-0f45-4955-b7cb-58ca305e42a8/Guidance%20No%207%20-%20Monitoring%20(WG%202.7).pdf

[123] Subsequent clarification by The Netherlands indicates that in the intercalibration process the Netherlands exceptions for phytoplankton are accepted.

- Fish: This element is used to assess nutrient pollution, chemical pollution, temperature, hydrological and morphological pressures, including river continuity. The status of migratory fish populations was also described in the iRBMP, including data gathered related to the implementation of the ICPR "Masterplan Migratory Fish Rhine"[124].

Member States reported to WISE which biological quality elements they considered to be sensitive for a given pressure. In WISE the sensitive biological quality elements are listed for each pressure. The table below differentiates biological quality elements, different pressures and different water categories.

An important assessment parameter is whether there is a minimum agreement between the iRBD sharing countries sharing a border with each other on the sensitivity of biological quality elements. Such an agreement would be expressed by the fact that there is at least one biological quality element that is considered to be sensitive (for each pressure) in both Member States. Such a quality element can then be used as the least common denominator for comparable assessments of ecological status, provided that the intercalibration has been successful.

For rivers, the table below lists sensitive quality elements for each pressure. In all the Member States in the iRBD, there is an agreement on sensitive quality elements for nutrients (other aquatic flora, macrophytes and phytobenthos), organic pollution (benthic invertebrates), hydrological (fish) and morphological pressures (benthic invertebrates). In the case of temperature pressures, most of the Member States sharing a border share at least one quality element between them[125]. The Netherlands did not report quality elements for chemical and temperature pressures, Austria did not report quality elements for chemical pressures and France did not report temperature pressures.

[124] https://www.iksr.org/en/documentsarchive/technical-reports/reports-and-brochures-individual-presentation/news/detail/News/179-master-plan-migratory-fish-rhine/

[125] i.e. Belgium (Wallonia) and Luxembourg share three quality elements (phytobenthos, benthic invertebrates, and fish) for chemical pressures and two quality elements (benthic invertebrates and fish) for temperature pressures; Germany and Luxembourg both use the same two quality elements (benthic invertebrates and fish) for both chemical and temperatures pressures; Luxembourg and France both use benthic invertebrates for temperature pressures; Germany and France both use benthic invertebrates for temperature pressures; and Austria and Germany both use fish for temperature pressures.

Table 1.6.2 Sensitivity of BQEs towards different pressure types for river water bodies

Member State	Phytoplankton	Other aquatic flora	Macrophytes	Phytobenthos	Benthic invertebrates	Fish
Assessment method mainly sensitive to nutrient pollution						
Austria			yes	yes		
Belgium		Yes	yes	yes	yes	yes
France	yes	Yes	yes	yes		
Germany	yes	Yes	yes	yes	yes	
Luxembourg	yes		yes	yes	yes	yes
Netherlands		Yes	yes	yes		
Assessment method mainly sensitive to organic pollution						
Austria					yes	
Belgium		yes	yes	yes	yes	yes
France			yes	yes	yes	yes
Germany					yes	
Luxembourg				yes	yes	yes
Netherlands					yes	
Assessment method mainly sensitive to chemical pollution						
Austria						
Belgium			yes	yes	yes	yes
France				yes	yes	
Germany					yes	yes
Luxembourg	yes		yes	yes	yes	yes
Netherlands						
Assessment method mainly sensitive to elevated temperature						
Austria						yes
Belgium			yes	yes	yes	yes
France						
Germany					yes	yes
Luxembourg					yes	yes
Netherlands						
Assessment method mainly sensitive to altered habitats due to hydrological changes						
Austria			yes			yes
Belgium			yes		yes	yes
France						yes
Germany					yes	yes
Luxembourg	Yes		yes		yes	yes
Netherlands					yes	yes
Assessment method mainly sensitive to altered habitats due to morphological changes						
Austria			yes		yes	yes
Belgium			yes		yes	yes
France					yes	yes
Germany					yes	yes
Luxembourg			yes		yes	yes
Netherlands					yes	yes

Source: WISE electronic reporting 2016

Coordination of river basin specific pollutants and matrices monitored

The WFD requires Member States to identify and select river basin specific pollutants and their thresholds at the national, river basin or water body level.

ICPR river basin specific pollutants were first identified in the 1970s and since 1999 the list has been updated every three years. The iRBMP refers to the list of specific pollutants in

2007, 2011 and 2014. The list includes heavy metals, industrial chemicals, pharmaceuticals and pesticides. Specific pollutants are monitored on a yearly basis at international monitoring sites. According to the iRBMP, for 13 of the 15 substances relevant for the Rhine environmental quality standards have been derived. An environmental quality standard for the substance copper is currently being developed for use in the third management cycle.

As part of the reporting to WISE regarding the assessment of ecological status, Member States were asked to report information regarding river basin specific pollutants at RBD level[126]. For the reporting to WISE, Member States could report pollutants using pre-defined codes from a list set by the European Commission, and they could report pollutants to a category "other". The "other" category is not uniform among the Member States and therefore the information reported for these pollutants cannot be compared within the iRBD.

The river basin specific pollutants reported by the Member States to WISE were evaluated. The summary of the evaluation concern three essential aspects:

13 which substances have been selected for the entire basin or parts of it;

14 whether the substances have an environmental quality standard and are monitored; and

15 whether the environmental quality standards are the same or in one or another way comparable (in the same range/order of magnitude, for the same matrix).

For environmental quality standards of river basin specific pollutants, different aspects have to be taken into account to make comparisons. They can only be compared for a given substance if the specific pollutant matrix (water, sediment, biota etc), the unit (mg/L, µg/L etc.), the scale at which the standard is applied (national, water body, river basin etc.), the category (rivers, lakes, coastal water, territorial water and transitional water) and the standard (AA-EQS[127], MAC-EQS[128]) are comparable. Therefore, there are many different approaches and dimensions for such a comparison.

This assessment covers selected aspects of the topic at the iRBD scale for reasons of practicability. The most important aspects are environmental quality standards for 1) AA-EQS, 2) for the matrix water and 3) setting of the standard at the national level. The relevant results are a quantitative description of the harmonisation and cooperation with respect to river basin specific pollutants.

[126] Subsequent clarification by Germany indicates that they reported on river basin specific pollutants at the national level, i.e. they reported one list of pollutants without differentiating among the different RBDs.
[127] annual average environmental quality standard
[128] maximum allowable concentration environmental quality standard

A summary for the number of established environmental quality standards is given in the table below. The table shows the number of Member States that have established an environmental quality standard for a certain river basin specific pollutant. This shows how many standards defined at the national level can be compared between how many countries and describes the extent of harmonization[129].

Table 1.6.3 Summary of the assessment of river basin specific pollutants for the Rhine basin

Number of Member States	Number of river basin specific pollutants with an environmental quality standard	
	River basin specific pollutant scale	
	National[130]	All[131]
1	66	71
2	30	30
3	17	16
4	11	1
5	4	0
6	0	0

Source: WISE electronic reporting 2016

There are six Member States that are part of the Rhine (excluding Italy).Table 1.6.3 shows that there is not one river basin specific pollutant with an environmental quality standard that is monitored in all six Member States in the Rhine. There are only four specific pollutants with an environmental quality standard defined at the national level in five out of the six Member States. This means that there are few specific pollutants with quality standards set at the same geographical scale that are comparable in the iRBD.

Although the iRBMP mentions that environmental quality standards were developed for 13 pollutants for the Rhine, the information reported to WISE indicates that there is no river basin specific pollutant with an environmental quality standard for the national scale in all the Member States in the Rhine (i.e. no substance is shared between the six riparian countries).

River basin specific pollutants are only useful and supportive for the assessment of ecological status if an environmental quality standard has been adopted and the pollutants are monitored. The information the Member States reported to WISE was assessed using the following reporting elements:

[129] This analysis assumes a basin-wide view only, it does not show whether the pollutants are shared between neighbouring countries.
[130] National means only standards for the national scale are included in the analysis.
[131] All means that the analysis takes all scales into account (i.e. national regional (sub-national), local/municipality, international RBD, RBD, sub-unit, water body, other).

3) RBSPvalue: If a value is provided in WISE criterion “EQS-yes” is fulfilled

4) chemicalLastMonitored: If a value>=2010 is provided in WISE the criterion “Monitored: yes” is fulfilled

For each river basin specific pollutant, the criteria mentioned above were evaluated according to the scheme given in table below. A filter is applied, considering the following schema elements: a) chemicalSubstanceCode, b) chemicalMatrix c) chemicalPurpose, d) rbspCategoryRW.Table 1.6.4 shows how many river basin specific pollutants can be used for the assessment of ecological status. The number of pollutants that can be integrated into the assessment of ecological status ranges between 7 (Austria and Belgium) and 56 (Netherlands). Luxembourg, the Netherlands and to a lesser extent also Germany and Belgium have a comprehensive set of pollutants that have been used for status assessment while most other countries have a short list of such status indicators. This information describes the role that river basin specific pollutants pay in the frame of the ecological assessment and whether the approaches are comparable. The results do not describe whether and how often theses pollutants have been used in the frame of status assessment.

Table 1.6.4 Synthesis of environmental quality standards and sampling of river basin specific pollutants with pre-defined codes in the WISE reporting[132]

Member State or Region	Monitored: yes Environmental quality standard: yes	Monitored: no Environmental quality standard: yes	Monitored: yes Environmental quality standard: no	Substances (number and percentage) that can be used for the assessment of ecological status
Austria	7	15	84	7 / 8 %
Belgium (Wallonia)	7	29	17	7 / 29 %
France	8	1	41	8 / 16 %
Germany	77	0	185	77 / 29 %
Luxembourg	37	0	0	37 / 100 %
Netherlands	56	3	51	56 / 52 %

Source: WISE electronic reporting 2016

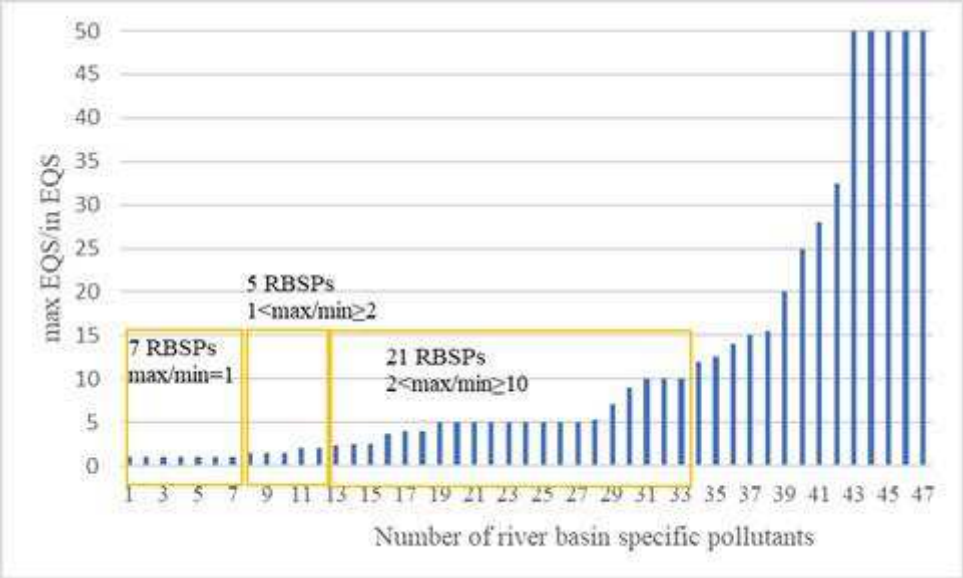
Environmental quality standards for river basin specific pollutants

A comparison between environmental quality standards is given in the figure below.

[132] Information regarding all “other RBSP” is not included in the table. Due to different terminology “other RBSP”s cannot be compared. “other RBSP”s are counted as 1 RBSP even if there are several of them.

There is limited agreement between the Member States. There is only one pollutant where the same environmental quality standard is shared between three countries. There are six pollutants with the same environmental quality standard but this standard is shared only between Luxembourg and Germany. For the majority of substances, the environmental quality standards differ by one order of magnitude or more. This makes it difficult to compare status between the Member States. The different standards used may also partly explain why some Member State identify certain substances as river basin specific pollutants while other Member States do not.

Figure 1.6.1 Ratio between the maximum and the minimum environmental quality standard for river basin specific pollutants in the Rhine iRBD[133]



Source: WISE electronic reporting 2016

Status Classification

Use of monitoring results for classification – transboundary harmonization

All Member States have determined the criteria for the classification of the ecological status or potential according to WFD Annex V for each type of water body/water and for most of the quality elements. The iRBMP refers to a map that presents the national classification in the iRBD and refers to the national plan for more information.

Annex 1 of the iRBMP shows the results of the monitoring programme for ecological status/potential for each surface water body in the Rhine. It shows which water bodies are shared by which Member States and shows how the different Member States classified all the

[133] A ratio of one indicates that the Member States that have set a standard use the same value for this standard. The higher the ratio, the higher the differences in the standards used.

quality elements. While Member States classified the ecological status/potential of individual quality elements for shared transboundary water bodies independently, through coordination the Member States agreed on a common total ecological status/potential classification. The table shows the final result of the classification of quality elements based on coordination. None of the water bodies have differing total classifications following coordination.

During the assessment of the iRBMP, the GIS data reported to WISE by the Member States was analysed to determine whether the national approaches for the ecological status assessment of surface water bodies resulted in a comparable outcome. Using the same stretches of the river as for the assessment of coordination on water body delineation (see the maps in section 2.2.1), it was assessed whether the status of the water body is the same on both sides of the border. While the water body between Germany and Luxembourg has the same ecological status/potential, the water body between France and Germany and between Germany and the Netherlands differ. This finding contradicts the information in Annex 1, which shows that the total ecological status/potential of all transboundary surface water bodies has been agreed between the Member States.

Intercalibration exercise and Geographical Intercalibration Group (GIG)

The rivers Rhine, Moselle and Saar are very large transboundary rivers. The European Working Group X-GIG Very Large Rivers is working on the intercalibration and classification of biological quality elements according to the WFD for very large rivers (catchment > 10,000 km²). All the Member States in the Rhine participate in this intercalibration.

According to the iRBMP, the main problems for large rivers are lacking reference status and methodological difficulties with respect to the analysis of biological quality elements. Also, the data sets of the different countries are partly inhomogeneous, e.g. with respect to the taxonomic resolution or the kind of contamination.

Due to this situation, it has so far only been possible to intercalibrate phytobenthos, which mainly only reacts to one contamination: phosphorus content.

The intercalibration for very large rivers was not finalised by the time the iRBMP was published. This relates to macrozoobenthos, fish and phytoplankton. While there are sufficient data available for an intercalibration of the quality element fish, issues still remain regarding to what extent the floodplain, which is an important element of a river system for the fish fauna, is significant for the classification. So far, most Member States use procedures which mainly classify the main stream.

1.6.5. Monitoring, assessment and classification of surface water chemical status

Monitoring of chemical status in surface waters

Joint monitoring programme for surface waters and application of joint methods/joint surveys

A joint chemical monitoring programme has been in place in the Rhine since 1950. An international coordinated surveillance monitoring network to assess the chemical status of surface water bodies was reported in 2006. During 2012 and 2013, the chemical surveillance monitoring programme was again conducted for the second cycle of the WFD. The joint monitoring network covers the Rhine main stream, large tributaries and the Delta area (56 surveillance monitoring stations).

The basis for the monitoring programme assessed in this report is the list of substances determined in the EQS-Directive. From 2015-2016, the updated EQS Directive was transposed into the national laws of the Member States. The environmental quality standards have been revised for seven substances.

Coordination of monitoring and assessment of chemical status

The ubiquitous substances / groups of substances PBDE, mercury, PAH and TBT have led to a chemical status "failing to achieve good" in the Rhine catchment. Values in excess of the environmental quality standards at almost all stations for almost all water bodies in the Rhine catchment have been monitored.

For the 12 new substances of the Directive 2013/39/EU for which environmental quality standards have been determined (9 pesticides: aclonifen, bifenox, heptachlorine and heptachlor epoxide, dicofol, quinoxyfen, cybutryn, terbutryn, dichlorvos, cypermethrin; other substances: dioxins, hexabromocyclododecane, perfluoroctanesulphonate) there are no (sufficient) data on the classification of the status of water bodies at all Rhine surveillance monitoring stations. The new identified priority substances and their environmental quality standards will be taken into account when drafting additional surveillance programmes and programmes of measures to be presented by the end of December 2018.

An important aspect for chemical status assessment is whether the water samples have been taken with the frequency recommended as a general rule in the WFD[134]. Monthly samples should be analysed for WFD compliant assessment of chemical status at a given site. Other frequencies need a justification based on expert judgement or technical knowledge. If the

[134] Information reported to WISE did not differentiate between surveillance or operational monitoring. In the case of surveillance monitoring, water sampling has to been carried once a month for one year only within the management cycle. Operational monitoring requires monthly sampling every year of the management cycle.

analysis excludes all frequencies that are lower than 12/year, the number of samples decreases from ~129 088 to ~88 300. This means that 68.4 % of the samples (reported to WISE) of Priority Substances in the Rhine catchment can be used for WFD compliant assessment of chemical status without any further justification. In some Member States, almost all samples can be used for WFD compliant status assessment, while in others the share of compliant samples is 41 %. All figures are listed in the table below.

Table 1.6.5 Percentage of Priority Substance samples that have been taken with a WFD compliant frequency (monthly samples)

Member State	Percentage of Priority Substance samples with a frequency ≥12/year	Samples usable for assessment of chemical status without any further explanation
Austria	72 % (out of 415 samples)	300
Belgium (Wallonia)	76 % (out of 3 588 samples)	2 736
France	41 % (out of 41 306 samples)	16 844
Germany	81 % (out of 75 750 samples)	61 197
Luxembourg	100 % (out of 4 109 samples)	3 731
Netherlands	89 % (out of 3 920 samples)	3 492

Source: WISE electronic reporting 2016

The total number of samples (see table below) was calculated by combining the information of the WISE reporting elements “chemicalfrequency” and “chemicalCycle”, as also illustrated in the reporting guidance under chapter 4.3.5.

Table 1.6.6 Total Number of analysed samples for each Priority Substance for the period 2010-15[135]

Number of samples for Priority substances (period 2010-2015)						
Samples	**Austria**	**Belgium (Wallonia)**	**France**	**Germany**	**Luxembourg**	**Netherlands**
CAS_104-40-5 - 4-nonylphenol		90	891	415	169	12
CAS_107-06-2 - 1,2-Dichloroethane	7	90	1290	3606	169	96
CAS_115-29-7 - Endosulfan	6	90	939	1440	169	96
CAS_117-81-7 - Di(2-ethylhexyl)phthalate (DEHP)		94	897	923	169	96
CAS_118-74-1 - Hexachlorobenzene	7	13	939	1527	169	96
CAS_12002-48-1 - Trichlorobenzenes (all isomers)		90	883	2878	169	96
CAS_120-12-7 - Anthracene	12	94	957	1429.5	169	96
CAS_122-34-9 - Simazine	7	104	939	1750.5	169	140
CAS_127-18-4 - Tetrachloroethylene	7	104	1314	3533	169	96
CAS_140-66-9 - Octylphenol (4-(1,1',3,3'-tetramethylbutyl)-phenol)		90	897	1123	169	96
CAS_1582-09-8 - Trifluralin		90	939	1317	169	104
CAS_15972-60-8 - Alachlor	7	90	939	1385.5	169	104
CAS_1912-24-9 - Atrazine	7	104	939	1750.5	169	104
CAS_206-44-0 - Fluoranthene	12	109	957	1502.5	169	120
CAS_2921-88-2 - Chlorpyrifos		90	939	1515.5	169	140
CAS_330-54-1 - Diuron	6	104	939	1812.5	169	140
CAS_34123-59-6 - Isoproturon	6	104	939	1714.5	169	140
CAS_36643-28-4 - Tributyltin-cation	1	94	897	1705	169	120
CAS_470-90-6 - Chlorfenvinphos		90	939	1521.5	169	104
CAS_50-29-3 - DDT, p,p'		90	939	1411	169	96
CAS_50-32-8 - Benzo(a)pyrene	12	123	1239	1496.5	169	120
CAS_56-23-5 - Carbon tetrachloride	7	90	1308	3635	169	96
CAS_608-73-1 - Hexachlorocyclohexane	1	94	939	3012	169	

[135] All monitoring frequencies, all matrices included and all purposes included.

