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COMMISSION STAFF WORKING DOCUMENT

European Overview - River Basin Management Plans

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Acronyms

AWB	Artificial water body
CIS	Common Implementation Strategy
EU	European Union
EQS	Environmental Quality Standard
FRMP	Flood Risk Management Plan
GEP	Good Ecological Potential
GES	Good Ecological Status
HMWB	Heavily Modified Water Body
ICPDR	International Commission for the Protection of the Danube River
iRBMP	International River Basin Management Plan
iRBD	International River Basin District
km	Kilometre
km^2	Kilometre squared
KTM	Key Type of Measure
MSFD	Marine Strategy Framework Directive
PoM	Programme of Measures
QA/QC Directive	Quality Assurance/Quality Control Directive
RBD	River Basin District
RBMP	River Basin Management Plan
RBSP	River Basin Specific Pollutants
WFD	Water Framework Directive
WISE	Water Information System for Europe

Executive summary

EU water policy has delivered significant improvements to water quality over the past four decades. Thanks to EU water law and the implementation efforts of Member States, supported by EU funding, it is increasingly possible to reconcile life in a densely populated continent, and a growing economy, with a progressive improvement of water quality. There are still significant pressures on water quality and quantity, but an effective approach to mitigate or eliminate these pressures has been chosen. Vigilance in intensification and implementation of efforts will however be needed throughout the EU to achieve the objectives of the Water Framework Directive (WFD).

EU Member States reported their second River Basin Management Plans (RBMPs) for the period 2015-2021 to the European Commission under the WFD as of March 2016; in some cases with significant delays. The Commission's analysis now also covers the delayed RBMPs, which were not adopted and reported on time, i.e. Canary Islands in Spain, Greece, Ireland and Lithuania[1].

This assessment of all RBMPs covers more than 118 000 surface water bodies and more than 14 000 groundwater bodies. The Commission focused on developments compared to its analysis of the first RBMPs (covering the period 2009-2015) in the main areas of integrated water management. The Commission's analysis highlights progress and identifies remaining challenges. This assessment includes the international river basins.

Governance

Appropriate governance of water quality management at the river basin level is an essential precondition for achieving the WFD objectives. For the second RBMPs, many Member States have strengthened coordination among the responsible authorities. They have also made considerable efforts to improve public consultation and strengthen the active involvement of stakeholders. Information and views provided by stakeholders have led to changes to the draft RBMPs across the whole EU. The majority of Member States have carried out joint consultations of the second RBMPs with the Flood Risk Management Plans (FRMPs) but fewer have carried out joint consultations with the Marine Strategy Framework Directive (MSFD), or incorporated MSFD objectives in their RBMPs. International cooperation has overall further improved in the second cycle.

[1] The Canary Islands in Spain and Gibraltar in the UK have not been part of this assessment either.

Characterisation of river basin districts

Article 5 of the WFD requires Member States to undertake an analysis of the characteristics of each RBD or portion of an international RBD falling within their territory. This analysis had to be reviewed by the end of 2013 as the basis for the second RBMPs. Member States had to review the general description of the characteristics of their RBDs within the RBMPs, the definition of all relevant categories and types of water bodies (delineation) and the identification of the pressures and impacts on water status. For the EU overall, the delineation of about 90% of the surface water bodies (by number of water bodies) and around 70% of the groundwater bodies (by area) was unchanged from the first to the second RBMPs. Progress has been made since the first RBMPs in the establishment of reference conditions, however gaps still remain, as in most Member States, reference conditions have not been established for all water body types (rivers, lakes, transitional and costal) and for all quality elements. A few Member States have established all reference conditions, including Austria, Hungary and Poland. The quality elements whose type-specific reference conditions showed the most significant gaps for surface water body types were found to be the hydro-morphological ones, as most Member States established reference conditions only for some water categories, and 9 Member States did not establish reference conditions for any water category (including Denmark, Finland, France, Croatia, Ireland[2], Italy, Latvia and Malta).