Number of samples for Priority substances (period 2010-2015)						
Samples	**Austria**	**Belgium (Wallonia)**	**France**	**Germany**	**Luxembourg**	**Netherlands**
CAS_608-93-5 - Pentachlorobenzene	1	94	1221	1032	169	96
CAS_67-66-3 - Trichloromethane	7	90	1308	3631	169	96
CAS_71-43-2 - Benzene		104	1158	3629	169	96
CAS_7439-92-1 - Lead and its compounds	67	108	1227	2619	169	104
CAS_7439-97-6 - Mercury and its compounds	68	27	943	1749	169	104
CAS_7440-02-0 - Nickel and its compounds	67	104	1419	2399.5	169	128
CAS_7440-43-9 - Cadmium and its compounds	67	108	1269	2405	169	104
CAS_75-09-2 - Dichloromethane	7	90	858	3641	169	96
CAS_79-01-6 - Trichloroethylene	7	104	1314	3551	169	96
CAS_85535-84-8 - Chloroalkanes C10-13	12	94	897	205	169	24
CAS_87-68-3 - Hexachlorobutadiene	1	13	1207	1776	169	96
CAS_87-86-5 - Pentachlorophenol		90	897	674	169	140
CAS_91-20-3 - Naphthalene	12	90	957	1865.5	169	96
EEA_32-02-0 - Total cyclodiene pesticides (aldrin + dieldrin + endrin + isodrin)		90	939	2984	169	96
EEA_32-03-1 - Total DDT (DDT, p,p' + DDT, o,p' + DDE, p,p' + DDD, p,p')		90	933	2768	169	
EEA_32-04-2 - Brominated diphenylethers (congener numbers 28, 47, 99, 100, 153 and 154)	1	100	891	1297	169	
EEA_32-23-5 - Total Benzo(b)fluor-anthene (CAS_205-99-2) + Benzo(k)fluor-anthene (CAS_207-08-9)		94	957	1806	169	120
EEA_32-24-6 - Total Benzo(g,h,i)-perylene (CAS_191-24-2) + Indeno(1,2,3-cd)-pyrene (CAS_193-39-5)		94	957	1838	169	120

Source: WISE electronic reporting 2016

Transboundary harmonisation of monitoring and assessment

The iRBMP refers to a map that presents the national classification in the iRBD and refers to the national plan for more information. Annex 1 of the iRBMP shows the classification results per Member States for shared water bodies and the classification following harmonisation between the Member States sharing the water body.

1.6.6. Monitoring, assessment and classification of groundwater quantitative and chemical status

The Rhine does not have a joint monitoring programme for groundwater bodies. The iRBMP mentions that monitoring networks were established to monitor the quantitative and chemical status in groundwater bodies in accordance with the WFD but it does not mention whether any coordination has taken place. The iRBMP does not provide information regarding the coordination or harmonization of the classification of quantitative and chemical status for groundwater bodies.

1.6.7. Designation of heavily modified water bodies, artificial water bodies and definition of good ecological potential

Cooperation and joint activities regarding heavily modified water body designation

The iRBMP refers to the 2004 Article 5 report for information regarding the designation of heavily modified or artificial water bodies. The 2004 Art. 5 report mentions that the identification of such water bodies followed the following steps:

First, the differences between artificial and natural water bodies are agreed.

In a second step, it is analysed in how far the hydromorphological alterations in a water body negatively impact the ability to achieve good ecological status. Water bodies where these alterations have led to irreversible changes are designated as heavily modified.

According to the 2004 report, these steps were implemented differently within the individual sub-catchments of the Rhine. From the transboundary water bodies shown in chapter 2.2.1 it is clear that coordination has taken place, as France and Germany as well as Luxembourg and Germany designated the shared transboundary water body the same. In the case of the transboundary water body between Netherlands and Germany a difference was found. Netherland designated as Heavily Modified, Germany as artificial[136].

[136] Subsequent clarification by The Netherlands indicates that this may have been a result of a reporting error.

Cooperation and Joint methods and approaches for the determination of Good Ecological Potential (GEP)

According to the iRBMP, for the first management cycle, the ecological potential was determined based on measures using the so-called "Prague Approach". The starting point was the joint definition of the maximum ecological potential of a water body resulting from the implementation of all technically feasible measures aimed at an ecological enhancement of a water body without significant effects on specified uses or the wider environment (according to WFD Article 4 (3)). Good ecological potential was understood as a gradation, as all measures with little ecological effect were subtracted from the maximum ecological potential.

According to the current iRBMP, the classification procedures have been further developed, but the EU Member States have partly chosen different approaches. The common features and differences of the methodologies are relevant with respect to the harmonisation of classification results of transboundary water bodies and have been intensively discussed within the iRBD. According to the iRBMP, maximum ecological potential has been defined on the basis of measures. In the Netherlands and in Germany, the ecological effects of potentially feasible measures are taken into account and transposed into calculable biological information, which can be integrated into classification procedures. In France, the degree of hydromorphological pollution is part of the classification of the ecological potential. For some quality elements on the German-French Upper Rhine, the different classification scales have been discussed bilaterally in order to agree upon a common classification. Details on other Member States are not provided in the iRBMP.

Member States were requested to report to WISE information on how good ecological potential is assessed. Whereas Austria, France, Luxembourg and Netherlands determine good ecological potential at water body level, Belgium (Wallonia) and Germany determine it for groups of heavily modified/artificial water bodies of the same use/physical modification. Benthic invertebrates and Fish are the most frequently used quality elements and are used by Austria, Belgium (Wallonia), Germany and the Netherlands. Austria, Belgium (Wallonia) and Luxembourg additionally use macrophytes, and Belgium (Wallonia) and the Netherlands use other aquatic flora. Similar mitigation measures were reported.

1.6.8. Environmental Objectives and Exemptions

According to the iRBMP, Article 4 (4) and Article 4 (5) have been applied in the Rhine for surface water bodies. Article 4 (6) has not been applied. The iRBMP mentions that in a few cases less stringent environment objectives according to Article 4 (5) and Article 4 (7) are being applied to groundwater bodies.

Article 4 (4) is being applied in internationally relevant catchments (i.e. >2,500 km^2) for the following reasons:

1. To restore river continuity and increase the habitat diversity of natural, artificial and heavily modified surface waters, disproportionate costs, natural conditions or technical feasibility are taken into account;

2. For phytoplankton in coastal waters;

3. For the substances relevant for the Rhine: zinc, copper and the group of PCBs;

4. For phosphorus in surface water bodies;

5. For priority (hazardous) substances, in particular, the group of substances of polycyclic aromatic hydrocarbons (PAH) and mercury (measured in biota), in surface water bodies;

6. Nitrogen in groundwater bodies is leading to article 4(4) being applied due to natural conditions, disproportionate costs;

7. Poor quantitative status in two groundwater bodies in Germany; and

8. Achieving good chemical status in groundwater bodies.

Article 4 (5) and Article 4(7) are being applied in a few groundwater bodies due to mining.

For the water bodies assessed in more details (see chapter 2.2.1) in all cases the reasons for exemptions match.

The iRBMP does not mention whether there was coordination on the application of exemptions or further details e.g. regarding the number of exemptions or details regarding methodologies.

1.6.9. Programme of measures

Common significant management issues were agreed in the Rhine. The PoM summary chapter in the iRBMP is structured along the identified management issues, namely restoration of biological river continuity, increased habitat diversity; reduction of diffuse inputs interfering with surface waters and groundwater (nutrients, pesticides, metals, dangerous substances from historical contamination and others) and further reduction of classical pollution of industrial and municipal point sources; and harmonisation of water uses (navigation, energy production, flood protection, regional land use and others) with environmental objectives. The section on harmonisation of water uses refers to basin-wide workshops to address these issues; further information is not provided.

For each significant water management issue, the sub-chapter presents a summary of the measures implemented during 2009 to 2015 and the measures planned for the second Management Plan 2015 – 2021.

Coordination on addressing pollution from agriculture

Joint identification of Pressures and Objectives

According to the PoM summary chapter, diffuse pollution is a major issue in the Rhine. Since 2000, the calculated nitrogen emissions have dropped by about 15 %. According to the iRBMP, the real reduction is presumably higher, as the calculations include natural background contamination. On the whole, a further 5 % reduction is expected for 2021. A 5 % reduction in phosphorus emissions are also expected by 2021.

Germany, Luxembourg and the Netherlands reported to WISE that they have defined general management objectives for nutrients and quantitative management objectives for nitrogen. Austria and Belgium reported that they did not.

Measures to address pollution from agriculture

To address nutrient pollution from agriculture, the PoM summary chapter presents the following measures:

- Good agricultural practice which may include information on and introduction of certification systems.
- Prohibition of fertiliser distribution in autumn or winter or on water-saturated or frozen soil or soil covered with snow;
- Keeping bank areas free of fertiliser or cultivation;
- Prohibition of ploughing grassland;
- Cultivation of swamp areas and helophyte fields;
- Extensification of livestock breeding;

- Improvement of the rate of implementation and fertilisation;
- Advisory services aimed at further improving the efficiency of fertilisation and land utilisation, e.g. information on nutrient accounting procedures and planning of fertilisation;
- Enhance agri-environmental measures, e.g. winter greening with intercropping and undersowing of arable areas aimed at reducing the nitrogen contents of the soil in autumn;
- Enhance investment in order to create additional storage capacity for farm manure.

The possibilities of reducing pollution from pesticides (diffuse pathways) was elaborated within an ICPR expert group on plant protection agents when the second iRBMP was published.

In order to enable a comparable grouping of measures in the national and international programme of measures, the European Commission introduced the concept of KTMs in 2012 to simplify reporting[137]. KTMs are groups of measures identified by Member States in the PoMs which target the same pressure or purpose. The individual measures included in the PoM (being part of the RBMP) are grouped into KTMs for the purpose of reporting. The same individual measure can be part of more than one KTM because it may be multi-purpose.

All the Member States reported applied KTM2 – Reduce nutrient pollution from agriculture and KTM 3 – Reduce Pesticides pollution from Agriculture. In addition, Austria, Belgium (Wallonia), Germany and Luxembourg reported applying KTM 12 – Advisory services.

Coordination on addressing pollution from sectors other than agriculture

Joint identification of Pressures and Objectives

Pollution from sectors other than agriculture is addressed in the iRBMP. The chapter on pressures details the different pollution sources and describes the substances relevant for the Rhine. The iRBMP defined as two relevant transboundary significant water management issues: the reduction of diffuse inputs interfering with surface waters and groundwater (including metals, dangerous substances from historical contamination and others) and further reduction of classical pollution of industrial and municipal point sources. All the Member States reported to WISE that they are addressing chemical pollution.

Measures to address pollution pressures from sectors other than agriculture

The ICPR has drafted an overall strategy for sediment management along the Rhine aimed at sustainable sediment and dredging management: 22 of the 93 analysed sedimentation areas

[137] The need for KTMs was borne out of the large differences in the level of detail reported in 2010 by the Member States. Some Member States reported 10-20 measures whilst others reported hundreds or even thousands.

have been classified as areas at risk, 18 as “areas of concern”. For areas at risk remediation measures have been defined, for the “areas of concern” intensive surveillance was recommended.

According to the iRBMP, reduction measures taken since 2000 to reduce emissions from wastewater treatment plants have been successful, as has been the reduction of emissions from wastewater treatment plants in the years and decades before. Existing concepts for wastewater elimination are basis of further measures, such as optimising the operation of wastewater treatment plants. Other measures include new sites for wastewater treatment plants or transfer/deviation of wastewater flow and/or merging wastewater treatment plants.

The iRBMP states that only a small percentage of nutrient inputs is of industrial origin, so no further significant improvement of the Rhine water quality is to be expected from measures aimed at a further reduction of direct inputs from industry.

Measures must be taken at the source for zinc and copper, in particular, since wastewater treatment plants were not designed to eliminate heavy metals from wastewater. The iRBMP states that no obvious measures can be recommended for rehabilitation purposes. Alternatives for the use of copper and zinc are being looked into in different sectors. Measures concerning the substances relevant for the Rhine arsenic, chromium, dichlorvos and dimethoate are described in the Part B reports.

Based on the decision of the Rhine Ministers in 2007, the ICPR has intensively worked on the assessment of the relevance of micro-pollutants for the Rhine e.g. due to pharmaceutical residues and has recommended relevant reduction strategies. Different measures are being implemented to reduce the discharge of micro-pollutants into water bodies. They include pilot projects (e.g. in the German federal states Baden-Württemberg and North Rhine-Westphalia and in the Netherlands) and competence centres (e.g. in the German federal states Baden-Württemberg, Rhineland- Palatinate and North Rhine-Westphalia) dealing with the issue of micro-pollutants. Competence centres of several countries are working together on the issue. In Switzerland in 2014 a legal basis to finance the upgrade of sewage water treatment plants (SWTPs) for micropollutants removal was introduced. In the meantime, the upgrade of the first plants has been completed.

All the Member States reported to WISE that they are implementing:

- KTM1 – Construction or upgrades of wastewater treatment plants;
- KTM4 – Remediation of contaminated sites (historical pollution including sediments, groundwater, soil); and
- KTM17 – Measures to reduce sediment from soil erosion and surface run-off; and

In addition, all the Member States except Luxembourg reported that they are implementing KTM15 – Measures for the phasing-out of emissions, discharges and losses of Priority Hazardous Substances or for the reduction of emissions, discharges and losses of Priority Substances. Austria, Belgium and Germany reported applying KTM16 – Upgrades or improvements of industrial wastewater treatment plants (including farms). All the Member States except Belgium reported that they are implementing KTM21 – Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure. Germany and Luxembourg reported applying KTM23 – Natural water retention measures and KTM25 – Measures to counteract acidification. In addition, Luxembourg reported applying KTM22 – Measures to prevent or control the input of pollution from forestry.

Coordination on addressing hydromorphological alterations

Joint identification of Pressures and Objectives

Hydrological and morphological pressures have been identified in the Rhine. A transboundary significant water management issue was identified, namely restoration of biological river continuity and increase habitat diversity.

All of the Member States reported to WISE setting general management objectives to address hydromorphological alterations. All the Member States except the Netherlands reported to WISE that they set quantitative management objectives.

Measures to address pressures from hydromorphological alterations and sedimentation

The iRBMP describes measures to improve river continuity and increase habitat diversity. Measures implemented in the first river basin management cycle are described in detail, focussing on joint projects for improving migration routes for individual fish species and on the Rhine and its tributaries. Multiple basin-wide programmes are mentioned: the Habitat Connectivity along the Rhine programme, Rhine 2020 programme including Salmon 2020, the Lake Constance Lake Trout programme, the Eel Management Plans, the Master Plan Migratory Fish Rhine, and the Sediment Management Plan. Progress in these programmes are described. In addition, the iRBMP provides a table showing the positive impact measures have had on individual biological quality elements and where these improvements have been observed within the iRBD.

Annex 7 of the iRBMP presents the hydromorphological measures already implemented and planned within the Master Plan Migratory Fish Rhine. The table shows four implementation phases: measures implemented by 2015 or implementation started; implementation or begin of work by 2018 planned; implementation by 2027; and long-term phased implementation planned. For each measure, the country and section of the Rhine/tributary system is given, the number of transverse structures and the costs of the measures.

For improving river continuity, the following measures are mentioned in the PoM summary chapter:

- Modification of transverse structures
- Construction of bypasses
- Near natural connection of tributaries
- Improving reconnection of tributaries/lateral river continuity
- Construction or optimisation of structures for up- and downstream fish migration

For increasing habitat diversity, the following measures are mentioned in the PoM summary chapter:

Measures aimed at increasing habitat diversity in the riverbank area are:

- Dismantling of riverbank stabilisations in places, where these are not required for safety or maintenance reasons; Improvement of the access to the water body; create foreshores in impounded sections wherever possible;
- Optimisation of river constructions, greater ecological design of the groynes, parallel diversion structures where this is spatially possible;
- Protection from waves, e.g. due to parallel structures, bypasses or partially closed groynes. These areas may develop shallow replacement habitats for juvenile fish, water plants and invertebrates.
- Increasing runoff diversity;
- Revitalisation of spawning and juvenile habitats.

Measures aimed at increasing habitat diversity in the riverbank area and floodplains are:

- Improvement of the lateral cross-linking with the aquatic environment, where possible, by creating and connecting secondary tributaries (with sufficient flow and varying flow velocity) in order to optimize the stepping stone function of the river bank and the aquatic surroundings in the network of biotopes and to open up side waters rich in aquatic plants, terraced scouring waters, impounded alluvial waters, alluvial zones with flow through and standing waters and by-passes as habitats for fish, invertebrates and aquatic plants;
- Enhancement of near-natural connections of tributaries in the Rhine estuary;
- Where possible, integration of dike relocations into the extension of alluvial areas when planning measures (also makes sense for reasons of flood protection);
- Enhancement of near-natural vegetation in the alluvial area, creation of riverbank strips, above all below sloping surfaces without vegetation (fields, etc.); enhancement of environmentally compatible agriculture and extensive agriculture to reduce inputs of fine sediments and of nutrients and pesticides of diffuse origin.

The PoM summary chapter states that many of these measures are part of Member State programmes of measures. Therefore, further details are included in Parts B of this international management plan for the iRBD Rhine (Part A).

All of the Member States reported to WISE that they are applying KTM5 – Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams). All the Member States are applying KTM6 – Improving hydromorphological conditions of water bodies other than longitudinal continuity.

1.6.10. Economic analysis and water pricing policies

An economic analysis in the Rhine was first undertaken by the Rhine Commission in 2004. The iRBMP states that only a trans-national summary is presented in the plan. The economic analysis chapter covers the following subjects: economic significance of water uses and the baseline for the development forecast for water uses by 2021. Cost recovery of water services, including environmental and resource costs is presented in the chapter on measures. The chapter on water uses provides information on: water abstraction for public drinking water and sewage systems; water abstraction from industry; water abstraction from agriculture; hydropower plants for power generation; navigation and transport; and very brief information on fishery, tourism, sand and gravel pits. The information provided is brief and summarizes the water uses and the baseline for the Rhine as whole.

Information on cost recovery is presented per Member State. Cost recovery is based on national regulations. At present, environmental and resource costs are only taken into account in so far as they are internalised in the costs of water supply and disposal. Member States located in the Rhine catchment have analysed their cost recovery in different ways. All analyses have in common that the costs for drinking water supply (production, preparation and distribution of drinking water) and sewage disposal (wastewater collection, discharge and treatment) have been investigated. In all the Member States, apart from the Netherlands and France, cost recovery is not being analysed separately for the sectors household, industry and agriculture, as the required data are not available. It is underlined that due to differing methods of analysis, the resulting degrees of cost recovery are not comparable.

With respect to identifying the most cost-efficient combination of measures, reference is made to the detailed presentations in the national plans.

1.6.11. Considerations specific to Protected Areas

The iRBMP presents the joint Protected Areas inventory for water-dependent protected areas relevant for the international part of the Rhine Basin. This covers areas for abstraction of water for human consumption; nature and bird protected areas under Natura 2000; and recreational and bathing waters. The joint inventory shows the number of Protected Areas per category from the first management plan and the second management plan.

Since the 2009 iRBMP, the number of recreational and bathing waters, as well as the number and surface of bird protection areas have slightly increased. The number of Natura 2000 areas is slightly reduced, which may be due to restructuring measures when designating areas (integration of several smaller, similar areas to one larger area). The total area of water-dependent Natura 2000 areas in the iRBD has increased by 3,199 km² and is now 35,438 km² (which is about 18.5 % of the total surface of the iRBD Rhine, i.e. 1.5 % more than in the beginning of 2010).