Even if there is better knowledge on the significant pressures which may put water bodies at risk of failing the objectives, significant gaps remain, which will need to be addressed in the current cycle, particularly in defining thresholds and criteria for significance and impact. Further work is also required by Member States on apportioning pressures to sectors and activities to design more targeted measures.

For the second RBMPs, almost all River Basin Districts (RBDs) have reported inventories for at least some Priority Substances[3]. Some Members States have included all Priority Substances, including Austria, Cyprus, Luxembourg, Lithuania, Latvia and Slovenia. In many cases, justification was provided for not including the missing Substances in the inventories. In some Member States, less than 10 substances have been included in the inventories, this is the case

[2] Ireland has subsequently informed the Commission that reference conditions for hydromorphological elements are in place.

[3] Under the Environmental Quality Standards Directive (Directive 2008/105/EC), Member States are required to establish an inventory of emissions, discharges and losses of the substances in Annex I of the Directive.

for Bulgaria, Croatia, Malta, Sweden and Slovakia. Few Member States have complete inventories for discharges, emissions and losses of such harmful substances. Furthermore, the inventories are mainly based on point sources while diffuse source inputs are insufficiently addressed. In Greece or specific RBDs of Spain (Ceuta, Fuerteventura, Lanzarote, La Palma, La Gomera and El Hierro), no inventory of the emission of discharges and losses of all Priority Substances and the eight other pollutants was reported.

Monitoring and assessment of ecological status of surface water bodies

The WFD requires Member States to establish monitoring programmes for the assessment of the status of surface and groundwater to provide a coherent and comprehensive overview of water status within each RBD. Member States have to establish a surveillance monitoring programme and an operational monitoring programme. They may also need in some cases to establish programmes of investigative monitoring.

In the second RBMPs, for almost all water bodies it has been possible to establish their status, reducing much of the uncertainty found in the previous cycle. This is the case even if there have been some significant changes, both increases and decreases, in the number of monitoring sites and in the proportion of surface water bodies included in monitoring used for the second RBMPs compared to the first. These changes partially relate to the revised characterisation of water bodies between the first and second plans.

There are still significant gaps in the biological and hydro-morphological quality elements required to be monitored in each water category. This is particularly so for the hydro-morphological quality elements, which are not monitored at all in the Czech Republic, Ireland and Croatia, only to a limited extent in Bulgaria, Portugal and France, and show significant gaps in practically all Member States. Significant gaps also persist in the monitoring of biological quality elements.

Environmental Quality Standards (EQSs) for RBSPs have not always been derived in accordance with the Technical Guidance[4] developed under the Common Implementation Strategy[5]. This is the case for the Czech Republic, Finland, Croatia, Italy, Luxembourg, Latvia, Malta and Poland, and, to a large extent, Spain. For Greece, no information were reported on wether or not EQSs were derived from the Technical Guide. Furthermore, the analytical methods used for some RBSPs did not correspond to the requirements of the relevant

[4] Technical Guidance For Deriving Environmental Quality Standards
[5] https://circabc.europa.eu/w/browse/3eaafe7c-0857-47d4-a896-8022df48d3ba

Commission Directive[6]. This is particularly the case of Malta, for which none of the analytical methods were in line with the requirements.

Annex V of the WFD establishes the classification for ecological status (and ecological potential, for heavily modified water bodies and artificial water bodies), which is an expression of the quality of the structure and functioning of aquatic ecosystems associated with surface waters. The overall ecological status/potential has not improved since the first RBMPs. Overall, there is a much better understanding of the situation of water bodies and the proportion of water bodies with unknown ecological status/potential has decreased significantly since the first cycle. The overall confidence in the classification has improved in the second RBMPs compared to the first, mainly due to better designed monitoring networks and improved availability and quality of the information for the status assessment methods.