1.6.12. Climate Change and Droughts

The Rhine Commission has developed a Strategy for Adapting to Climate Change, which was published in 2015. It is meant to be a living document with periodic updates. To develop the strategy, the Commission's working groups analysed the possible specific effects on economic activities and their vulnerabilities and risks in the areas of water quantity, ecology and water quality. For this analysis, the ICPR working groups used information from multiple Rhine studies (observed changes in climate variables and future scenarios in the form of projected ranges) and deepened them for their respective areas.

Mutual exchanges between the Rhine working groups took place at interdisciplinary meetings involving international intergovernmental organizations and NGOs. In an interdisciplinary workshop in 2013, the expected effects of climate change on the different water management areas were presented and around 80 experts discussed possible solutions. The results of this workshop were fed into the Strategy. The iRBMP states that when treating the four major management issues, effects of climate change and changes in the discharge regime of the Rhine, among others more frequent flood events and longer lasting phases of low water, must in future increasingly be taken into account. In the framework of the Rhine Commission, the relevant basis has been established within different studies of scenarios for water management and water temperature.

The Adaptation Strategy includes suggestions for measures to be implemented by the Member States. It also defines basic principles for the selection of adaptation measures. The iRBMP does not detail which of the measures in the PoM summary chapter is linked to the Adaptation Strategy.

1.6.13. Recommendations

Important efforts have been made in the Rhine iRBD on international coordination addressing a range of water management aspects.

The following recommendations can be made to further improve cooperation:

- The efforts in coordinating typology should be further continued.
- The next iRBMP should better explain how heavily modified water body designation has been coordinated and the definition of ecological potential should be further harmonised.
- Exemptions for transboundary water bodies should be explicitly coordinated among the countries and a harmonised approach for setting exemptions should be elaborated.
- Coordination of river basin specific pollutants and setting of environmental quality standards should be further improved.
- The important efforts on river restoration and re-establishing river continuity for migratory fish species should be continued. In particular, the measures on river continuity which have been agreed in the framework of the Rhine Commission need to be fully and timely implemented by all concerned Member States.

1.7. Sava River Basin District

1.7.1. General Information

Map 1.7.1 Sava River Basin District

Source: Sava River Basin Management Plans

The Sava International River Basin District (iRBD), which is a sub-basin of the Danube iRBD is shared by Albania, Bosnia and Herzegovina, Croatia, Montenegro, Serbia and Slovenia. The Sava iRBD is allocated to cooperation Category 1, which means that an international agreement, a permanent co-operation body and international WFD RBMP is in place.

The first international RBMP for the Sava was published on 2 December 2014. The iRBMP can be downloaded on the Sava Commission website[138] in all the basin's national languages as well as English.

The table below presents the size of the total catchment area and national shares within the iRBD (km^2; %).

[138] http://www.savacommission.org/srbmp/en/draft

Table 1.7.1 Country share of the iRBD

Name of the International River Basin District	Total Area of Shared International RBD	EU Member States/Non-EU countries in iRBD	National Area within International RBD	National Area within International RBD
	km^2		km^2	%
Sava	97,713.20	Albania	179	0.18 %
		Bosnia and Herzegovina	38,349.10	39.25 %
		Croatia	25,373.50	25.97 %
		Montenegro	6,929.80	7.09 %
		Serbia	15,147	15.5 %
		Slovenia	11,734.80	12.01 %

Source: iRBMP

1.7.2. Governance and public participation

Cooperation framework: International, bilateral and/or multilateral agreements in place covering certain cooperation aspects

In 2001 the four riparian countries of the Sava River Basin (Slovenia, Croatia, Bosnia and Herzegovina and Yugoslavia (subsequently Serbia & Montenegro and then Serbia)) entered into a process of negotiation, which led to the Framework Agreement for the Sava River Basin. The Agreement was signed in 2002 and entered into force at the end of 2004. Montenegro is not a signatory to the Agreement but contributed to the development of the iRBMP. The Agreement established the International Sava River Basin Commission with a permanent Secretariat, whose mandate is to make decisions and recommendations with regard to navigation and river basin management in terms of issues of basin–wide importance. The Commission serves as a platform for coordination of the implementation of the WFD on issues of basin-wide importance.

In addition, the international agreement, multilateral and bilateral agreements between the Sava countries have been established; a list of these agreements is included in an Annex in the iRBMP.

Joint activities within the iRBD

Development of an iRBMP and link to national RBMPs

The approach for the Sava iRBMP is coordinated with the methodology and process applied in the Danube River Basin. Within the development of the Sava iRBMP, an attempt was made to go beyond the elaboration of existing information to collect missing data and fill gaps in knowledge to better analysis pressures and impacts and select measures. The chapters of the

Sava RBMP follow the requirements of the WFD and their structure is determined by the identified significant water management issues.

Areas of joint cooperation

Two public participation related lines of activities were carried out in the framework of preparation of the Sava iRBMP:

- Public participation activities that facilitated input by the stakeholders to ensure enhanced quality of the plan using stakeholder knowledge. Specific outcomes and conclusions from the implemented activities have been incorporated in the current Sava iRBMP and the Programme of Measures.
- Activities for the establishment of a mechanism to secure public participation in the monitoring of implementation of the Sava iRBMP as well as its review and updating / preparation of the next RBMPs.
- Public consultation activities focused on 1) meeting with institutions and organisations of the concerned countries, 2) workshops at transboundary level and 3) web-based consultation.

Sectors and observers involved within the development of the iRBMP

A stakeholder analysis was carried out to identify stakeholders to target with public participation activities. A list of main stakeholders at national and transboundary level (which include all relevant stakeholders in the Parties of the Agreement and in Montenegro as well) was compiled. Two workshops (organized back to back with the PoM workshop and Stakeholder Forum) were used to ensure that the list was inclusive and representative. This activity also resulted with a detailed plan of forthcoming activities.

The overall process of the iRBMP preparation was led by the Sava Commission's Permanent Expert Group for River Basin Management (PEG RBM). Certain topics were further elaborated in ad-hoc discussions of other expert groups. All major stakeholders /stakeholder groups had an opportunity to actively participate in this process as well as in all other activities of the Sava Commission by gaining the observer status.

Existence of a transboundary accident warning system

Taking into consideration international conventions, the WFD and Directive 96/82/EC on the control of major accident hazards involving dangerous substances, the members of the Sava Commission proposed a Protocol on Emergency Situations to the Framework Agreement on the Sava River Basin, which establishes a basis for:

- Cooperation for the undertaking of measures to prevent or limit hazards, and reduce and eliminate adverse consequences, including those from incidents involving substances hazardous for water;

- Establishing a coordinated or joint system of measures, activities, warnings and alarms in the Sava River Basin for extraordinary impacts to the water regime, such as sudden and accidental pollution; and
- Operation of an Accident Emergency Warning System.

A transboundary system for accident prevention and control (Accident Emergency Warning System) has been established by the Sava River Basin countries by the adoption of the Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Danube River Protection Convention). The system was developed and is maintained by the ICPDR. The main purpose of the warning system is to increase public safety and to protect the environment in the event of accidental pollution by providing early information for affected riparian countries.

1.7.3. Characterisation of the River Basin District

Coordination of the Article 5 assessment

As the first step in the development of the Sava iRBMP, the Sava River Basin Analysis (i.e. the Art. 5 assessment) was carried out in 2009. In addition to the characterization and assessment of water resources in the Sava River Basin, water quantity and integration issues were also addressed through an additional consideration of flood management and navigation development.

Delineation of water bodies and designation of heavily modified and artificial water bodies

Surface water

Surface water body delineation has been coordinated in the iRBD. Based on the Art. 5 assessment report (developed in 2009), it was agreed to focus the iRBMP on water bodies of basin-wide importance. The following criteria were applied regarding the selection of surface water bodies:

- The Sava River and its tributaries with a catchment size of >1,000 km^2,
- Reservoirs with a volume above 5 million m^3 and
- Rivers of a basin-wide importance (Sotla/Sutla, Lašva and Tinja; area <1,000 km^2).

The criteria for rivers expands the focus under the Danube iRBMP, which concentrates on rivers with a catchment size of >4,000km^2.

To harmonise delineation among the riparian countries, additional activities were carried out:

- Merging of Sava river water bodies and water bodies at its tributaries according to the hydrological order;

- Identification of problems of some water bodies within individual countries;
- Analysis of related documents with regards to the Water bodies;

Update of water bodies by countries:

- Republika Srpska (part of Bosnia and Herzegovina) updated water bodies on the Sava River;
- Federation of Bosnia and Herzegovina updated water bodies on most of the rivers;
- Croatia updated water bodies;
- Proposal of the water bodies for Montenegro.

In total 189 surface water bodies have been delineated by the Sava countries, of which 44 are transboundary water bodies. According to the iRBMP, the stated total length of the Sava River and its tributaries is different from the real length due to problems with the harmonisation of transboundary water bodies. The lengths of all delineated water bodies were counted if different lengths of water bodies on transboundary stretches were reported by the neighbouring countries.

In the transboundary section, the number of water bodies are different in the following cases:

- Sotla/Sutla: Slovenia has delineated one water body, while Croatia two water bodies. The length of the water bodies is also not harmonized (two water bodies on the border between Slovenia and Croatia)
- Bosut: Croatia delineated two water bodies, while Serbia only one water body.
- Kupa/Kolpa River: two water bodies on the border between Slovenia and Croatia,
- Una River: four water bodies on the border between Bosnia and Herzegovina and Croatia and
- Sava: two water bodies on the border between Croatia and Bosnia and Herzegovina.

Groundwater

The criteria for delineation of groundwater bodies vary among the countries, reflecting different local geological and hydrogeological conditions and data availability on natural conditions and pressures. In general, the approach (groundwater – aquifer - groundwater body) recommended by CIS Guidance document on Identification of Water Bodies[139] was followed by all countries. The groundwater bodies were generally delineated according to a combination of criteria including the geological type, borders of the surface catchment areas and present anthropogenic pressures.

Due to the late involvement of Montenegro in the process of WFD implementation, the country has not delineated groundwater bodies thus far.

[139] Available at: https://circabc.europa.eu/sd/a/655e3e31-3b5d-4053-be19-15bd22b15ba9/Guidance%20No%202%20-%20Identification%20of%20water%20bodies.pdf

The following common criteria were applied regarding the selection of water bodies:

- Transboundary and national groundwater bodies which are important due to the size of the groundwater body (area >1,000 km²), or
- For those < 1,000 km² transboundary groundwater bodies which are important due to various other criteria, e.g. socio-economic importance; uses, impacts, pressures, interaction with aquatic eco-system.
- 20 out of the 41 groundwater bodies are transboundary.

Typology Coordination of surface water bodies

Based on the analyses of available data, the Sava River was divided into three ecoregions. The iRBMP indicates that the sectioning of the Sava River should be further elaborated further in the next cycle as some discrepancies in the available data was recorded (e.g. river type description within the Middle and a part of the Lower Sava shared by Bosnia and Herzegovina and Croatia).

The Art. 5 report states that all iRBD countries used the obligatory factors (altitude, latitude, longitude, geology, size) given for System B. In addition, all the countries introduced mean substratum composition as an optional factor for river typology. Croatia and Slovenia introduced additional optional factors, with Croatia also using discharge [m3/s] and Slovenia hydrology (permanent), karst spring influence, lake outflow influence, limnocrene spring influence. There are differences with respect to class boundaries for the different descriptors. The iRBMP highlights the need for further harmonization of typologies, especially for rivers at border crossings and for stretches of rivers, which form the border between countries.

Coordination in the Establishment of reference conditions for surface water bodies

The background document on surface water bodies provides information on the different approaches a country can take to establish reference conditions. The Art. 5 report states that reference conditions have so far been defined for certain biological quality elements by Croatia, Serbia and Slovenia. Reference conditions for rivers in the Federation of B&H are not defined yet.

The countries used different methods for establishing the reference conditions. Spatially based data have been used in Serbia and Slovenia. Historical data have been used in Croatia, Slovenia and for fish fauna in Serbia. Expert data have been used in Croatia, Serbia and Slovenia.

Coordination on Significant Water Management Issues

Based on the analysis of pressures, the following significant water manage issues were agreed in the Sava iRBD:

- Organic pollution
- Nutrient pollution
- Hazardous substances pollution
- Hydromorphological alterations

Groundwater quality

A stakeholder workshop was held in September 2010, which provided input for the definition of significant water management issues.

In the Sava, it has also been concluded that there is currently insufficient information on (i) pressures and impacts to groundwater quantity, (ii) quantity and quality aspects of sediments as pressures and impacts, (iii) invasive species and (iv) water demand management, which should therefore be considered as candidates for significant water management issues in future planning cycles.

Floods, navigation and hydropower issues were considered of very high importance in the Sava River Basin and therefore suggested by the Sava Commission working group on implementation of the WFD to be addressed in more detail separately from the significant water management issues on hydromorphology.

1.7.4. Monitoring, assessment and classification of surface water ecological and chemical status

Joint monitoring programmes for surface waters and application of joint methods/joint surveys and interlaboratory tests

The Sava iRBD is part of the Trans-National Monitoring Network in the Danube River Basin. Under this monitoring network, the following types of monitoring take place:

- Surveillance monitoring I: Monitoring of surface water status;
- Surveillance monitoring II (SM 2): Monitoring of specific pressures;
- Operational monitoring (OM); and
- Investigative monitoring.

The monitoring network is ased on the national monitoring networks and the operating conditions are harmonized between the national and basin-wide levels.

For the Sava iRBD, the surface water status monitoring sites are selected based on the following criteria:

- Rivers with catchments of >1,000 km² shall have at list one surveillance monitoring site;

- Rivers <1,000 (rivers considered as important for iRBD, according to the agreement between the Sava countries) should have one monitoring site; and
- the sites along the Sava River should be situated to enable analyses of the influence of the major tributaries and point sources of pollution to the Sava River.

In the case of pressures monitoring sites, the selection of sites is based on the availability of the data from the site in the past, to enable long term analyses, as well as the following criteria:

- Located just upstream/downstream of an international border;
- Located upstream of confluences between Danube and main tributaries or main tributaries and larger sub-tributaries (to enable estimation of mass balances);
- Located downstream of the major point sources; and
- Located to control important water uses.

According to the data uploaded to the DANUBIUS, the trans-national monitoring network within the Sava covers all together 29 operational monitoring sites, 37 sites monitoring water status and 20 sites monitoring pressures. According to the iRBMP, operational monitoring sites are unequally distributed within the basin and that the distribution of these sites is not in harmonisation with the status assessment provided for the iRBMP.

Overall comparability of monitoring activities within the countries throughout the basin is ensured by regular cooperation between the monitoring services (National Reference Laboratories) focussing on:

- Reference and optional analytical methods; and
- Defining minimum concentrations to be measured and the required tolerance.

The network's laboratories are free to select their own analytical method, provided they are able to demonstrate that the method meets the required performance criteria. Therefore, the minimum concentrations expected and the tolerance required for actual measurements have been defined for each parameter so that method compliance can be checked. To ensure the quality of collected data, a basin-wide analytical quality control programme is regularly organized by the ICPDR. Within this programme, all monitored quality elements are covered by three quarterly test sample distributions. The fourth distribution is dedicated to those quality elements which showed more than 30 % flagged results.

In line with the WFD implementation timeline, a revised Danube Trans-National monitoring network has been under operation since 2007.

Monitoring of Ecological Status

Annex 2 of the background document on surface water bodies includes a table on the status of the surface water bodies in the Sava. Therein it is shown which biological quality elements are monitored and used for the assessment of status in individual rivers. These include benthic invertebrates, phytobenthos, macrophytes and phytoplankton. Fish are not included in the assessment of rivers in the Sava. Neither the iRBMP or the background document indicate which sensitive biological quality elements are used to monitor the impacts of certain pressures.

The iRBMP and the background document indicate that relevant river basin specific pollutants have not been identified in all countries.

Monitoring of Chemical status

Priority pollutants and certain other pollutants are listed in the background document on surface water bodies, but it is not made clear whether all the pollutants relevant for chemical status assessment are monitored in the Sava. According to the iRBMP, there is a general lack of monitoring data on the WFD priority substances.

The occurrence of hazardous substances in the Sava River was explored during Joint Danube Surveys organized by the ICPDR. A large number of organic substances with wide range of polarity including priority substances and other substances such as pesticides, pharmaceuticals and endocrine disrupters as well as heavy metals were monitored in water, sediment, suspended solids and biota.

One of the key findings of JDS1 (Joint Danube Survey), which took place in 2001, was that the highest concentration value of atrazine (0,78 µg/L) which was detected during the survey was found in the Sava River. This elevated concentration even had an influence on the Danube water downstream the confluence with Sava to the Irongate reservoir (JDS65 = Golubac/Koronin).

The results of second survey carried out in 2007 brought more comprehensive information on the occurrence of organic micropollutants and heavy metals in the Sava River. The Sava was found to supply the Danube with increased amounts of Cd, Pb, Ni, Cr and Zn in the suspended solids.

Among the pollutants most frequently measured were non-synthetic compounds (arsenic, copper, zinc and chromium). The national environmental quality standards for specific pollutants were exceeded in several water bodies (Sotla, Sava, and Spreča rivers).

Status Classification

Ecological Status

Ecological status of 183 water bodies (of a total of 189) in the iRBD has been assessed. A high ecological status has been attained by 10 water bodies, and good ecological status was assessed for 65 water bodies. The majority of water bodies (70) have moderate status. Poor status was found in 176 water bodies, while no water bodies have a bad status.

Most of the Sava countries are in the process (or at the beginning) of implementation of the ecological assessment methods. During the assessment of the ecological status, WFD compliant methods for the analysis of biological quality elements had to be applied for the first time for a number of water bodies in the Sava iRBD. This included new sampling methods for all biological quality elements, needing to establish appropriate classification systems and putting these new methods into practice at the national level. In most of the Sava countries, this process is still under development. Most of the countries have not yet managed to use all the biological quality elements required by the WFD for ecological status assessment. The key missing data were those for macrophytes and/or phytobenthos as well as for fish.

The most frequently measured biological quality element used for an ecological status assessment was benthic invertebrates. It was used to classify ecological status in the majority of the evaluated water bodies.

Methods for the assessment of ecological status vary between different countries in the Sava River Basin. Based on obtained information from the Sava countries, only Slovenia has data on monitoring of ecological status, as well as the WFD method for assessment of ecological status available. For those countries where the method of assessment of status is missing, or in the case when monitoring data are not available for particular water body, the estimation of failure of good status (update of the risk analysis) has been prepared based on the information on the pressures on a particular water body provided.

In general, the reasons for low and medium confidence regarding the ecological status assessment were:

- Lack of the monitoring data;
- Not all biological methods, which were applied for assessment of the individual quality elements were WFD compliant;
- Biological quality elements were not fully supported by additional parameters (physico-chemical and hydromorphological) in the national classification schemes for ecological status assessment;

- Methods for assessment of ecological potential are not developed in all Sava countries;
- Relevant river basin specific pollutants not identified in all countries;
- Monitoring schemes in the individual countries are not fully WFD-compliant (e.g. not monitoring all required elements and not monitoring at required frequencies).

Intercalibration exercise and Geographical Intercalibration Group (GIG)

Thus far, Slovenia and Croatia have taken part of the intercalibration exercise. Since not all Sava countries participated in the intercalibration exercise, full comparability and a high level of confidence in the ecological water status assessment results could not be ensured throughout the Sava River Basin.

Chemical Status

176 water bodies are in good chemical status and 26 water bodies are not in good chemical status. 13 water bodies have not yet been assessed.

The chemical status assessment was based on monitoring results in combination with an estimation of the risk of failure to achieve good status. The iRBMP states that the confidence level for the assessment of water bodies in good chemical status was generally low. The reasons for low and medium confidence were:

- General lack of monitoring data;
- Monitoring schemes in the individual countries are not fully WFD compliant (not all WFD priority substances has been monitored in all countries; not at required frequencies); and
- The methodologies for analysis of WFD priority substances and assessment of chemical status not fully compliant with the QA/QC Directive (2009/90/EC) and 2013/39/EC Directive.