There has been progress in the development of biological assessment methods since the first RBMPs. However some Member States, such as Austria, The Netherlands and Romania, have not reported methods sensitive to chemical pollution, although chemical pollution had already been reported in the first cycle as having a significant impact in those Member States. Hydro-morphological quality elements are not assessed in the Czech Republic, Denmark, Ireland and The Netherlands, while in many other cases this concerns some hydro-morphological quality elements for some water types, particularly for coastal waters.

The 'one-out all-out' principle is a key principle that reflects the integrated approach on which the WFD is based. The overall status is only 'good' if all the elements comprised are at least considered 'good'. This ensures that all pressures capable of degrading the water status are addressed. All 175 RBDs with reported information except Madeira, in Portugal, indicated that the one-out-all-out principle had been applied in the second RBMPs.

Monitoring and assessment of chemical status of surface water bodies

The WFD objective of achieving good surface water chemical status means that concentrations of pollutants cannot exceed the environmental quality standards established in the Environmental Quality Standards Directive[7].

Overall, the percentage of water bodies that are of unknown chemical status has decreased significantly since the first RBMPs from 39 % of all surface water bodies to only 19 %. This indicates that the monitoring (spatially, substances and frequency) and status assessment

[6] Directive laying down technical specifications for chemical analysis and monitoring of water status (2009/90/EC) for the strictest standards applied
[7] Directive 2008/105/EC

methods have improved overall. A limited number of Member states have more than 60% of their water bodies in unknown status (Bulgaria, Denmark, Ireland, Estonia, Latvia, Portugal).

Against a background of little change overall in the proportion of water bodies achieving good status and an increase in the proportion failing to achieve good status (most likely due to an increase in knowledge), several cases of improvements between the first and second RBMPs were reported for particular Priority Substances.

Grouping techniques and expert judgement have been widely used to classify water bodies. Some RBMPs provide information on the approaches used. The use of these may also be at least partly linked to the reduced confidence in the assessment of status. The range of confidence levels varies widely between Member States. This may result from various factors, including differences in the methodologies to assess the level of confidence.

Although it is not expected that all water bodies be monitored, the monitoring undertaken should be sufficient to obtain a reliable and robust assessment of the chemical status of all water bodies in the RBD, and should allow Member States to assess the effectiveness of the measures implemented to reach good status. The WFD also requires Member States to monitor all discharged priority substances.

Overall the extent of monitoring of Priority Substances across the EU has been very diverse, which tends to reflect differences in population density and intensity of pressures between Member States but also different strategies for monitoring.

Generally, the spatial extent of monitoring in water was limited in terms of the proportion of water bodies monitored with some variation between water categories. Some Member States (Slovenia, Malta and Belgium) however monitored at least some priority substances in more than 80% of their surface water bodies. The majority of Member States monitor all of their water bodies failing to achieve good status as part of their operational monitoring programmes in at least some of their RBDs and most commonly in coastal and transitional waters.

For status assessment, all Member States monitored Priority Substances in water. Nearly three quarters of Member States monitored mercury, hexachlorobenzene and/or hexachlorobutadiene in biota in at least some RBDs for status assessment, even if they generally (also) monitored in water in the same and other RBDs.

Relatively few chemical pollutants have individually a large impact on status. These include certain metals (cadmium, nickel, lead) and several ubiquitous, persistent, bioaccumulative and toxic substances, such as mercury[8], which is involved in by far the largest number of failures to meet good chemical status. As regards measures against mercury pollution, a new Mercury Regulation[9], applicable since 1 January 2018, seeks to limit further mercury use and emissions by, *inter alia*, regulating trade in mercury and mercury compounds and improving the management of mercury waste. The atmospheric deposition onto EU surface waters of mercury from non-EU sources – a significant source of pollution - is expected to decrease in the decades to come, following the entry into force, since August 2017, of the Minamata Convention on Mercury[10], already ratified by over 100 countries, including major global players.

The majority of Member States monitored all of the Priority Substances identified as discharged into their RBDs with the exception of a few Priority Substances and with some variation among RBDs within Member States. Although significant efforts have been made to establish inventories of emissions, few Member States reported complete inventories for all their RBDs, and it is therefore unclear whether all discharged substances have been identified. In some cases (eg Cyprus, Slovenia), all substances were included in the inventories, and all discharged substances were monitored.

For trend assessment, around two-thirds of Member States reported that arrangements were in place for long-term trend analysis in most, but not all, RBDs. All but two of these monitored sediment and/or biota for this reason. Most Member States monitored the majority of the 14 substances though not in all RBDs and not in all water categories. Some Member States (including Greece, Hungary, Bulgaria, Czech Republic) did not report any trend monitoring in any of their RBDs.

According to Article 4 of the Directive 2008/105/EC Member States may designate mixing zones adjacent to points of discharge. Concentrations of one or more substances may exceed the relevant EQS within such mixing zones if they do not affect the compliance of the rest of the surface water body with those standards. Just over a quarter of Member States designated mixing zones in at least some RBDs, in a small portion of water bodies overall.

The EQSD allows Member States to take into account the natural background concentrations and bioavailability for metals and their compounds when assessing the monitoring results against the EQS. Most Member States have used this possibility (sometimes only in some RBDs within a Member State).

[8] Other ubiquitous, persistent, bioaccumulative and toxic substances causing failure to meet good chemical status are pBDEs, tributyltin and certain polycyclic aromatic hydrocarbons (Benzo(a)pyrene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, benzo(b)fluoranthene and benzo(k)fluoranthene).

[9] (EU)2017/852

[10] http://www.mercuryconvention.org/

Monitoring and assessment of groundwater quantitative status

The groundwater quantitative monitoring network has to include sufficient representative monitoring points to estimate groundwater level in each groundwater body or group of bodies taking into account short and long-term variations in recharge. Overall, groundwater quantitative monitoring improved since the first RBMPs with increasing coverage of groundwater bodies. Most Member States increased the coverage of groundwater bodies by quantitative monitoring or at least kept the coverage at high level (decreases were observed in Bulgaria, Estonia, Finland, Romania). Nevertheless, a significant number of groundwater bodies (around 65%) are still without quantitative monitoring sites in specific Member States and the partially reported grouping of groundwater bodies for monitoring purposes does not fully explain the absence of monitoring.

The definition of quantitative status is set out in WFD Annex V (2.1.2). Good groundwater quantitative status is achieved when the level of groundwater in the groundwater body is such that the available groundwater resource is not exceeded by the long term annual average rate of abstraction. The groundwater quantitative status situation improved with 88% of the groundwater bodies representing 90% of the total groundwater body area being at good status. Most of the changes in status are due to the significant re-delineations of groundwater bodies better targeting the groundwater bodies at risk and improved status assessment methodologies. Next to the improvement of status, also knowledge improved, which is expressed in the decreased share of groundwater bodies at unknown status (6% of groundwater bodies representing 1% of the area) and the increased confidence in the status results which is high or medium for about 29% respectively 37% of the groundwater bodies.

The WFD requires for the characterisation of RBDs that Member States estimate and identify the impact of significant water flow regulation, including water transfer and diversion, on overall flow characteristics and water balances. Water balance is almost fully considered in status assessment. Also associated surface water bodies and groundwater dependent terrestrial ecosystems are fully considered in almost all Member States where such ecosystems exist and where they are related to groundwater quantitative risk. This is a significant improvement since the previous RBMPs.

Monitoring and assessment of groundwater chemical status

The surveillance monitoring of chemical status of groundwater needs to be carried out to supplement and validate the impact assessment procedure and provide information for use in the assessment of long-term trends, both as a result of changes in natural conditions and through anthropogenic activity. Sufficient monitoring sites should be selected for bodies identified as being at risk and for bodies which cross a Member State border.

The definition of chemical status is set out in WFD Annex V (2.3.2). Good groundwater chemical status is achieved when there is no saline intrusion, monitoring data do not show exceedance of relevant standards and groundwater concentrations do not result in status failure of associated surface waters, nor in any significant diminution of their ecological or chemical quality, nor in any significant damage to terrestrial ecosystems which directly depend on the groundwater body.