1.7.5. Monitoring, assessment and classification of groundwater quantitative and chemical status

Joint monitoring of groundwater bodies

Currently there is no joint monitoring network in the Sava iRBD for groundwater bodies. According to the background document on groundwater bodies, a future Sava Commission groundwater body monitoring network will be based on the existing national monitoring networks, assuming that most of the necessary information for a basin wide level assessment will be obtained by making minimum adjustments of existing monitoring programmes which

are (or will be) WFD compliant. Existing national monitoring programmes are in some cases still under adaptation to the requirements of Article 8 WFD.

According to the iRBMP, the major identified gaps in groundwater monitoring in Sava countries for different aspects are:

Legal and organizational aspects:

- Legal background for groundwater monitoring does not exist in all countries;
- Ambiguous responsibilities of different state institutions concerning the monitoring, data flow; and
- Results of monitoring for other different purposes (drinking water production etc.) are often not used for the purpose of status assessment.

Concept of establishment of monitoring networks:

- Locations of monitoring sites (stations) are mostly based on local hydrogeological settings and not on the conceptual model (understanding of the groundwater system), existing pressures (quantitative and chemical), vulnerability of aquifer and land use;
- Unequal spatial distribution of monitoring sites does not represent the overall status of a groundwater body;
- Large areas are not covered by monitoring; and
- Abstraction wells and springs are generally not included in the monitoring network.

Concept of monitoring programmes (parameters and frequency):

- Measurement frequency and parameters are often not in accordance with existing pressures and possibility of entering the underground media;
- List of analysed chemical parameters is not reviewed and adjusted periodically; and
- Monitoring parameters are usually not focused on pressures affecting the overall state of the groundwater body.

According to the background document on groundwater bodies, the main focus in the future bilateral activities of Sava countries sharing the same aquifers should be:

- Development of conceptual models of groundwater bodies,
- Achievement of harmonised monitoring networks, and
- Establishing of criteria for the selection of parameters.

Coordination of monitoring and assessment of groundwater body status

In the Sava iRBD, the process of establishing status (or risk) assessment methodologies for determining the chemical and quantitative status of groundwater bodies is still being developed. 11 groundwater bodies are possibly “at risk” or have poor chemical status and 30

groundwater bodies are in good chemical status. Three groundwater bodies are possibly "at risk" or do not have good quantitative status and 38 groundwater bodies have good quantitative status or are not "at risk".

Monitoring results concerning the chemical and quantitative status of groundwater bodies in large parts of the Sava River Basin are limited or absent. The present absence of information on groundwater quantity and quality parameters resulted in low confidence of groundwater body status assessment, in many cases allowing only the assessment risk of not achieving environmental goals stated in Art. 4 of WFD.

1.7.6. Designation of heavily modified water bodies, artificial water bodies and definition of good ecological potential

Cooperation and joint activities regarding heavily modified water body designation

The 2009 Art. 5 report describes the individual methodologies for designation of heavily modified water bodies in each Sava iRBD country, including which criteria were used. The Sava iRBMP provides limited information on the designation of heavily modified water bodies other than stating that heavily modified and artificial water bodies were identified. According to the iRBMP, there are shortcomings related to the final designation of heavily modified water bodies. The final designations still need validation based on high confidence assessment results regarding the ecological status.

Cooperation and Joint methods and approaches for the determination of Good Ecological Potential (GEP)

The 2009 Art. 5 report, the background document on surface water and the Sava iRBMP provide limited information regarding the approach for determining good ecological potential. The process as outlined in the respective CIS guidance document is described, without concretely indicating how the process was carried out within the Sava basin or in the individual countries. The iRBMP mentions that the ecological potential was assessed for 20 heavily modified water body candidates on the Sava, Vrbas, Bosut, Drina, Lim and Kolubara rivers. In 17 water bodies, good ecological potential was identified, and in three water bodies a moderate ecological potential was identified. There is no information regarding methodologies or coordination.

1.7.7. Environmental Objectives and Exemptions

In the iRBMP, exemptions are listed in for Croatia and Slovenia according to their national RBMPs. Coordination of exemptions is not mentioned in the iRBMP.

Slovenia has applied Article 4 (4) and Article 4 (7) in its share of the Sava iRBD. The iRBMP does not indicate the reasons for application of Article 4 (4). Slovenia reported using Art. 4

(7) in the iRBMP for three water bodies. The reasons for application of Art. 4 (7) are hydropower power plants: hydropower plant Blanca (already in operation), hydropower plant Krško (under construction), hydropower plant Brežice and Mokrice (both planned), as defined in the national RBMP. Measures and conditions to mitigate adverse impacts on the status of water bodies were defined at the national level and are taken into account at the concessions of hydropower plants Krško, Brežice and Mokrice. A reason for the new modification is public interest, namely to ensure the security of electrical energy in Slovenia.

Croatia has applied Article 4 (4) in its share of the Sava iRBD. The iRBMP states that the reasons for application are transitional (through later entry into the EU) and technical feasibility.

The iRBMP includes a table of existing infrastructure projects in all Sava iRBD countries and mentions that any future projects would require an assessment of their impact on water status.

There is no information in the iRBMP regarding the use of exemptions for groundwater bodies.

1.7.8. Programme of measures

General information

The iRBMP states that the Programme of Measures presented in the international plan responds to all the significant pressures identified in order to achieve the agreed environmental objectives and addresses the visions and management objectives that were jointly defined at basin-wide scale. The iPoM is based on the national programmes of measures and includes measures of basin-wide importance. It includes the basic measures to be implemented in order to achieve the objectives defined for 2015 by the management plan in accordance with Union and/or national laws, as well as supplementary measures. Priorities for the effective implementation of national measures on a basin-wide scale are highlighted and are the basis of further international coordination.

The iPoM is structured according to the significant water management issues agreed for the Sava River Basin. The effect of the national measures from a basin-wide perspective are estimated. The implementation of measures of basin-wide importance is ensured by their integration into the national programme of measures of each Sava country. The iRBMP emphasizes that a continuous feedback mechanism from the international to the national level and vice versa is crucial.

In addition to the Programme of Measures, the iRBMP includes a chapter on “Integration of water protection in developments in the Sava River Basin”. The focus is on flood protection,

navigation, hydropower and agriculture. The pressures and best practices to achieve environmental objectives are described and there are specific proposals for activities within the iRBD.

Coordination on addressing water abstraction and implementation of measures

Joint identification of Pressures and Objectives

Water abstraction is considered a local pressure rather than a basin-wide pressure in the Sava. Water scarcity and droughts are not mentioned as pressures. The vision for groundwater quantity is that water use is appropriately balanced and does not exceed the available groundwater resources in the Sava River Basin, taking into consideration the potential impacts of future climate change. The associated management objective is to prevent over-abstraction from groundwater bodies within the Sava River Basin by sound groundwater management.

Measures to address water scarcity

Measures addressing the poor quantitative status of groundwater bodies are based on so-called "other basic measures" (such as controls over the abstraction of groundwater including a register of water abstractions) and by a supplementary measure, listed in Article 11(3) of WFD. Given the scale of the depletion of groundwater resources (which is a local rather than a widespread problem), the implementation of measures to address quantity issues are also considered as a local matter.

Coordination on addressing pollution from agriculture and implementation of measures

Joint identification of Pressures and Objectives

Nutrient pollution was identified as a significant pressure in the Sava. The vision for nutrient pollution is the reduction of nutrient emissions from point and diffuse sources in the Sava River Basin in order to avoid any negative impacts from eutrophication. The associated management objectives are the reduction of the nutrients loads entering the Sava River and its tributaries to levels consistent with the achievement of good ecological status/potential and good chemical status in the Sava River Basin. The iRBMP includes a separate sub-chapter on measures in the agriculture sector in the iPoM.

Measures related to pollution from agriculture

The proposed measures are of varied type: legislative enforcement, changes of practice, investigations, metering and tariffs, awareness raising, education, codes of good practice, voluntary agreements, etc.

The following measures will be implemented:

- Definition of basin-wide and/or national quantitative reduction targets (for point and diffuse sources) taking the respective preconditions and requirements of the Sava countries into account, up to 2015;
- Creation of baseline scenarios for nutrient input taking the respective preconditions and requirements of the Sava countries into account, up to 2015;
- Implementation of the Best Available Techniques and Best Environmental Practices regarding agricultural practices (for EU Member States linked to EU Common Agricultural Policy – CAP);
- To ensure the registration of applied pesticide products, including a national central register of quantities applied;
- Establishing regular data collection on the application of fertilisers and pesticides (annually);
- Revising the risk assessment of impacts with regard to diffuse pollution sources; and
- Development of capacity building measures for preparation and/or implementation of agri-environmental schemes.

A concept for best available techniques has been developed. As a priority, the BAP should be applied as a uniform concept across the whole Sava iRBD. This is complementary to the existing EU concepts of Codes of Good Agricultural Practice under the EU Nitrate Directive and verifiable standards of Good Farming Practice under the EC Rural Development Regulation. A key action mentioned for the successful implementation of best available techniques is ensuring an adequate storage capacity for manure generated on farms and the application of advanced techniques for spreading manure. The iRBMP emphasizes the use of voluntary agri-environmental measures to address diffuse and point sources of agricultural water pollution (nitrates, phosphates and pesticides) as well as soil erosion.

Coordination on addressing pollution from sectors other than agriculture and implementation of measures

Joint identification of Pressures and Objectives

The PoM considers and addresses pollution pressures from agglomerations and the industrial sector. The vision for organic pollution is no emission of untreated wastewater into the waters of the Sava River Basin.

The associated management objective is the phasing out all discharges of untreated wastewater from towns with >2,000 population equivalents and from all major industrial and agricultural installations.

The vision for hazardous substance pollution is no risk or threat to human health or to the aquatic ecosystem of the waters of the Sava River Basin. The associated management

objective is the elimination/reduction of the total amount of hazardous substances entering the Sava and its tributaries to levels consistent with good chemical status.

The vision for groundwater quality is that emissions of polluting substances do not cause any deterioration of groundwater quality in the Sava River Basin, also taking into consideration the potential impact of climate change in the future. Where groundwater is already polluted, restoration to good status will be the goal. Management objectives include:

- Prevention of pollution in order to avoid a deterioration of groundwater quality and to attain a good chemical status in groundwater bodies;
- Elimination/reduction of the amount of hazardous substances and nitrates entering groundwater bodies in the Sava River Basin to prevent the deterioration of groundwater quality and to prevent any significant and sustained increase in the concentrations of pollutants in groundwater;
- Reduction of pesticide/biocides emission into the Sava River Basin; and
- Increase of wastewater treatment efficiency in order to avoid GW pollution from urban and industrial pollutions sources.

Measures related to pollution from sectors other than agriculture

According to the iRBMP, the implementation of the UWWTD in the EU Member States and the development of wastewater infrastructure in the non-EU countries are the most important measures to reduce the organic pollution in the Sava. Given the specific situation in non-EU countries, the following measures are to be implemented:

- Specification of number of wastewater collecting systems (connected to respective WWTPs) which are planned to be constructed by 2015;
- Specification of number of municipal and industrial wastewater treatment plants, which are planned to be constructed by 2015 including;
- Specification of treatment level (secondary or tertiary treatment);
- Specification of emission reduction targets.

The estimated effects of the implementation of national measures on a basin-wide scale indicate a high potential to reduce nitrogen and phosphorus emissions by treating the generated pollution load to wastewater treatment plants.

To address pollution from households, the following measures are to be implemented:

- Introduction of a maximum limit of 0.2 to 0.5 % P weight/weight for the content of total phosphorus in laundry detergents for consumer use;
- Working towards a market launch of polyphosphate-free dishwasher detergents for consumer use;

To address pollution from hazardous substances, the following measures are foreseen:

- To set up monitoring programmes for the quantification of priority substances and the identification of other pollutants relevant for the surface water bodies in the iRBD;
- To set up a monitoring programme for quantification of specific pollution of industrial wastewaters (priority and other relevant substances);
- To create legislative rules for the regulation and implementation of prevention and the control of discharges and leaks of these substances, including establishing a national central register of produced, used and discharged quantities of these substances in industrial and agricultural activities;
- With regard to accidental pollution, the most important measures are the prevention of accidents and ensuring effective contingency planning in the event of an incident.
- The Protocol on Emergency Situations to the Framework Agreement on the Sava River Basin will be an excellent base for the preparation of:
- An inventory of risk sites in the Sava RB and their prioritisation (hot spots);
- Monitoring of surface water according to WFD requirements including priority
- substances and relevant specific substances;

Coordination of other measures.

Coordination on addressing hydromorphological alterations and sedimentation and implementation of measures

Joint identification of Pressures and Objectives

Hydromorphological alterations and sedimentation were identified as pressures in the Sava.

The vision for hydromorphological alterations is the balanced management of past, current and future structural changes of the riverine environment, so that the aquatic ecosystem of the Sava River Basin functions holistically and all native species are present. The associated management objectives are the following:

- Anthropogenic barriers and habitat deficits do not hinder fish migration and spawning;
- Floodplains/wetlands in the Sava iRBD are protected, conserved and restored ensuring the development of self-sustaining aquatic populations, flood protection and pollution reduction in the iRBD;
- Improvement of hydrological alterations does not affect the aquatic ecosystem with regard to its natural development and distribution; and
- Future infrastructure projects are conducted in the iRBD in a transparent way using best environmental practices and best available techniques – impacts on, or the deterioration of, good status and negative trans-boundary effects are fully prevented, mitigated or compensated.

The following management objectives are proposed for each type of hydrological alteration:

- Impoundments: Impounded water bodies are designated as heavily modified and therefore good ecological potential needs to be achieved. Due to this fact, the management objective foresees measures at the national level to improve the hydromorphological situation in order to achieve and ensure this potential.
- Water abstractions: The management objective foresees the discharge of a minimum ecological flow, ensuring that the biological quality elements have a good ecological status or good ecological potential.
- Hydropeaking: Water bodies affected by hydropeaking are designated as heavily modified and a good ecological potential must be achieved. Therefore, the management objective foresees measures at the national level to improve the situation to achieve and ensure this potential.

Measures related to hydromorphological alterations and sedimentation

To address problems with river and habitat continuity, the following measures are foreseen:

- Specification of number and location, funding needs and funding sources for building of fish migration aids and other measures to achieve / improve river continuity which are intended to be implemented by 2021/2027 by the Sava countries;
- Specification of location, extent and measure type, funding needs and funding sources for restoration, conservation and improvements of habitats which are intended to be implemented by 2021/2027 by the Sava countries.
- Construction of fish migration aids and/or other measures to achieve / improve river continuity in the Sava River and its tributaries to safeguard reproduction and the self-sustaining of migratory species;
- Restoration, conservation and improvements of habitats and their continuity for migratory species in the Sava River and its tributaries.

To address hydrological alterations, the following measures are foreseen for the next river basin management cycle:

- Water abstractions: Ensuring sufficient residual flow below a water abstraction, meeting ecological flow requirements (i.e. for ensuring fish migration or for meeting good status in the section influenced by the water abstraction);
- Impoundments: Morphologically restructuring the headwater sections of impoundments;
- Hydro-peaking: Possible measures could include compensation reservoirs. The ecological status of the water body/bodies affected can be improved through operational modifications (e.g. downstream “buffer” reservoirs) that reduce the

volume and frequency of artificially generated abrupt waves and avoid extreme water level fluctuations.

To address morphological alterations, the iRBMP differentiates between water bodies at risk, possibly at risk and not at risk. For the 83 % of water bodies which are “not at risk” measures should be aimed at their protection and maintenance and avoiding their deterioration. The measures may include:

- Law enforcement regarding riparian zone maintenance;
- Control over sand and gravel extraction; and
- Avoiding reduction of floodplain size.

For the 16 % of water bodies which are “possibly at risk” additional investigations are needed to define the causes of morphological deterioration. A final decision on whether a water body is defined as “at risk” or “not at risk” will depend on the results and the relevant measures should then be taken.

For the 1 % water bodies which are “at risk” the relevant measures required to improve and restore their quality should be implemented. Such actions include branch and floodplain reconnection. Obedska bara (9,500 ha), part of the Sava’s floodplain in Serbia, is at present the only officially planned project for floodplain reconnection in the Sava iRBD.

The Protocol on Sediment Management to the Sava Agreement, which entered into force in October 2017s, stipulates the development of the Sediment Management Plan for the Sava River Basin. The Sava River Basin Sediment Management Plan is intended to be adopted by the Parties no later than six years after the Protocol enters into force and to then be subsequently revised in six year cycles. By this Protocol, the Parties will:

- Develop Dredging Programmes on a yearly basis;
- Establish a coordinated monitoring system;
- Develop Sediment Management Plan;
- Exchange information related to the implementation of the Protocol; and
- Initiate and cooperate on research into technologies for sustainable sediment management.

The Plan will probably include the following issues:

- Evaluation of sediment balance and sediment quality and quantity;
- Measures to control erosion processes;
- Measures to ensure the integrity of the water regime with regard to quality and
- quantity and to protect wetland, floodplains and retention areas;
- Monitoring of sediment;

- Measures to prevent impacts and the pollution of water or sediment;
- Measures to maintain conditions for safe navigation;
- Determination of designated areas for capital dredging; and
- Guidance for sediment disposal, sediment treatment and use.

1.7.9. Economic analysis and water pricing policies

The main purpose of the 2009 Sava River Basin Analysis Report (i.e. Art. 5 report) was to identify the major water uses in the Sava River Basin. An estimate of the water use of the countries has been made based on the data supplied by countries. The 2009 Analysis Report did not include Montenegro. The level of confidence for the data was relatively low due to problems with data gathering in most of the countries in the Sava River Basin for various reasons.

The 2009 Report stated that water use could not be considered as a significant water management issue. On the basis of existing national plans for future water demand up to 2015, an analysis was prepared for all important water uses in the Sava River Basin. The confidence level in such an analysis is low due to the rapidly changing political and economic conditions. Furthermore, some of the countries were unable to perform such an analysis only for the Sava River Basin.

Cost recovery was also included in the economic analysis. No information was available on cost recovery of self-supply for industrial and agriculture sectors.

According to the 2009 Report, the available data led to the conclusion that an increase of water use is probable, particularly for irrigation, but this will depend on the general economic situation in the region.

1.7.10. Considerations specific to Protected Areas

Protected Areas are addressed in the iRBMP. Slovenia and Croatia delineated all areas identified in WFD or other related directives. The related national legislation in non-EU countries is not fully harmonized with the EU standards. In Serbia, the new by-law (Official Gazette of the RS, 102/2010) identifies the sites and regulates the issue of management and financing of an Ecological network. Within the Sava, a modified approach in dealing with protected areas has been used due to the different national standards for the delineation of protected areas, which takes into consideration:

- National standards for the delineation of protected areas;
- A different status within Bern Convention implementation and NATURA 2000 network design within the countries;

- The different level of adaptation of national legislation to EU legislation and standards in non-EU countries;
- The general lack of registers and/or effective databases of protected areas in certain countries;
- Shared responsibility regarding maintenance and the protection of drinking water zones between national and sub-national level competent authorities; and
- Shared responsibility for the monitoring of drinking water protection areas.

Despite the national differences, a joint Protected Areas inventory was made in the Sava. The Sava register includes:

- A register of areas important for the protection of habitats and/or species that are protected under the relevant international conventions;
- A register of areas important for the protection of habitats and/or species protected by national legislation; and
- A preliminary register of areas used for the abstraction of drinking water - groundwater.

The full inventory is available in the background document on protection areas.

1.7.11. Climate Change and Droughts

At present, the Sava countries are at different stages of preparing, developing and implementing national adaptation strategies. The extent of development depends on the magnitude and nature of the observed impacts, assessments of current and future vulnerability and the capacity for adaptation.

According to the iRBMP, the priority in dealing with climate change in the first cycle of implementing the WFD in the Sava iRBD is to propose a set of guiding principles to assist Sava River Basin managers to establish a strategy for building adaptive capacity to manage the Sava iRBD with regard to climate change, such as:

- Consideration of changes in risk, due to climate change, due to not achieving the WFD objectives (e.g. good status of water bodies) as a consequence of the identified pressures (e.g. organic pollution); and
- Looking for opportunities in the monitoring programmes, and in ongoing and future projects which will support decisions on these issues in the second management cycle to improve the understanding of climate change trends.

A list of projects addressing climate change impacts in the Sava iRBD is provided in the background document on climate change[140].

1.7.12. Recommendations

Considerable efforts have been undertaken in the Sava iRBD to coordinate river basin management planning with riparian countries. For many aspects of WFD implementation, coordination has been carried out and this has led to improvements in harmonisation of methods and results. In other cases, despite coordination issues still remain. The iRBMP is very transparent regarding the existing shortcomings and also discusses in some cases the future work planned to improve in the next management cycle.

The following recommendations can be made to further improve cooperation:

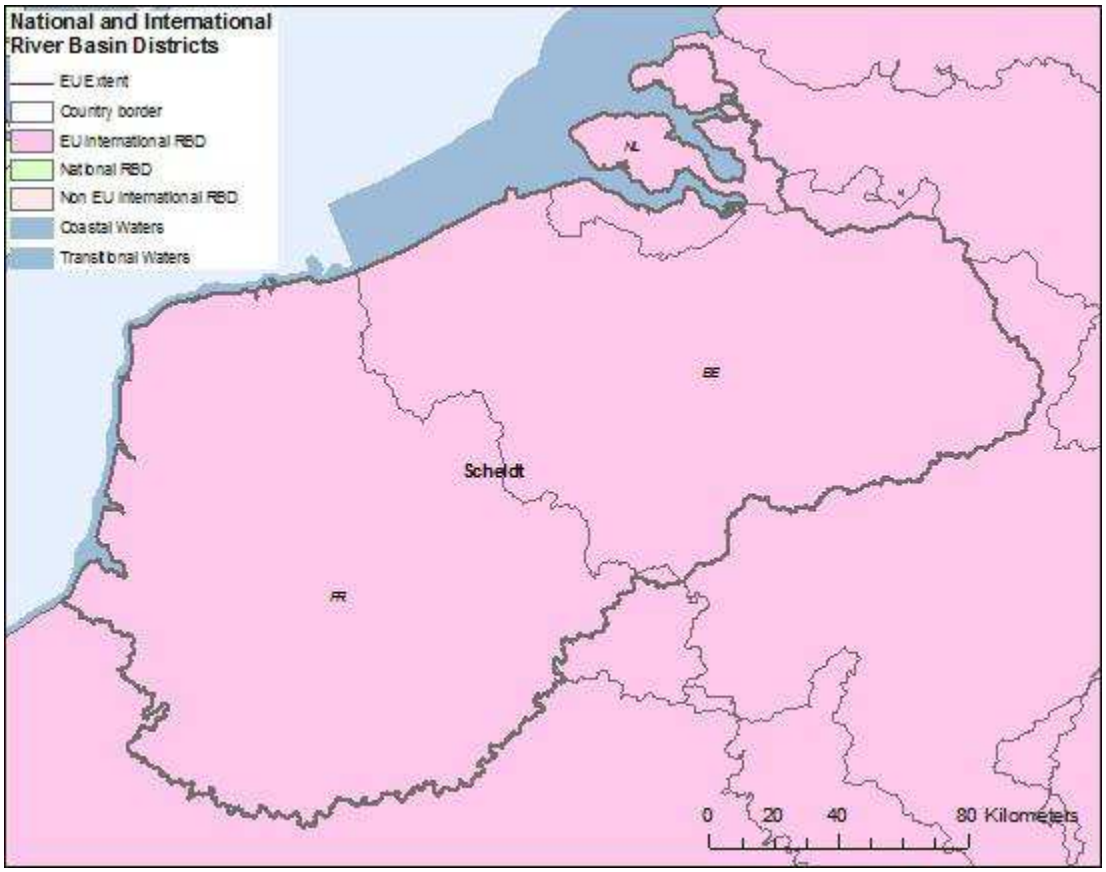
- The Member States should continue harmonisation of delineation for surface and groundwater bodies to reduce discrepancies.
- The iRBMP should provide clear information on which sensitive biological quality elements are monitored to assess pressures in surface water bodies. It should be clear whether the quality elements chosen have been coordinated among the countries.
- There should be information on the selection of river basin specific pollutants in the basin or the establishment of environmental quality standards.
- Monitoring of priority substances should be further improved and clarified in the iRBMP.
- The harmonisation and application of methodologies for the designation of Heavily Modified Water Bodies and definition of good ecological potential should be improved.
- Efforts to ensure the sustainability of future infrastructure projects in line with WFD requirements should be continued and intensified.

[140] Available at: http://www.savacommission.org/dms/docs/dokumenti/srbmp_micro_web/backgroundpapers_approved/no_10_background_paper_climate_change_and_rbm_planning_.pdf

1.8. Scheldt River Basin District

1.8.1. General Information

Map 1.8.1 Scheldt International River Basin District



Source: WISE reporting 2016

The Scheldt International River Basin District (iRBD) is shared between Belgium, France and the Netherlands. The iRBD is allocated to cooperation Category 1, which means that an international agreement, a permanent co-operation body and international WFD RBMP is in place. The iRBMP can be downloaded from the Scheldt Commission webpage141.

The table below presents the size of the total catchment area and national shares within the iRBD (km^2; %) as reported by the Member States to WISE and information presented on the Scheldt Commission website.

[141] http://www.isc-cie.org/

Table 1.8.1 Member State share of the iRBD

Name of the International River Basin District	Total Area - calculated based on national WISE reporting	Total Area – website of Scheldt Commission	EU Member States	EU RBD Code	National Area within iRBD* - based on national WISE reporting	National Area within iRBD - iRBMP	National Area within iRBD - based on national WISE reporting
	(km^2)				(km^2)		(% of iRBD)
Scheldt	37,309.4	36,416	Belgium (Flanders)	BESCHELDE_VL	12,026	Not provided in the iRBMP	32.23
			Belgium (North Sea)	BENOORDZEE_FED	0 (128 including coastal area)		0
			BE (Wallonia)	BEESCAUT_RW	3,773		10.11
			Belgium (Brussels)	BEESCAUT_SCHELDE_BR	162		0.43
			France	FRA	18,858.4		50.55
			Netherlands	NLSC	2,490		6.67

Source: WISE electronic reporting 2016 and Scheldt Commission website

** Excluding coastal areas*

1.8.2. Governance and public participation

Cooperation framework: International, bilateral and/or multilateral agreements in place covering certain cooperation aspects

The Agreement on the protection of the Scheldt/L'Escaut dates back to 1994 and hence does not mention the WFD or the FD. On 3/12/2002, the Member States/Regions of the international Scheldt treaty (Treaty of Ghent) decided that the International Scheldt Commission would become the consultation forum for the implementation of the WFD and the FD in the Scheldt iRBD. The Member States/Regions parties decided unanimously to draw up two management plans together: one for the WFD and one for the FD. These plans consist of an overarching part and the national and regional parts.

In addition, there are multiple bilateral/multilateral agreements in place among the Member States/Regions.

Changes since the first management cycle

Since the first management cycle, international coordination in the Scheldt has improved through the introduction of a system for standardizing the way the Member States and Regions report information on surface and groundwater bodies to the Scheldt Commission. Standardized files for transboundary and transboundary aquifers contain information provided by competent authorities of all parties sharing the respective water body. These files allow for a coherent overview of differences in the analysis between iRBD shares. Files are also used to inform the other parties on measures planned for transboundary watercourses.

Joint activities within the iRBD

Development of an iRBMP and link to national RBMPs

The International Commission for the Scheldt coordinates the drafting of the roof report of the RMBPs and the exchange of information on the PoMs. Bilateral contracts ensure the coordination of measures planned in adjacent water bodies. For the Scheldt iRBD, some measures have been co-ordinated. An example of bilateral co-ordination is the work of the Flemish Region and the Netherlands on hydromorphological and ecological aspects. As a part of the Scaldit project, a catalogue of the main implemented and planned measures in the different RBMPs of the Scheldt river basin was developed with information on the cost-effectiveness of these measures. To assure coherence between the different PoMs, intensive coordination has taken place both bilaterally and at the level of the Scheldt Commission.

Areas of joint cooperation

According to the iRBMP, public participation (implementation of art. 14 paragraph 1 WFD) is the competence of the Member States and Regions. Within the Scheldt Commission, the

Parties hold mutual consultation on the RRMPs. This enables the iRBD sharing countries to harmonize the national and/or regional programs of measures if needed.

Sectors and observers involved within the development of the iRBMP

According to the iRBMP, public participation is the competence of the States and Regions. The iRBMP describes the public participation activities of each Member State and Region. Since 2003, the Scheldt Commission has been welcoming NGOs to their technical work meetings and at the Plenary Meeting. The European Commission, DG Environment, the International Meuse Commission and Benelux are official observers to the Scheldt Commission. In addition, NGOs can apply to the Scheldt Commission as observers following agreed procedures. NGOs from industry, research and environment are currently observers, namely:

Bond Beter Leefmilieu, an environmental NGO focussing on sustainability

- Cefic, the European Chemical Industry Council
- Conseil Scientifique de l'Environnement Nord Pas de Calais (CSENPC), Scientific Council of the Nord Pas de Calais Environment
- Environnement et Développement Alternatif (EDA), an environmental NGO
- Escaut Sans Frontières / Grenzeloze Schelde, an environmental NGO focussing on water management
- Good Planet Belgium, an environmental NGO
- Youth Parliament for Water (France)
- World Youth Parliament For WaterYouth Parliament for the Scheldt
- Escaut Vivant, an environmental NGO
- Eurométaux, a European industry association
- Green Belgium, an environmental NGO
- Inter-Environnement Wallonie, an umbrella environnemental NGO
- SAR Minaraad, The Environment and Nature Council of Flanders, in short the Minaraad, is an advisory body of the Flemish Government.
- Nord Nature, Regional Federation of Associations for the Protection of Nature and the Environment of the Hauts de France, focussing on promoting research and education
- Union Wallonne des Entreprises, an umbrella organisation for business
- WWF
- Zeeuwse Milieufederatie, an association of environmental NGOs

Existence of a transboundary accident warning system

There is a transboundary warning system in the Scheldt that focuses on pollution and is activated in case of a sudden deterioration of the Water quality. The Warning and Alarm

System covers the main river of the Scheldt and the transboundary tributaries in the entire Scheldt river basin district.

The warning and alarm system's objective is to enable adequate and fast exchange of information in case of transboundary accidental pollution in order to avoid major environmental disasters, to protect – among other things – swimming water and avoid pollution of raw water sources. Through monthly communication tests among main warning stations, the yearly alarm testing and the notifications of accidental pollutions, the system is kept operational and improved wherever necessary.

1.8.3. Characterisation of the River Basin District

Coordination of the Article 5 assessment

The iRBD sharing countries coordinate on elements of the Article 5. The report was updated in 2015 and integrated into the iRBMP.

Delineation of water bodies

Surface water

The delineation of surface water bodies has been coordinated. For the second river basin management cycle, information exchange among the Member States and Regions was strengthened through the development of fiches for each transboundary water course, which inform each relevant party on, among others, the delineation of a water body. The methodologies for delineation have not been harmonised, and the Member States and Regions use different criteria. For the river water bodies, this has led to large differences in the size of the water bodies applied by the various parties. For the coastal and partly transitional waters, the parties have used more comparable methods for demarcating the water bodies.

Groundwater

The Member States and Regions coordinated through a consultation process on the production of a map of groundwater bodies in the Scheldt, in which a horizontal as well as vertical agreement was reached regarding national and regional boundaries. The methodologies for delineation have not been harmonised. The Member States and Regions use similar criteria with minimal differences. The approach taken by the different parties has led the differing delineation of groundwater bodies regarding size and superposition. According to the current, three different coordinated systems continue to be in use by the parties and the storage of data and differing approaches between parties continue to form a challenge. A cartography project was carried out to address this issue, drawing on the common frame of reference through the INSPIRE Directive, and joint maps have been produced.

Typology Coordination of surface water bodies

In the Scheldt, all the Member States and Regions applied the same methodology for determining the typology of their surface water bodies. All parties have applied system B for the development of their typology, as proposed by the Directive.

A few comparable river types are present in the iRBD. For coastal and transitional waters, a common typology was developed by the Member States and Regions. There are no transboundary lakes in the iRBD. However, larger 'artificial waterways' in the Dutch part of the district were classified in the category lakes, whereas in the Flemish part they were assigned to the rivers category. This requires further coordination between the two regions. A common typology has been developed for transitional waters (5 types) and for coastal waters (6 types). In the Scheldt district there is one transboundary transitional water and two transboundary coastal waters, which correspond to adjacent water bodies of the same type.

Based on the standardized files used for coordination, it has been found that most typology and state designations are similar, except when the watercourse's structure changes from one region to another. For example,

- the Aa Delta, is different. This big French water body is heterogeneous – a part of the water body is not of the same type (the Basse Colme canal (FR-VL)
- The Woluwe in the BCR (small brook without any significant pollution pressures) and on Flemish territory (large brook with significant pollution pressures);
- The Western Scheldt on Flemish (tidal river) and Dutch (estuary) territory.

The main difference in the Parties' approaches is related to the watercourses' size as a water body. Belgium (Wallonia) listed all of its watercourses, even the smallest ones, while France focuses on the main watercourses and the other Parties opted for an intermediate approach.

Coordination in the Establishment of reference conditions for surface water bodies

According to the iRBMP, the Parties have been found to have several difficulties in defining the good biological state as there are no undisrupted reference locations in the Scheldt district. On those locations where the impact is at its lowest, pressures on the water bodies are still not negligible so they cannot be used as reference locations as meant by the WFD in order to determine the reference condition. In the absence of reference locations, certain Member States and Regions have reconstructed reference values. Member States and Regions have used different type specific reference conditions.

Coordination on Significant Water Management Issues

The following "important water management issues" were defined in the iRBMP:

- Surface water quality, hydromorphological changes
- Unsatisfactory surface water quality
- Scheldt-specific pollutants
- Important hydromorphological changes
- Vulnerable groundwater
- Chemical status of groundwater
- Quantitative status of groundwater
- Raising awareness on the value of water
- Preserving and/or restoring coastal and marine waters and the corresponding protected areas
- Financing
- Fighting floods
- Managing drought effects
- Effects of climate change on "fresh water ecosystems" and various types of water use
- Governance
- Good governance
- Reinforce interregional and international cooperation
- Data, measuring methods and assessment methods

1.8.4. Monitoring, assessment and classification of surface water ecological status

Monitoring of ecological status/potential

Joint monitoring programmes for surface waters and application of joint methods/joint surveys and interlaboratory tests

There is a joint monitoring programme for the Scheldt river basin. This programme is called the Homogeneous Monitoring Network and is coordinated by the International Scheldt Commission. It establishes joint methods and runs joint surveys for ecological surface water status. The Network relies on 35 monitoring sites that were jointly selected. These measuring points have been chosen by the parties from a series of existing monitoring networks implemented especially for the WFD. They are representative of the surface waters in the Scheldt district, and allow to obtain a harmonized and cross-border picture.

The monitoring programme assesses physical-chemical, chemical and biological parameters (no information on frequencies mentioned). According to the iRBMP, all national methods of analysis have been compared with one another in terms of quality, exactness of results, reporting scope and sampling method at yearly meetings with the heads of laboratory and measurements. Data management is centralized, and a joint exchange format has been defined. Monitoring results are published in a common report every three years. The

coordination within the Scheldt district also encompasses the intercalibration of laboratories to ensure harmonised approaches.

Sensitive Quality elements monitored (excluding river basin specific pollutants)

According to the WFD and as explained in the CIS guidance on monitoring[142], for operational monitoring, Member States are required to monitor for those biological and hydromorphological quality elements most sensitive to the pressures to which the body or bodies are subject. The iRBMP mentions that biological quality elements monitored in the iRBD include algae (phytoplankton and phytobenthos), macro-invertebrates, fish and macrophytes. The iRBMP states that these quality elements are monitored by all countries but that there are differences in monitoring frequency (some parties measure with a higher frequency than what is described in the WFD) but this are "counterbalanced by operational monitoring". The iRBMP does not mention whether the Member States/Regions harmonised the selection of the most sensitive biological quality elements.

Member States and Regions were requested to report to WISE which biological quality elements they considered to be sensitive for a given pressure. In WISE the sensitive biological quality elements are listed for each pressure. The table below differentiates four biological quality elements, nine different pressures and four different water categories.

An important assessment parameter is whether there is a minimum agreement between the Member States and Regions sharing a border with each other on the sensitivity of biological quality elements. Such an agreement would be expressed by the fact that there is at least one biological quality element that is considered to be sensitive (for each pressure) in both Member States or Regions. Such a quality element can then be used as the least common denominator for comparable assessments of ecological status, provided that the intercalibration has been successful.

For rivers, the table below lists sensitive quality elements for each pressure. In all the Member States and Regions in the iRBD, there is an agreement on sensitive quality elements for nutrients (other aquatic flora, macrophytes and phytobenthic), organic pollution (benthic invertebrates), hydrological (fish) and morphological (fish) pressures. All three regions in Belgium use four of the same quality elements for chemical pressures (macrophytes, phytobenthic and benthic invertebrates. Both Belgium (Wallonia) and Belgium (Brussels) use four of the same quality elements for temperature pressures (macrophytes, phytobenthic and benthic invertebrates France and the Netherlands did not report quality elements for chemical and temperature pressures. Belgium (Flanders) did not report quality elements for temperature pressures.

[142] See: https://circabc.europa.eu/sd/a/63f7715f-0f45-4955-b7cb-58ca305e42a8/Guidance%20No%207%20-%20Monitoring%20(WG%202.7).pdf

Table 1.8.2 Sensitivity of BQEs towards different pressure types for river water bodies

Member State	Phytoplankton	Other aquatic flora	Macrophytes	Phytobenthic	Benthic invertebrates	Fish
Assessment method mainly sensitive to nutrient pollution						
Belgium (Flanders)	yes	yes	yes	yes	yes	yes
Belgium (Wallonia)	yes	yes	yes	yes	yes	yes
Belgium (Brussels)	yes	yes	yes	yes	yes	yes
France		yes	yes	yes		
Netherlands		yes	yes	yes		
Assessment method mainly sensitive to organic pollution						
Belgium (Flanders)		yes	yes	yes	yes	
Belgium (Wallonia)		yes	yes	yes	yes	yes
Belgium (Brussels)	yes	yes	yes	yes	yes	yes
France		yes	yes	yes	yes	yes
Netherlands					yes	
Assessment method mainly sensitive to chemical pollution						
Belgium (Flanders)			yes	yes	yes	yes
Belgium (Wallonia)			yes	yes	yes	yes
Belgium (Brussels)	yes		yes	yes	yes	yes
France						
Netherlands						
Assessment method mainly sensitive to elevated temperature						
Belgium (Flanders)						
Belgium (Wallonia)			yes	yes	yes	yes
Belgium (Brussels)	yes		yes	yes	yes	yes
France						
Netherlands						
Assessment method mainly sensitive to altered habitats due to hydrological changes						
Belgium (Flanders)			yes	yes		yes
Belgium (Wallonia)			yes		yes	yes
Belgium (Brussels)	yes		yes	yes	yes	yes
France						yes
Netherlands					yes	yes
Assessment method mainly sensitive to altered habitats due to morphological changes						
Belgium (Flanders)			yes	yes	yes	yes
Belgium (Wallonia)			yes		yes	yes
Belgium (Brussels)	yes		yes	yes	yes	yes
France						yes
Netherlands					yes	yes

Source: WISE electronic reporting 2016

Coordination of River Basin Specific Pollutants (RBSPs) and matrices monitored

The WFD requires Member States to identify and select river basin specific pollutants and their environmental quality standards at the national, river basin or water body level. The iRBMP mentions that the river basin specific pollutants relevant for the Scheldt are copper, zinc and PCBs. These substances are locally significant. PCBs are hardly soluble and therefore not analysed further in the iRBMP. Copper is found in almost all measuring points but generally below national environmental quality standards. In contrast, zinc concentrations exceed the national environmental quality standards in France and Belgium (Flanders).

As part of the reporting to WISE regarding the assessment of ecological status, Member States were asked to report information regarding river basin specific pollutants at RBD level. For the reporting to WISE, Member States could report pollutants using pre-defined codes from a list set by the European Commission, and they could report pollutants to a category "other". The "other" category is not uniform among the Member States and therefore the information reported for these pollutants cannot be compared within the iRBD.