Most groundwater bodies have been assessed, and for only very few the chemical status is unknown. Overall, the confidence in the status results is relatively high. As explained above, some of the changes in the chemical status of groundwaters are also due to the reported re-delineation of a significant number of groundwater bodies, improvements of the status assessment methods and changed threshold values. Therefore, comparison between both reporting cycles need to be done with caution.

About 82% of groundwater bodies (representing 75% of the total groundwater body area) in good groundwater chemical status. The overall chemical status of groundwater bodies improved only very little since the first cycle[11]. Also the reported expected achievement of good status for most of the groundwater bodies by 2027 or beyond 2027 demonstrates the long time-lag between the implementation of measures and their effectiveness in groundwater.

The consideration of groundwater associated aquatic and groundwater dependent terrestrial ecosystems improved significantly. In almost all Member States such ecosystems were identified and commonly considered in status assessment if risk was related to them.

Overall, groundwater chemical monitoring did not improve since the first RBMPs. Six Member States (Slovenia, Luxembourg, Malta, the Netherlands, Estonia and Croatia) have now full coverage of groundwater bodies by surveillance monitoring. On the contrary a few Member States (e.g. Spain, the United Kingdom) reduced the coverage of groundwater bodies by surveillance monitoring while some others have still limited coverage of groundwater bodies (e.g. Finland, Sweden, Denmark). A significant number of groundwater bodies is still without chemical monitoring sites and the partially reported grouping of groundwater bodies for monitoring purposes does not fully justify the absence of monitoring. Not all groundwater bodies which were identified at risk of failing good chemical status are subject to operational

[11] About 80% of groundwater bodies, representing 72% in terms of area, were reported to be of good chemical status in 2009

monitoring and also not all substances causing risk are fully covered. As with surveillance monitoring the partially reported grouping of groundwater bodies cannot completely justify the absence of operational monitoring.

Designation of Heavily Modified Water Bodies and definition of Good Ecological Potential

According to the WFD Article 4(3)(a) and (b), Member States may designate a water body as heavily modified if the changes to the hydro-morphological characteristics of that body which would be necessary for achieving GES would have significant adverse effects on the use, and the beneficial objectives served by modified characteristics of the water body cannot, for reasons of technical feasibility or disproportionate costs, reasonably be achieved by other means, which are a significantly better environmental option.

At EU level, the extent of designated Heavily Modified Water Bodies (HMWBs) and Artificial Water Bodies (AWBs) has remained similar to the first RBMPs: approximately 12% of European surface water bodies are designated as HMWB and 3% as AWB. The extent of designation varies across Member States, with some States designating more than 30% of their water bodies as heavily modified (Greece, Hungary, Malta, Germany and the Netherlands), while other States designate less than 5% of their water bodies as heavily modified (Finland, Ireland and Sweden).

A methodology for designating HMWB is described for the RBMPs of all Member States, with few exceptions such as Croatia, where a consistent description of the method is missing.

In some countries (e.g. in Denmark, Sweden, Slovakia), assessments to complete the designation of HMWB and AWB are still ongoing and further changes to the extent of designation may take place during the second cycle.

Most Member State methodologies address the definition of “substantial changes in character” in order to consider a water body for designation as HMWB and report relevant criteria. Descriptions of how to assess significant adverse effects of restoration measures on the use or wider environment and how to assess other means which are better environmental options were assessed in detail in about two thirds of the Member States, but not done in particular for the Czech Republic, Germany, Greece and Croatia. Only few Member States provide information on specific criteria used to assess significant adverse effects of restoration measures, such as Austria, and the criteria reported are mainly of qualitative nature, similar to the first RBMPs.