The river basin specific pollutants reported by the Member States to WISE were evaluated. The summary of the evaluation concern three essential aspects:

2. which substances have been selected for the entire basin or parts of it;
3. whether the substances have an environmental quality standard and are monitored; and
4. whether the environmental quality standards are the same or in one or another way comparable (in the same range/order of magnitude, for the same matrix).

For environmental quality standards of river summary for the number of established environmental quality standards They can only be compared for a given substance if the specific pollutant matrix (water, sediment, biota etc), the unit (mg/L, µg/L etc.), the scale at which the standard is applied (national, water body, river basin etc.), the category (rivers, lakes, coastal water, territorial water and transitional water) and the standard (AA-EQS[143], MAC-EQS[144]) are comparable. Therefore, there are many different approaches and dimensions for such a comparison.

This assessment covers selected aspects of the topic at the iRBD scale for reasons of practicability. The most important aspects are environmental quality standards for 1) AA-EQS, 2) for the matrix water and 3) the setting of the standard at national level. The relevant results are a quantitative description of the harmonisation and cooperation with respect to river basin specific pollutants.

A summary for the number of established environmental quality standards is given in the table below. The two tables below – one at Member State level and one also including

[143] annual average environmental quality standard
[144] maximum allowable concentration environmental quality standard

Regional level (in the case of Belgium) show the number of Member States and Regions that have established an environmental quality standard for a certain river basin specific pollutant. This shows how many standards defined at the national level can be compared between how many countries and describes the extent of harmonization[145].

Table 1.8.3 Summary of the assessment of river basin specific pollutants for the Scheldt basin at the Member State level

Number of Member States	Number of river basin specific pollutants with an environmental quality standard	
	River basin specific pollutant scale	
	National[146,147]	All[148]
1	54	58
2	7	32
3	0	6

Source: WISE electronic reporting 2016

Table 1.8.4 Summary of the assessment of river basin specific pollutants at the Member State and Region level

Number of Member States and Regions	Number of river basin specific pollutants with an environmental quality standard	
	River basin specific pollutant scale	
	National[149]	All[150]
1	54	43
2	7	37
3	0	10
4	0	5
5	0	1

Source: WISE electronic reporting 2016

For the regions in Belgium the result is as follows: There is an environmental quality standard for:

- 1 river basin specific pollutant in all three regions,
- 30 river basin specific pollutants in two out of three regions
- 41 river basin specific pollutants in only one out of three regions

[145] This analysis assumes a basin-wide view only, it does not show whether the pollutants are shared between neighbouring countries.
[146] National means only standards for the national scale are included in the analysis.
[147] No EQS in Belgium has been declared as "national scale" therefore, not 1 RBSP has an EQS in all three Member States of the Scheldt basin.
[148] All means that the analysis takes all scales into account (i.e. national regional (sub-national), local/municipality, international RBD, RBD, sub-unit, water body, other).
[149] National means only standards for the national scale are included in the analysis.
[150] All means that the analysis takes all scales into account (i.e. national regional (sub-national), local/municipality, international RBD, RBD, sub-unit, water body, other).

There are five Member States and Regions in the Scheldt iRBD. Table 1.8.3 shows that there is not one river basin specific pollutant with an environmental quality standard that is monitored in all five Member States or Regions in the Scheldt. There are two pollutants with an environmental quality standard but these are shared by only two Member States or Regions. This means that there are few specific pollutants with quality standards set at the same geographical scale that are comparable in the iRBD.

River basin specific pollutants are only useful and supportive for the assessment of ecological status if an environmental quality standard has been adopted and the pollutants are monitored. The information the Member States and Regions reported to WISE was assessed using the following reporting elements:

5) RBSPvalue: If a value is provided in WISE criterion “EQS-yes” is fulfilled

6) chemicalLastMonitored: If a value>=2010 is provided in WISE the criterion “Monitored: yes” is fulfilled

For each river basin specific pollutants, the criteria mentioned above were evaluated according to the scheme given in table below. A filter is applied, considering the following schema elements: a) chemicalSubstanceCode, b) chemicalMatrix c) chemicalPurpose, d) rbspCategoryRW.

Table 1.8.4 shows how many river basin specific pollutants can be used for the assessment of ecological status. The number of pollutants that can be integrated into the assessment of ecological status ranges between nine (France) and 62 (Belgium). The information describes the role that river basin specific pollutants play in the frame of the ecological assessment and whether the approaches are comparable. The results do not describe whether and how often these pollutants have been used in the frame of status assessment.

Table 1.8.5 Synthesis of environmental quality standards and sampling of river basin specific pollutants with pre-defined codes in the WISE reporting[151]

Member State	Monitored: yes Environmental quality standard: yes	Monitored: no Environmental quality standard: yes	Monitored: yes Environmental quality standard: no	Substances (number and percentage) that can be used for the assessment of the ecological status
Belgium (Wallonia)	8	28	19	8 / 30 %
Belgium (Brussels)	0	4	12	0 / 0 %
Belgium (Flanders)	62	2	3	62 / 95 %
France	9	0	97	9 / 8 %
Netherlands	42	17	47	42 / 47 %

Source: WISE electronic reporting 2016

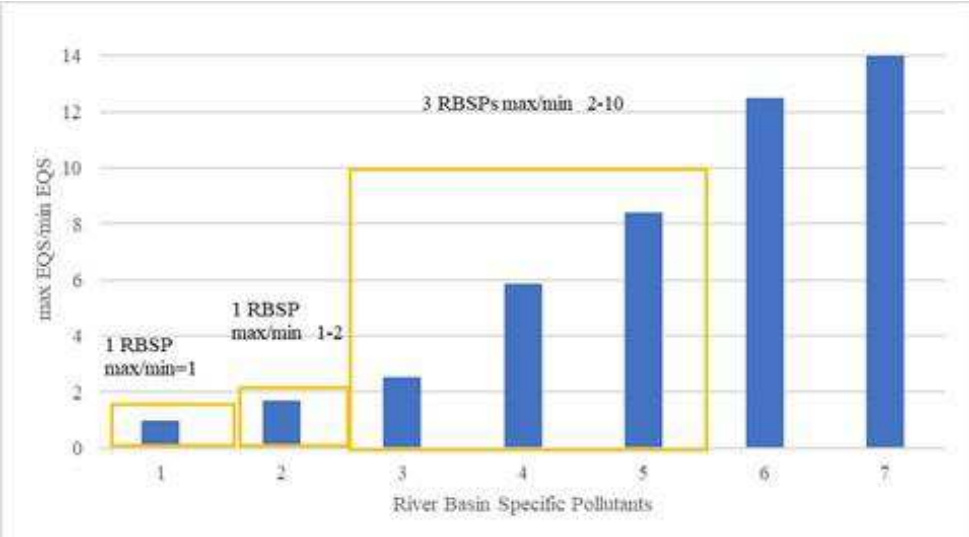
Environmental quality standards for river basin specific pollutants

A comparison between environmental quality standards is given in the figure below.

There is limited agreement between the Member States and Regions. There is one pollutant with the same environmental quality standard but this standard is shared only between two countries (France and the Netherlands). For most of the substances with an environmental quality standard, the standard differs by one order of magnitude or more. This makes it difficult to compare status between the Member States and Regions. The different standards used may also partly explain why some Member States or Regions identify certain substances as river basin specific pollutants while other Member States or Regions don't.

[151] Information regarding "other RBSP" is not included in the table.

Figure 1.8.1 Ratio between the minimum and the maximum environmental quality standard for river basin specific pollutants in the Scheldt iRBD[152]



Source: WISE electronic reporting 2016

Status Classification

Use of monitoring results for classification – transboundary harmonization

The iRBMP indicates that comparing results of monitoring can be difficult as although all the Member States have adjusted their systems of standards to meet the WFD's requirements, there are sometimes big differences, both for the standards and the way these standards are expressed (90-percentile, average, absolute maximum or minimum, median, total or group standard). The objectives are similar for most of the general parameters: biological oxygen demand (BOD) and chemical oxygen demand (COD), dissolved oxygen, suspended matter, conductivity, chloride, sulphates and pH. As for nutrients (nitrogen and phosphor compounds), environmental quality standards are observed to differ strongly to very strongly. The assessment methods are not the same throughout all iRBD shares. To aid in the harmonisation of monitoring and assessment, individual fiches have been produced for each transboundary water course, which according to the iRBMP are used for the coordination and alignment of results.

Intercalibration exercise and Geographical Intercalibration Group (GIG)

All laboratories in Member States participated in the intercalibration exercise (no information on GIG found in iRBMP).

[152] A ratio of one indicates that the Member States and Regions that have set a standard use the same value for this standard. The higher the ratio, the higher the differences in the standards used.

1.8.5. Monitoring, assessment and classification of surface water chemical status

Monitoring of chemical status in surface waters

Joint monitoring programme for surface waters and application of joint methods/joint surveys and interlaboratory tests

As already mentioned, the Homogeneous Monitoring Network is coordinated by the International Scheldt Commission. All national methods of analysis have been compared with one another in terms of quality, exactness of results, reporting scope and sampling method at yearly meetings with the heads of laboratory and measurements. Data management is centralized, and a joint exchange format has been defined. Monitoring results are published in a common report every three years. The coordination within the Scheldt district also encompasses the intercalibration of laboratories to ensure harmonised approaches.

Coordination of monitoring and assessment of chemical status

According to the iRBMP, there are 41chemical parameters (33 priority substances and eight other pollutants) that need to be monitored according to the WFD. All substances determining the chemical status have been analysed and coordinated within the Homogeneous Monitoring Network except for chloroalkanes. The assessment of the chemical status was not coordinated. The different methods used were compared across the river basin and an attempt was made to explain divergences in status assessments.

An important aspect for chemical status assessment is whether the water samples have been taken with the frequency recommended as a general rule in the WFD[153]. Monthly samples should be analysed for WFD compliant assessment of chemical status at a given site. Other frequencies need a justification based on expert judgement or technical knowledge. If the analysis excludes all frequencies that are lower than 12/year, the number of samples decreases from ~27199 to ~14428. This means that 53 % of the samples of Priority Substances (reported to WISE) in the Scheldt catchment can be used for WFD compliant assessment of chemical status. All figures are listed in the table below.

[153] Information reported to WISE did not differentiate between surveillance or operational monitoring. In the case of surveillance monitoring, water sampling has to been carried once a month for one year only within the management cycle. Operational monitoring requires monthly sampling every year of the management cycle.

Table 1.8.6 Percentage of Priority Substance samples (matrix water) that have been taken with the frequency recommended in the WFD (monthly samples)

Member State	Percentage of Priority Substance samples with a frequency >12/year	Samples usable for assessment of chemical status without any further explanation
Belgium (Flanders)	49 % (out of 7 488 samples)	3 648
Belgium (Wallonia)	95 % (out of 3 112 samples)	2 952
Belgium (Brussels)	94 % (out of 462 samples)	432
Belgium (North Sea)	27 % (out of 11 207 samples)	3 052
France	79 % (out of 1 860 samples)	1 476
Netherlands	99 % (out of 2 898 samples)	2 868

Source: WISE electronic reporting 2016

The total number of samples (see table below) was calculated by combining the information of the WISE reporting elements "chemicalfrequency" and "chemicalCycle", as also illustrated in the reporting guidance under chapter 4.3.5.

Table 1.8.7 Total Number of analysed samples for each Priority Substance and each national iRBD share for the period 2010-15[154]

Priority Substance	Number of samples for Priority substances (period 2010-2015)					
	Belgium (Flanders)	Belgium (Wallonia)	Belgium (North Sea)	Belgium (Brussels)[155]	France	Netherlands
CAS_104-40-5 - 4-nonylphenol	180	72			36	
CAS_107-06-2 - 1,2-Dichloroethane	180	72		256	48	84
CAS_115-29-7 - Endosulfan	180	72		413	36	84
CAS_117-81-7 - Di(2-ethylhexyl)phthalate (DEHP)	186	74		212	48	84
CAS_118-74-1 - Hexachlorobenzene	20	76	6	231	48	72
CAS_12002-48-1 - Trichlorobenzenes (all isomers)	180	72		318	36	12
CAS_120-12-7 - Anthracene	186	74	72	250	48	84
CAS_122-34-9 - Simazine	244	85		374	48	84
CAS_127-18-4 - Tetrachloroethylene	226	85		288	48	72
CAS_140-66-9 - Octylphenol (4-(1,1',3,3'-tetramethylbutyl)-phenol)	180	72			48	84
CAS_1582-09-8 - Trifluralin	180	72		461	48	84
CAS_15972-60-8 - Alachlor	180	72		439	48	84
CAS_1912-24-9 - Atrazine	244	85		374	48	72
CAS_206-44-0 -	207	80	72	250	48	84

[154] All monitoring frequencies, all matrices included and all purposes included.

[155] Belgium (Brussels) subsequently informed the Commission that there may be a reporting error in the information in this table. All 41 priority substances have been reported to be monitored in Brussels in 2010-2015. The number of samples for the period 2010-2015 should be 360, 370 or 380, depending on the substance.

Priority Substance	Number of samples for Priority substances (period 2010-2015)					
	Belgium (Flanders)	Belgium (Wallonia)	Belgium (North Sea)	Belgium (Brussels)[155]	France	Netherlands
Fluoranthene						
CAS_2921-88-2 - Chlorpyrifos	180	72		475	48	84
CAS_330-54-1 - Diuron	244	85		374	48	72
CAS_34123-59-6 - Isoproturon	244	72		374	48	108
CAS_36643-28-4 - Tributyltin-cation	186	74	30	240	48	84
CAS_470-90-6 - Chlorfenvinphos	180	72		205	48	84
CAS_50-29-3 - DDT, p,p'	180	72		231	48	84
CAS_50-32-8 - Benzo(a)pyrene	255	74	72	250	48	72
CAS_56-23-5 - Carbon tetrachloride	180	91		298	48	84
CAS_608-73-1 - Hexachlorocyclohexane	186	74		371	36	
CAS_608-93-5 - Pentachlorobenzene	186	74		231	48	84
CAS_67-66-3 - Trichloromethane	180	78		296	48	84
CAS_71-43-2 - Benzene	226	84		302	48	72
CAS_7439-92-1 - Lead and its compounds	238	87		368	48	84
CAS_7439-97-6 - Mercury and its compounds	66	89	6	391	48	90
CAS_7440-02-0 - Nickel and its compounds	232	85		368	48	84
CAS_7440-43-9 - Cadmium and its compounds	238	87		398	48	84
CAS_75-09-2 - Dichloromethane	180	72		298	48	84
CAS_79-01-6 - Trichloroethylene	226	85		288	48	84
CAS_85535-84-8 - Chloroalkanes C10-13	186	72			48	12
CAS_87-68-3 - Hexachlorobutadiene	20	76	6		48	84
CAS_87-86-5 - Pentachlorophenol	180	72		338	48	72
CAS_91-20-3 - Naphthalene	180	72		274	48	84
EEA_32-02-0 - Total cyclodiene pesticides (aldrin + dieldrin + endrin + isodrin)	180	72		241	36	84
EEA_32-03-1 - Total DDT (DDT, p,p' + DDT, o,p' + DDE, p,p' + DDD, p,p')	180	72		231	36	
EEA_32-04-2 - Brominated diphenylethers (congener numbers 28, 47, 99, 100, 153 and 154)	192	74	72		36	
EEA_32-23-5 - Total Benzo(b)fluor-anthene (CAS_205-99-2) + Benzo(k)fluor-anthene (CAS_207-08-9)	186	74	72	250	36	84

Priority Substance	Number of samples for Priority substances (period 2010-2015)					
	Belgium (Flanders)	**Belgium (Wallonia)**	**Belgium (North Sea)**	**Belgium (Brussels)[155]**	**France**	**Netherlands**
EEA_32-24-6 - Total Benzo(g,h,i)-perylene (CAS_191-24-2) + Indeno(1,2,3-cd)-pyrene (CAS_193-39-5)	186	74	84	250	36	72

Source: WISE electronic reporting 2016

1.8.6. Monitoring, assessment and classification of groundwater quantitative and chemical status

In the Scheldt, there are 22 groundwater bodies part of transboundary aquifer. For groundwater bodies, national networks are used for monitoring. Member States have compared their monitoring methods but there is no joint monitoring programme in the iRBD. Information has been exchanged on the groundwater monitoring networks for surveillance monitoring, with a particular focus on the transboundary aquifers.

The groundwater bodies' status assessment is based on the results of the monitoring networks, the density, the nature (wells, piezometers, sources etc.) and the extraction depth, which may vary among the Member States/Regions. For the assessment of the quantitative status, the trend analyses of the piezometric measurement series was considered, along with a survey of the hydrogeological state. A joint methodology for quantitative status assessment is not used in the Scheldt.

For the assessment of chemical status, each Member State/Region has defined criteria, including nitrate, pesticides and polluting parameters that are causing groundwater bodies to be designated as at risk. The impact of salt water intrusion on the quality of surface water or terrestrial ecosystems depending on groundwater, or on the quality of the extracted groundwater intended for human consumption, has also been studied. There are joint case studies monitoring the carboniferous limestone aquifer and salt water intrusion in the Flemish-Dutch polder aquifer. Chemical status has not been harmonised. There are several explanations for the divergence of chemical status assessments among the Member States/Regions:

- Differences in the use of groundwater bodies;
- Differences in threshold values fixed by the Member States/Regions; and
- The monitoring networks' particularities.

1.8.7. Designation of heavily modified water bodies, artificial water bodies and definition of good ecological potential

Cooperation and joint activities regarding heavily modified water body designation

The Member States and Regions have each developed their own method to designate heavily modified and artificial water bodies. The use of different descriptors by each of the parties for the designation of heavily modified water bodies did not lead to substantial differences in the final assessment of whether or not a water body was heavily modified. The approach taken in the iRBD can be summarized as follows:

- inventory of physical changes;
- the use functions for which these changes were necessary;
- the effects on hydromorphology and biology; and
- the indicators used by the parties.

The iRBMP states that the heavily modified water bodies characterization was updated from the first river basin management cycle (revised procedure and/or requalification of water bodies). This has led to fewer waterbodies being classified as heavily modified compared to 2005.

Cooperation and Joint methods and approaches for the determination of Good Ecological Potential (GEP)

National approaches to determining good ecological potential were used in the iRBD. No joint method regarding the definition of good ecological potential has been developed/applied exclusively for the main river in the iRBD.

Member States were requested to report to WISE on their approach for defining good ecological potential. Belgium (North Sea) did not report to WISE. All the Member States and Regions except Belgium (Wallonia) reported defining good ecological potential at water body level; in Wallonia it is defined for groups of heavily modified and artificial water bodies of the same use/physical modification. France, Belgium (Flanders) and the Netherlands reported using the Hybrid CIS/Prague Approach. Belgium (Brussels) uses the CIS Guidance Approach, and Belgium (Wallonia) uses the Prague Approach.

Phytoplankton is used by all the Member States and Regions. Benthic invertebrates and Fish are used by all the Member States and Regions except for France. Similar mitigation measures are offered.

1.8.8. Environmental Objectives and Exemptions

The iRBMP states that Member States and Regions used different methodologies for the application of exemptions in accordance with Art. 4 (4) and Art. 4 (5) but that coordination on adjacent water bodies took place. Exemptions for groundwater bodies were not coordinated.

According to the iRBMP, the Member States and Regions in the Scheldt have interpreted the reasons for applying Articles 4.4 (term extension) and 4.5 (less strict objectives) - i.e. technical unfeasibility and disproportionate costs and their definitions - differently. Within the Scheldt, information was exchanged among the Member States/Regions on how they define ‘disproportionate costs’ when applying exemptions.

The French part of the Scheldt is applying Art. 4 (5) to some adjacent waterbodies. The Belgian and Dutch parts of the Scheldt apply Art. 4 (4). There is no information regarding Article 4 (7) in the iRBMP. According to national reporting to WISE, Art 4 (7) has not been applied.

1.8.9. Programme of measures

General information

A joint PoM has been developed. Two basin-wide level objectives have been defined in the iRBMP:

- fine-tune water management scaled to the level of the international water basins, and
- preserve and improve the water systems' biological and chemical quality, including the seas and coastal areas.

As previously mentioned, fiches for each transboundary water course were developed, wherein national measures planned by the different Member States and Regions are included. Through the files, the Member States and Regions can take note of the measures planned by the other Parties for the transboundary watercourse involved. According to the iRBMP, these files helped to influence other Member States and Regions regarding potential measures, for example, for new sources of pollutions or resolving existing bottlenecks.

A list of national/regional measures of significance to the Scheldt district is presented in the iRBMP. This list is a compilation of all measures implemented in the different RBDs of the Scheldt. Joint "measures" listed by the iRBMP 2015 include the Warning and Alarm System for the Scheldt, the Scheldt Master Plan Fish and joint measures to decrease nitrates in the field of agriculture.

In addition, the website of the Scheldt Commission includes a web-based tool comprising a catalogue of measures developed for the following purposes:

- To provide a well-ordered and uniform presentation of the various partners' or parties' measures;
- To draw up an evolutive catalogue in which measures, parameters and other fields can be amended, deleted or added in a user-friendly way; and
- Make 'custom tailored' reports meant to support comparative studies and/or gear the measures.

Coordination on addressing water scarcity and droughts

Joint identification of Pressures and Objectives

The iRBMP states that abstraction from groundwater for drinking water is most intense in the Flemish region. Groundwater abstractions in Brussels for drinking water purposes but the pressure is characterized as medium. The iRBMP mentions water scarcity and droughts has been identified as a "challenge", not a pressure.

Water abstraction for agriculture, public water supply, industry and cooling water was reported as a significant pressure to WISE by Belgium (Flanders) for surface and groundwater bodies.

Measures related to abstractions and water scarcity

The iPoM lists the national/regional measures of the Member States and Regions. As water abstraction is a local pressure, joint measures to address water scarcity and abstraction are not included in the programme.

The national/regional measures included in the iPoM to address water scarcity and droughts are:

- France: Drinking water: no deterioration of the situation, reconstruction of outdated installations, wider and better collection for deterioration to avoid the purification performance, and adaptation to climate change by one better management of collection during rainy weather with alternative and preventive means, also in water bodies that are in good condition. - secure access to and supply of drinking water - encouraging more efficient water consumption
- Flemish Belgium: Active water level management, elaboration of low water strategies, promoting water conservation, protect or safeguard water conservation areas, develop policy framework for surface water abstractions, studies and research regarding surface water quantity
- Walloon Belgium: Maintain ecological flow minima in watercourses; Knowledge enrichment in connection with the impact of climate change on water management
- Brussels Belgium: Restoring the functions of the water cycle, among other things as a weakening element for the effects of urban heat islands
- Netherlands: Investigations and - if necessary adapt the desired ground and surface water regime, measures under 2.2; execution of the implementation program associated with the Delta Program on Freshwater

With respect to water abstraction, the measures include:

- France: drinking water: save water, reduce leakage

- Walloon Belgium: implement regional water storage plan
- Flemish Belgium: Adapt licensing to the systems carrying capacity
- Belgium-Brussels: Continue and improve quantitative monitoring, update data bank for water abstractions, conduct prospective analysis
- Netherlands: move groundwater abstraction points, introduce licenses and taxes/charges for significant abstractions

In order to enable a comparable grouping of measures in the national and international programme of measures, the European Commission introduced the concept of KTMs in 2012 to simplify reporting[156]. KTMs are groups of measures identified by Member States in the PoMs which target the same pressure or purpose. The individual measures included in the PoM (being part of the RBMP) are grouped into KTMs for the purpose of reporting. The same individual measure can be part of more than one KTM because it may be multi-purpose.

Belgium (Flanders) is implementing KTM7 – Improvements in flow regime and/or establishment of ecological flows and KTM8 – Water efficiency, technical measures for irrigation, industry, energy and households.

Coordination on addressing pollution from agriculture

Joint identification of Pressures and Objectives

Nutrient pollution from agriculture is addressed in the iRBMP. General management objectives or quantitative management objectives are not mentioned in the iRBMP. According to information reported to WISE, general management objectives regarding nutrients from agriculture have been defined in Belgium (Flanders and North Sea) and the Netherlands. Belgium (North Sea) reported quantitative management objectives for nitrogen and phosphorus.

Measures related to pollution from agriculture

The Member States and Regions have a joint approach to address nutrient pollution from agriculture. Measures to address the reduction of nitrogen pollution were compiled and compared. The Member States and Regions jointly estimated their impact and costs. Joint measures have not been defined for the joint significant water management issue of reducing nitrate in agriculture.

The iRBMP includes a list of nitrate reduction measures of the different Member States and Regions. The iPoM supplementary measures details the measures taken at national level for

[156] The need for KTMs was borne out of the large differences in the level of detail reported in 2010 by the Member States. Some Member States reported 10-20 measures whilst others reported hundreds or even thousands.

each Member State and Region. The table is structured according to "important water management challenges".

All Member States and Regions except Belgium (Brussels) indicate that they are applying KTM 2 Reduce nutrient pollution from agriculture. All Member States and Regions shares, except Belgium (North Sea) indicate that they are applying KTM 3 Reduce Pesticides pollution from Agriculture. France is applying KTM 12 Advisory Services.

Coordination on addressing pollution from sectors other than agriculture

Joint identification of Pressures and Objectives

Water pollution from sectors other than agriculture – industry, transport, navigation - is described in the iRBMP. All the Member States and Regions also reported to WISE that chemical pollution is an issue. The iRBMP refers to management objectives in general, i.e. achieving surface water of sufficient quality.

Measures to address pollution from sectors other than agriculture

The iPoM lists several measures taken in the different Member States and Regions that are addressing pollution from other than agricultural origin, such as urban wastewater and industry.

Belgium (Wallonia and Flanders), France and the Netherlands reported to WISE that they are implementing the following KTMs:

- KTM1 – Construction or upgrades of wastewater treatment plants;
- KTM4 – Remediation of contaminated sites (historical pollution including sediments, groundwater, soil);
- KTM15 – Measures for the phasing-out of emissions, discharges and losses of Priority Hazardous Substances or for the reduction of emissions, discharges and losses of Priority Substances;
- KTM16 – Upgrades or improvements of industrial wastewater treatment plants (including farms); and
- KTM17 – Measures to reduce sediment from soil erosion and surface run-off; and

In addition, Brussels reported applying KTM1, KTM4 and KTM15. All the Member States and Regions except Belgium (Wallonia) reported applying KTM21 – Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure. Belgium (Brussels and Flanders) reported applying KTM23 – Natural water retention measures. Belgium (Flanders) is also applying KTM25 – Measures to counteract acidification.

Coordination on addressing hydromorphological alterations

Joint identification of Pressures and Objectives

River continuity and other hydromorphological measures are addressed in the Scheldt. Hydromorphological changes was identified as a basin-wide significant water management issue. The iRBMP does not specifically define joint management objectives. However, the Scheldt Master Plan Fish contains management objectives.

The Member States and Regions except Belgium (Brussels) and Belgium (North Sea) reported to WISE that they identified management objectives regarding river continuity. Belgium (Wallonia and Flanders) and France reported quantitative management objectives but did not report indicator values regarding the number of fish/continuity passes required to achieve environmental objectives.

Measures related to hydromorphological alterations

The iRBMP refers to the joint Scheldt Master Plan Fish, which identifies threats (lack of continuity being the main threat), opportunities and recommendations. The Plan is intended to ensure good transboundary coordination through effective exchange of information on innovation and current trends.

According to the iRBMP, the water body fiches developed for each transboundary watercourse helped to influence other Parties regarding potential measures, for example:

- Creating or resolving fish migration bottlenecks, and
- Creating or resolving hydraulic bottlenecks with an impact on flood risks.

The iPoM lists the following measures:

- restoration of natural banks,
- reintroduction of river continuity,
- environmental flow,
- re-opening of river branches/channels, and
- renaturalisation.

KTM5 – Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams) and KTM6 - Improving hydromorphological conditions of water bodies other than longitudinal continuity were reported by Belgium (Flanders, North Sea), France and the Netherlands. Belgium (Wallonia and Brussels) reported implementing KTM 5.

Other hydromorphological measures are also included in the iRBMP. Belgium (Wallonia and Flanders) and the Netherlands are implementing measures to re-naturalize river banks. In

addition, Belgium (Wallonia) is implementing measures to create wetlands, and Belgium (Brussels) is implementing measures to the re-opening of river beds.

1.8.10. Economic analysis and water pricing policies

An economic analysis has been undertaken and is part of the iRBMP. The economic analysis covers households, industry and agriculture and cost recovery for water-related services. The analysis has been updated in the iRBMP. The countries of the iRBMP have applied a joint approach (commonly agreed indicators) regarding the economic analysis of the drivers (households, industry & agriculture). The Member States and Regions analysed the differences in their approaches applied to water pricing policies.

1.8.11. Considerations specific to Protected Areas

The iRBMP provides joint map of the areas. It refers to the national Protected Areas inventories for further information.

The iRBMP lists the transboundary Protected Areas and briefly describes the cooperation practiced between countries/ regions. In some cases, specific measures are mentioned:

- Parc Naturel Régional Scarpe-Escaut (between France and Wallonia) &Parc naturel des Plaines de l'Escaut: yearly consultation,
- global development project Carboniferous limestone aquifer (France, Flanders and Wallonia): consultations resulting in a trilateral declaration,
- execution of a joint modelling study, and
- other forms of cooperation being considered in the Zwin area (Flanders and the Netherlands): EU LIFE project ZTAR (2011-2015) implemented hydromorphological measures (freshwater pools, breeding islands, grazing plots, channel restoration) international transboundary nature park 'Groot-Saeftinghe'- transboundary cooperation in park management

Furthermore, the iRBMP mentions cooperation efforts between Brussels and Flemish authorities on protected areas in Brussels area.

1.8.12. Climate Change and Droughts

Within the Scheldt, an initial exploratory climate memorandum has been developed. According to the iRBMP, the Climate memorandum includes drought aspects: it discusses use restrictions/limitations on abstraction as an option and points out that the issue needs to be

mapped out further on district level before actions and measures can be recommended. The initial exploratory climate memorandum identified several issues, focusing on droughts. Other dimensions of climate change such as effects on freshwater ecosystems and fighting floods are dealt with in other chapters of the iRBMP.

1.8.13. Recommendations

International coordination efforts in the Scheldt iRBD have increased since the first river basin management cycle with the introduction of transboundary water body fiches.

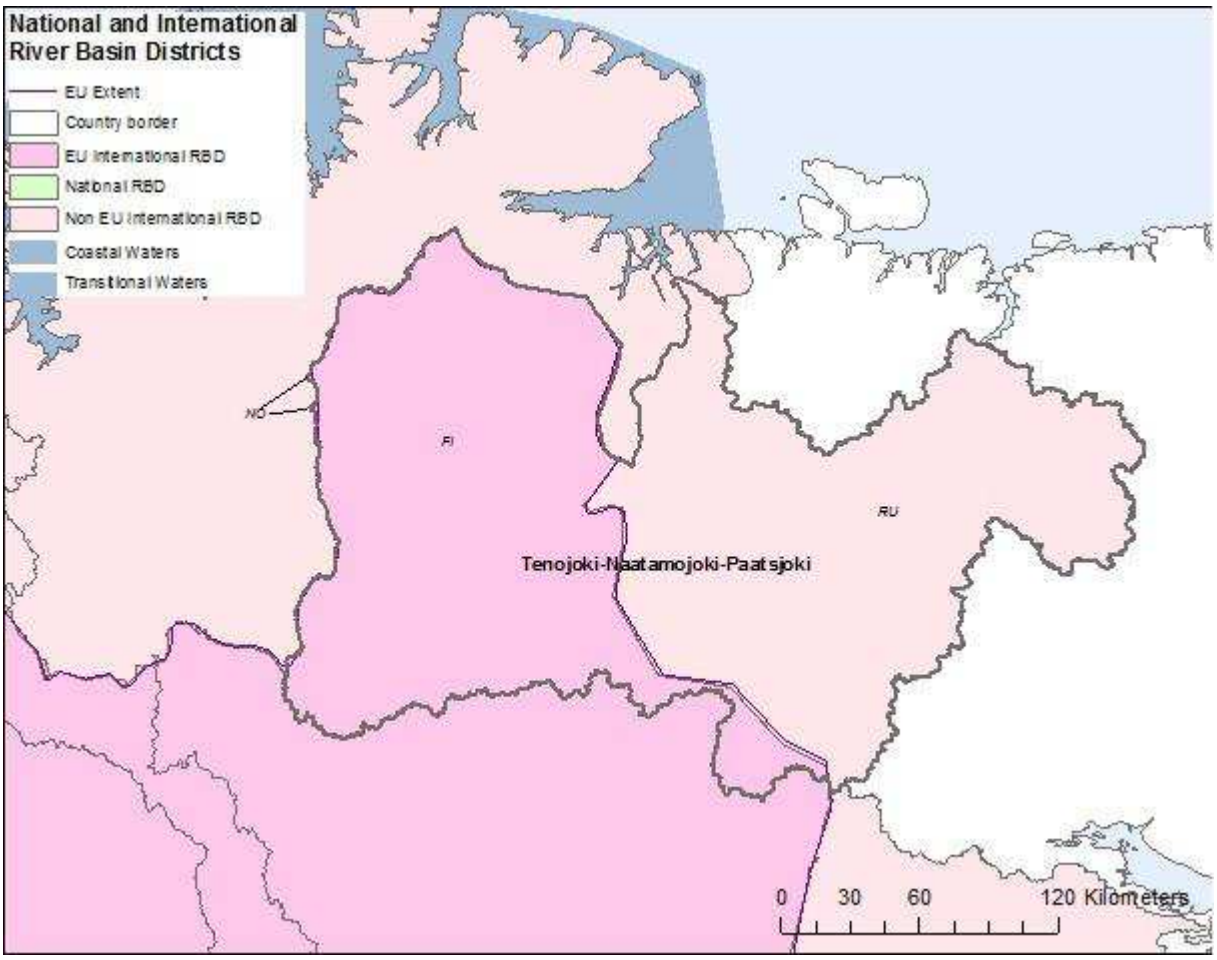
The following recommendations can be made to further improve cooperation:

- Coordination on river basin specific pollutants and the setting of environmental quality standards should be further improved.
- The sampling frequency for priority substances should be increased, where relevant, in line with the WFD requirements in order to strengthen the assessment of chemical status.
- Better harmonisation of water body status assessment methods will ensure achieving comparable results.
- The designation of heavily modified water bodies and the definition of ecological potential should be further harmonised.
- The methodologies for the justification and subsequent application of exemptions should be further harmonised.

1.9. Finnish-Norwegian International River Basin District: Paatsjoki/Pasvik/Pasvikelva, Näätämö/Neiden and Teno/TanaUutuanjoki River Basins

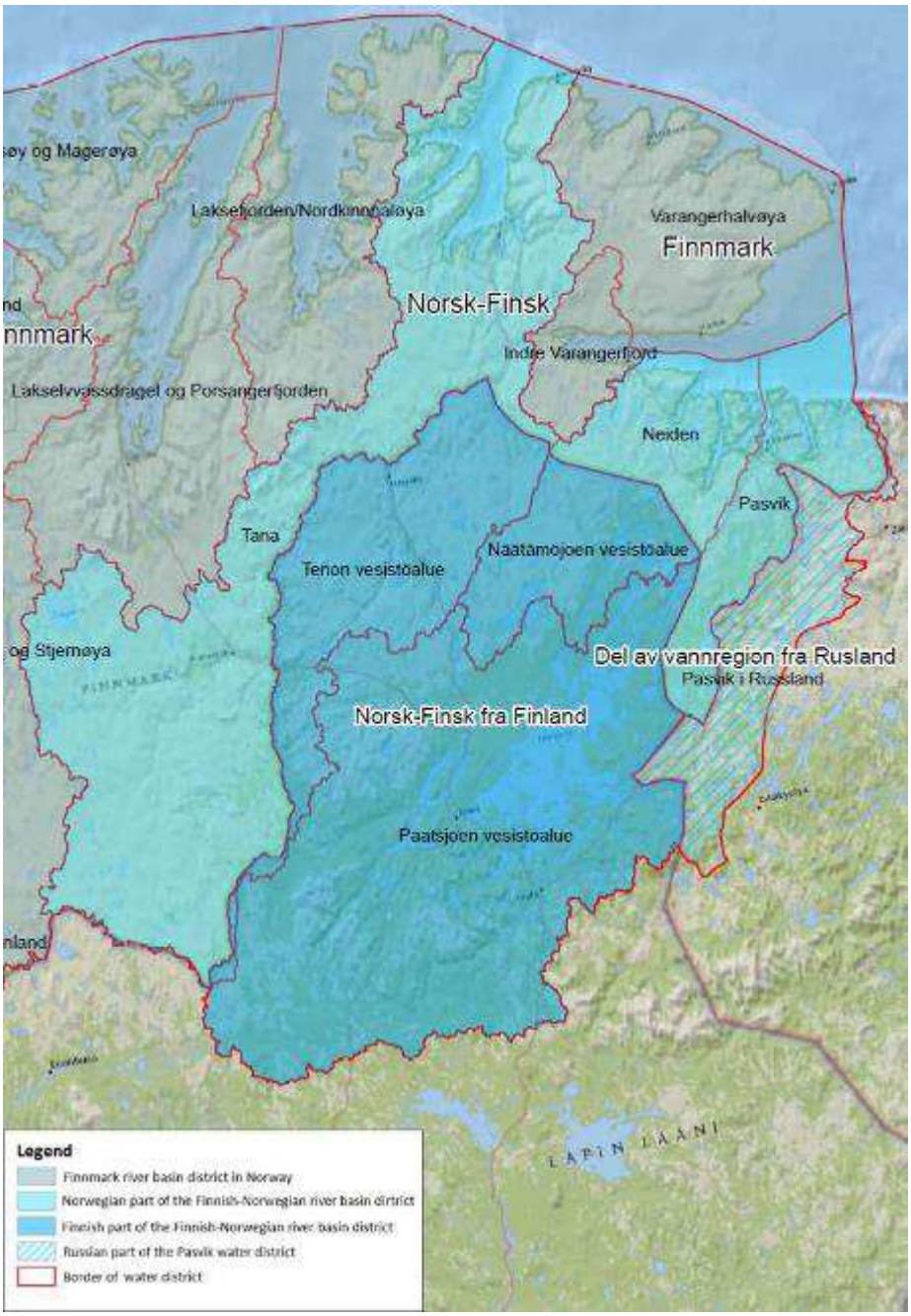
1.9.1. General Information

Map 1.9.1 Finnish-Norwegian International River Basin District – detailed map



Source: WISE reporting 2016

Map 1.9.2 Finnish-Norwegian International River Basin District



Source: iRBMP for Finnish-Norwegian- River Basin District

The Finnish-Norwegian International River Basin District (iRBD) includes the Pasvloa/Paatsjoki/Pasvik, Nataamo/Neiden and Teno/Tana River Basins. The iRBD is allocated to cooperation Category 1, which means that an international agreement, a permanent co-operation body and international WFD RBMP is in place. While the Tana and Neiden cover territory in Norway and Finland, the Pasvik water district also stretches into Russia. Russia is not part of the agreement concerning the international river basin district and did not cooperate in the development of the International River Basin Management Plan (iRBMP). However, Russia is also involved in the cooperation when Pasvik water district issues are dealt with. The iRBMP can be downloaded from the European Commission's website[157].

According to the iRBMP, the total land area of the river basin is roughly 48,000 km², with roughly two-thirds located in Finland.

Table 1.9.1 Size of the total catchment area and national shares for each international RBD

Shared International RBD	Total Area of Shared International RBD	EU Member States/Non EU Member States in International RBD	EU RBD Code	National Area within International RBD	National Area within International RBD
	(km^2)			(km^2)	(%)
Tana/Teno	19 843	Finland	FIVHA7	5 150	26
		Norway	NO1106	14 693	74
Neiden/Näätämö	4 869	Finland	FIVHA7	2 584	53
		Norway	NO1106	2 285	47
Pasvik/Paatsjoki	20 291	Finland	FIVHA7	14 710	73
		Norway	NO1106	2 908	14
		Russia	RUNO1106	2 673	13
TOTAL	45 003	Finland	FIVHA7	22 444	50
		Norway	NO1106	19 886	44
		Russia	RUNO1106	2 673	6

Source: Data provided by Finland and Norway

This report presents the information included in the iRBMP as regards to international coordination. As Norway had not yet completed WISE reporting[158], information reported by Finland to WISE is not included in the report.

[157] http://ec.europa.eu/environment/water/pdf/Finnish_Norwegian_international_river_basin_district.pdf

[158] Norway is an EFTA country. Norway is implementing the WFD under a specific timetable agreed pursuant to the Agreement on the European Economic Area (EEA), including reporting to WISE. The plans for 2016-

1.9.2. Governance and public participation

Cooperation framework

The cooperation framework in the iRBD is based on two main bilateral agreements:

- Between Finland and Norway: Finnish-Norwegian Transboundary Water Commission
- The Agreement between Norway and Finland on a Norwegian-Finnish River Basin District, with Memorandum of Understanding (2014)

Russia is an official observer to the Finnish-Norwegian Transboundary Water Commission and is therefore kept informed of the cooperation between Finland and Norway regarding the implementation of the WFD.

The Finnish-Norwegian Transboundary Water Commission has been operational since 1981. With the entry into force of the new Agreement between Finland and Norway in May 2014, the cooperation framework between the two countries expanded. This is in line with the European Commission Recommendation 2 for Finland, which called for "*International co-ordination with Sweden and Norway as well as the Russian Federation needs to be extended*." and Article 13 (developing an iRBMP) of the WFD. The Agreement designates the three catchments Tana, Neiden and Pasvik as an International River Basin District.

The objective of the Finland-Norway Agreement is to create a framework for bilateral cooperation and administrative arrangements to meet the requirements of the WFD. Detailed procedures for the coordination are laid down in a Memorandum of Understanding attached to the bilateral agreement. The Memorandum states that a common Roof Report for the whole international river basin district should be produced in order to meet the requirements of the WFD, in the form of a comprehensive "executive summary" of the two national RBMPs. In addition, each country should approve the water management plan covering the parts of the Finnish-Norwegian Water Management Area in its territory in accordance with its national law.

The regional authorities Finnmark County Council, the Office of the Finnmark County Governor and Lapland ELY-centre (Centre for Economic development, Transport and the Environment) have held meetings periodically since 2011 to coordinate and set common goals for water management. The meetings addressed delineation of water bodies, the methodology behind characterisation, classification and risk assessment, and which level of coordination can be attained for the river basin management plans, programmes of measures and monitoring programmes. In addition, yearly meetings for all the river basin districts in northern Scandinavia (North Calotte) have been held to exchange information and better

2021 represent the first cycle under formal WFD obligations for Norway. Full reporting to WISE is being completed.

coordinate processes. Meetings at the local level have also been held between municipalities in Norway and Finland.

In addition to these, both Finland and Norway have agreements with Russia where Pasvik water district issues are dealt with, namely:

- Between Finland and Russia: The Joint Finnish-Russian Agreement and Commission on the Utilization of Frontier Waters
- Between Norway and Russia: The Norwegian-Russian Environmental Agreement and Commission
- Tri-party agreement and working group on the regulation of Lake Inari in Pasvik water distrctions through the Kaitakoski Hydro-Electric Power Station and Dam.

The Finnish-Russian Agreement was signed in 1964. The agreement originally focused on regulation of water but cooperation has been expanded to now also include other water management issues. It defined the principles of common transboundary river and lake use. The Agreement extends extensively to the use, management and protection of water resources: water, water regulation, construction, water protection, waterborne traffic, swimming and fisheries. The WFD or FD are not mentioned in the agreement between Finland and Russia, but it covers the regulation of the flow of the Lake Saimaa and Vuoksi River in case of flooding or drought, the water quality and protection of transboundary water and ensuring the free passage of fish and preventing harm to fish stocks. The agreement covers all transboundary river basins between Finland and Russia and thus Pasvik water district issues are also addressed within the work of the Finnish-Russian transboundary water commission.

The 1992 Norwegian-Russian Environmental Agreement and Commission includes but is not limited to addressing water management issues, especially in the Barents region and Artic areas. For example, the work program for 2016-2018 has projects in the marine environment and border cooperation, among others. An important project in the marine cooperation is to contribute to a management plan on the Russian side of the Barents Sea, based on the same principles as on the Norwegian side. The two countries also collaborate on a web portal with common knowledge about the Barents Sea - Barentsportal. Efforts are underway to develop a common system for monitoring the environment in the Barents Sea.

Public consultation

The RBMPs in Norway and Finland were published for public consultation for a period of six months. There were differences in the timetables in Norway and Finland. The public consultation period in Norway was from the 1st of July to the 31st of December 2014. During the public consultation period, a national public consultation conference was held, as well as regional and local information meetings. During the first part of 2015, the results of the public

consultation were processed and alterations and updates to the management plan were made. This entailed meetings for the Finnmark River Basin District Board, working groups if necessary, and meetings with the regional reference group, which consists of interest organisations and other affected parties. The public consultation period in Finland lasted from the 1st of October 2014 until the 31st of March 2015. Results from the public consultation were processed during 2015 in co-operation with stakeholders and authorities.

The draft Finnish water management plan was translated into Norwegian, and the Norwegian documents were translated into Finnish. In addition, both plans were translated into Sami (*Lappish)* which is an indigenous language spoken across the border. The translated documents were linked on both authorities' consultation web pages. The joint management report (i.e. the iRBMP) is an unofficial appendix to the respective national river basin management plans.

1.9.3. Characterisation of the River Basin District

The iRBMP provides information regarding delineation of water bodies and significant pressures in the basin. Typology or establishing reference conditions are currently not coordinated in the iRBD. As the agreement entered into force shortly before the plans were due to be completed, the focus was on exchange of information and mapping of common issues. Further cooperation is expected in the third management cycle.

Water body delineation has not been coordinated in the iRBD. According to the iRBMP, there are some differences in how Norway and Finland have delineated smaller water bodies. Norway has delineated rivers or stretches of river with a catchment area larger than 10 km^2, and lakes that are larger than 0.5 km^2. Smaller lakes are included in river water bodies. In Finland, rivers with catchments larger than 100 km^2, as well as 60 smaller rivers with catchments ranging between less than 10 km^2 and up to 100 km^2 have been delineated. All lakes larger than 1 km^2 have been fully characterised, and lakes between 0.5 km^2 and 1 km^2 have been typified and preliminarily classified. This results in some rivers being delineated on the Norwegian side of the border but not on the Finnish side. The bigger water bodies, however, are delineated in the same way. There are no transboundary groundwater bodies between Finland and Norway. The iRBMP mentions that a future challenge for the iRBD will be to harmonise delineation efforts between the two countries.

The iRBMP provides a summary of significant water management issues for the Finnish-Norwegian river basin district for the period 2016-2021. It shows which pressures are in which region. 15 pressures are listed and seven are in common for both Norway and Finland.

These include:

- Pressures from mining;
- Wastewater and sewage;
- Diffuse source pollution (e.g. municipal landfills, wastewater, forestry);
- Contamination from metallurgy in Russia;
- Alien/invasive species (e.g. pink salmon (Oncorhynchus gorbuscha), minnow (Phoxinus phoxinus) and vendace (Coregonus albula));
- Fish migration barriers; and
- Transmission of *Gyrodactylus salaris* and other fish diseases

1.9.4. Monitoring, assessment and classification of surface water ecological and chemical status

Joint monitoring programmes for surface waters

Despite no formal joint monitoring programme, there is a long history of common water monitoring activities on transboundary rivers between Finland and Norway. It was highlighted in the iRBMP that a common monitoring programme is needed, so a shared knowledge base can be built up. Data from monitoring activities are shared, among other via the Norwegian-Finnish Transboundary Commission.

The national surface water monitoring programmes were updated in Finland and Norway in 2013. The new programmes include a more variable set of water bodies and types with different pressures and aim to meet with the demands of WFD. According to the iRBMP, water quality has been jointly monitored in the Tana River between Finland and Norway for decades. Chemical parameters have been measured a longer time, and during the latest years ecological monitoring has also been carried out. A common map for monitoring in the Finnish-Norwegian river basin district has not yet been made. This is due to a difference in approach between the two countries. The map for the Finnish side of the river basin district shows existing monitoring, while the maps for the Norwegian side show planned monitoring.

According to the Teno-Näätämöjoen-Paatsjoen RBMP from Finland, since 2006 there is a joint environmental monitoring program between Finland, Norway and Russia has been prepared for the Pasvik river basin. Finland further provided information regarding the EU ENPI Project Trilateral Cooperation on Environmental Challenges in the Joint Border Area, which was implemented in 2012–2014. The project area covered the watersheds of Lake Inarijärvi and the Pasvik River. The effects of pollutants, water level regulation and climate change on the ecological state of the Pasvik River and Lake Inarijärvi and the state of the small lakes in the vicinity of the Pasvik watercourse were assessed and a monitoring program

for these areas was developed. Also, the possibilities of using freshwater pearl mussels in assessing the effects of pollution and climate change in small rivers were studied. The project developed further the monitoring programme planned earlier for this region, which is based both on the national monitoring programmes and on recommendations of the project.

Coordination and harmonization of Status Classification

Ecological status

In the Norwegian part of the international river basin there are over 1000 water bodies. Few of these have been monitored according to the WFD requirements, and a complete classification can, therefore, rarely be carried out. However, the area is sparsely populated and most industrial activity in the river basin is located along the coast. Many of the water bodies have no recorded impacts on the aquatic environment, and it is therefore assumed that the ecological condition of these water bodies is very good. In uncertain cases, Finland has frequently classified water bodies as having a good or high status.

There are seven rivers or river tributaries with lower ecological status in Norway compared to Finland. The differences are due to different water quality parameters and limit values or different approaches concerning alien species and fishing pressures. There are also different methods for determination of the final status class. The greatest difference is for the Skiehččanjohka (Kietsimäjoki) River, which is classified as moderate status in Norway, but good ecological status in Finland.

According to the iRBMP, the national differences in ecological status assessment is the largest issue in the basin. Current differences in classification methods result in different status even with the same data. The main issue is that in Norway the one-out-all-out principle is used to designate ecological status, while in Finland a median value is used, which has led to different results with the same data on either side of the border.

Figure 1.9.1 Differences in ecological status of transboundary water bodies in the iRBD

Norwegian name	Finnish name	Status in Norway	Status in Finland	Difference in assessment of
Anárjohka	Inarijoki	Assumed good	High	Water quality/chemistry
Tanaelva Utsjok til Hillagurra/Polmak	Teno alaosa	Assumed good	High	Water quality/chemistry
Tanaelva Karasjok til Utsjok	Teno yläosa	Assumed good	High	Water quality/chemistry
Neiden	Näätämöjoki	Assumed good	High	Alien species (pink salmon)
Munkelva	Uutuanjoki	Assumed good	High	Alien species (pink salmon)
Skiehččanjohka	Kietsimäjoki yläosa	Moderate	Good	Overfishing
Skiehččanjohka	Kietsimäjoki alaosa	Moderate	Good	Overfishing

Source: Joint water management of the Finnish-Norwegian river basin district (2016-2021)

It was noted that a report on the ecological status of fish for rivers with anadromous salmonids in the Norwegian areas of the Finnish-Norwegian river basin district was published in 2015. The new data had not been incorporated into the Norwegian river basin management plan before it was approved.

Chemical status

Data for classification of chemical status in the Tana-Neiden-Pasvik river basin area consists mainly of heavy metal water monitoring and mercury surveys in fish. Norway has clarified that Finland and Norway have different mean and limit values for mercury, meaning Norway and Finland likely report different chemical status for the iRBD. There may be other differences for other priority substances.

Chemical status on the Finnish side of the river basin district area is good. No concentrations of priority substances that exceed the limits used for the classification are found in the area. On the Finnish side of the river basin district area, there are no installations or operators which are authorized to use or discharge EU priority substances to the aquatic environment.

In Norway, nearly 97 % of water bodies lack an assessment of chemical status. This is due to a lack of data. There is only one chemical monitoring station, which forms part of a national monitoring programme for transboundary air pollution and acid rain. Norway clarified that that the County Governor decided to solely use monitoring data for determining chemical status as opposed to additionally use expert judgement where data is still unavailable.

1.9.5. Designation of heavily modified water bodies, artificial water bodies and definition of good ecological potential

No joint method regarding the designation of heavily modified water bodies has been applied for the iRBD (and its transboundary rivers). There is no joint method for defining good ecological potential.

In Norway, heavily modified water bodies are identified using the "measure method". The River Basin District Board decides which waterbodies should be defined as heavily modified. The iRBMP notes that in the Norwegian part of the basin, the designation of water bodies as heavily modified has been hindered by not knowing the ecological status of water bodies. The Office of the Finnmark County Governor and the Norwegian Water Resources and Energy Directorate have in cooperation reviewed all waterbodies affected by hydropower production, and attempted to set an ecological status, define heavily modified water body status and define an appropriate environmental objective. This has been done based on expert judgement and various reports on waterbodies. A full explanation is available in the Norwegian national river basin management plan for Finnmark.

In the Norwegian part of the river basin there are 27 waterbodies defined as heavily modified. Only river and lake water bodies affected by hydropower have been defined as heavily modified in this planning period. For most of the heavily modified water bodies, the measures suggested are problem mapping and/or investigative monitoring, and to a lesser extent biotope measures and suggestions for minimum water flow to secure better conditions for fish. The latter measures are mainly suggested for prioritised watercourses in the river basin district. Problem mapping and investigative monitoring is widely suggested to gain data on ecological status, which will give a better starting point for considering mitigating measures. No heavily modified water bodies have been defined in coastal waters, as complete guidelines are not yet in place.

On the Finnish side of the river basin district, Lake Inarijärvi and Rahajärvi are regulated for hydropower production, but their environmental status does not meet the criteria for the designation of a heavily modified water body status.

1.9.6. Environmental Objectives and Exemptions

Environmental exemptions have not been coordinated in the iRBD. The iRBMP emphasises the deadline for achieving environmental objectives in water bodies is different between the two countries. In Finland, as a EU Member State, the deadline was 2015; in Norway the deadline is 2021. The plan states that any surface water bodies in Finland that had not yet achieved good status by 2015 have exemptions under Article 4 (4) – extension of the deadline. Exemptions for groundwater bodies are not mentioned in the iRBMP as there are no transboundary groundwater bodies.

In the Norwegian part of the international river basin, there are 34 water bodies that have received an exemption in accordance with Article 4 (4). In the Finnish part, there is one river water body where an Article 4 (4) has been applied. This waterbody is set to attain good ecological status by 2021.

Article 4 (5) exemptions have not been applied in the iRBD. Exemptions in accordance with Article 4 (6) and (7) have not been applied prior to approval of the plans in 2015.

1.9.7. Programme of measures

According to the iRBMP, as the coordination process was not yet complete, and due to differences in timetables, it was challenging to coordinate common measures for the Finnish-Norwegian river basin district for the second management cycle. The competent authorities have previously agreed to coordinate measures to prevent wastewater pollution and prevent the spreading of *Gyrodactylus salaris*, but at the moment there are no common measures. The two countries coordinate by keeping the other informed on the national measures planned, with the aim to improve coordination between the relevant sector authorities to achieve the environmental objectives of transboundary waterbodies.

In Norway and Finland, the process of designing a programme of measures has been organised regionally. In Norway, the River Basin District Board was informed of the upcoming process in the autumn of 2012. In Finnmark, the requests for measures from the responsible sector authorities was organised regionally; the water basin districts assessed the environmental pressures present in their waterbodies and sent formal requests to the competent authority of the Finnmark County Council. The competent authority then collected and coordinated all requests and directed them to each sector authority. The sector authorities then proceeded to assess the information presented to them, conduct inspections of the waterbodies in question, and suggest measures. Based on these responses, the water districts compiled local measure analyses, which formed the basis for the regional programme of measures. All sector authorities responded to the requests sent by the competent authority, although some did so after the regional deadline of the 1st of September in Norway. This was

due to a shortage of resources and a lack of national guidelines regarding the compilation of the programme of measures. For many sector authorities, suggesting measures and giving detailed information on costs and timeframes requires information on ecological status, which could not be attained within the set deadlines.

In Finland, regional cooperation group meetings were held during the process. In Norway, meetings with sector authorities were held to clarify their role and responsibilities. Public consultations with the greater public were held as well. National guidelines for the program of measures were published during the spring of 2013.

A majority of measures suggested for the Norwegian part of the international river basin are problem mapping, investigative monitoring or collecting further information in order to determine ecological status and suggest more concrete measures if necessary, and to determine if the pressure is significant. There is no information on costs of measures at this point, as measures are a suggestion from sector authorities and there is no guarantee that they will be implemented if the costs are deemed higher than the benefits. Some measures will be implemented before 2016 as they form part of local and regional management processes which operate with different planning periods that the Water Management Regulation. This largely concerns improvements in municipal wastewater management. Some of the measures suggested are also based on other legislation than the Water Management Regulation, but nonetheless are connected in terms of water quality.

The iRBMP includes a list of measures for the iRBD. Measures that are being implemented in both Norway and Finland (but not jointly) include:

- Improvements in municipal wastewater treatment,
- Remove fish migration barriers,
- Problem mapping in regulated waterbodies, other measures,
- Pollution from diffuse sources (run-off from settlements, mining, industry, landfills, polluted harbours, etc.), and
- Preventive measures for *Gyrodactylus salaris.*

1.9.8. Economic analysis and water pricing policies

The iRBMP provides a summary of water uses and future trends, prices and a brief statement regarding cost recovery.

In Norway it is mainly the municipalities or municipally owned companies which are in charge of supplying water and wastewater services for the general population and industry. An average Norwegian household pays roughly 7000 NOK/year for these services. This number may increase in order to secure necessary investments and maintenance, but municipalities may not price these services higher than a strictly necessary level (full cost level). The replacement costs for water supply and wastewater management in Norway is estimated to be NOK 1053 billion. Many improvements have already been made, but increasingly strict quality requirements mean that costs will continue to be high in the future.

In Finland, a total of two household water plants have been included in the calculations, which both are profitable. The cost of coverage for the entire region (the income/expenses) had an average of 115.6 %. Subsidies have not been paid for the plants in Finland in the year 2011. Use of water is estimated to slightly decline in the future, mainly due to the reduction in the population number in the region and the increasing prevalence of the modern water saving equipment in the households.

1.9.9. Considerations specific to Protected Areas

There is a map showing the protected areas in the Finnish-Norwegian river basin district. Two national salmon fjords and rivers in Norway are highlighted which cross the border to Finland (the rivers Tana and Neiden). Protected areas are not discussed in detail in the Joint water management of the Finnish-Norwegian river basin district (2016-2021) as the process of identifying water bodies in protected areas has not been completed in Norway.

In Finland, 10 Natura 2000 areas and 14 Class I groundwater areas in the Finnish-Norwegian river basin district area are highlighted. There are no EU bathing water areas in the river basin district on the Finnish side. For Norway, the register includes protected areas in 1) drinking water zones, 2) aquatic species of economic importance, 3) areas of recreation (bathing areas), 4) areas sensitive to nutrient loading and 5) areas chosen for the protection of habitats and species. An external link to the register for the Norwegian part is included in the iRBMP (www.vannportalen.no and www.vann-nett.no (upon completion)).

1.9.10. Recommendations

Joint water management efforts in the Finnish-Norwegian river basin district have led to considerable improvements in the coordinated implementation of the WFD in the iRBD and the harmonisation of approaches and methodologies. The iRBMP points out areas where further cooperation is needed, namely joint monitoring, ecological status assessment and the delineation of water bodies. The iRBMP also mentions that since the status assessment is not complete, it is difficult to estimate the need for exemptions and plan measures, including joint measures.

The following recommendations can be made to further improve cooperation:

- The existing gaps and further harmonisation needs should be appropriately addressed and the required measures implemented as soon as possible for the timely achievement of the WFD environmental objectives.