The status of HMWB and AWB needs to be assessed in terms of achieving at least Good Ecological Potential (GEP) as this is defined in Annex V of the Directive. This refers to the best approximation to the best status which could be achieved, given the hydro-morphological characteristics that cannot be changed without significant adverse effects on the specified use or the wider environment. As regards the definition of Good Ecological Potential (GEP) some improvements have been noted in relation to the methodology, which will allow for easier tracking of progress. In the second RBMPs, GEP is reported as defined (or partly defined) in the majority of Member States. Methodological improvements for the establishment of GEP are reported by a number of countries, while in some, new national methods have been developed since the first cycle. One of the key improvements since the first RBMPs is the inclusion of more biological quality elements in the definition of GEP. In most Member States, the establishment of values of biological quality elements for GEP is based on assessment methods similar to those used for good ecological status (GES) of natural water bodies, but often using lower thresholds to distinguish between classes of "good" and "moderate". Mitigation measures for defining GEP are reported in most Member States. However, the level of information provided on the ecological changes that the measures are designed to achieve remains very limited, indicating little progress in this respect since the first RBMPs.

Environmental objectives and exemptions

The exemptions foreseen in Article 4[12] of the Directive are still used extensively, with around half of Europe's water bodies currently under an exemption, to a greater extent for surface waters than for groundwaters. Exemptions under Article 4(4) are still used to a significant extent in all Member States. For surface waters, technical feasibility, natural conditions and disproportionate costs are used as justifications. For groundwater bodies, mainly natural conditions and technical feasibility are used to justify these exemptions, with technical feasibility used more often than natural conditions. Article 4(5) exemptions have been applied more often in the second cycle than in the first in several Member States.

The justifications provided in the second RBMPs for exemptions under Article 4(4) and 4(5) are more detailed and more consistently reported on water body level compared to the first cycle, when in many cases justifications were very general and it was often unclear when the environmental objectives were expected to be reached (under Article 4(4)). However, justifications are in many cases still very generic. Technical feasibility under Article 4(4) and

[12] Article 4(1) defines the WFD general objective to be achieved in all surface and groundwater bodies, i.e. good status or potential (for HMWBs) by 2015, and introduces the principle of preventing any further deterioration of status. A number of exemptions to the general objectives are possible under certain conditions. Article 4(4) allows for an extension of the deadline beyond 2015, Article 4(5) allows for the achievement of less stringent objectives, Article 4(6) allows a temporary deterioration in the status of water bodies and Article 4(7) sets out conditions in which deterioration of status or failure to achieve certain of the WFD objectives may be permitted for new modifications to the physical characteristics of surface water bodies, and deterioration from high to good status may be possible as a result of new sustainable human development activities.

technical 'infeasibility' in relation to Article 4(5) needs to be substantially improved and made more transparent in most of the RBMPs. Also, the justifications for disproportionate costs under Article 4(4) and Article 4(5) should be better distinguished. A few Member States have applied Article 4(6) exemptions due to prolonged droughts, such as Spain and in the Netherlands. In Portugal a potential use of this exemption is referred to in the RBMPs.

The application of Article 4(7) has increased in the second RBMPs. It can be concluded that more projects are in the pipeline and more cases of Article 4(7) application may occur in the future. Some progress has been made in terms of methodologies to assess impacts on the status of water bodies. The assessment of cumulative effects, though, remains a challenge. Information on how to determine overriding public interest is limited and it is not clear to which extent public consultations have taken place. The newly developed CIS guidance document on Article 4(7) of December 2017 provides important clarifications and is expected to further improve Article 4(7) related assessments and reporting for the next RBMPs.

The fact that exemptions are so widely used is an indicator of the significant efforts needed from Member States to achieve good status or good potential by 2027. However, and in line with what is required by that same Article, Member States need to better ensure that the exemptions applied for one water body do not permanently exclude or compromise the achievement of the environmental objectives in other water bodies (Article 4(8)), and guarantee at least the level of protection provided for in other EU environmental law (Article 4(9)).

PROGRAMMES OF MEASURES (PoMs)

General

Whilst progress has been made in implementing the first programmes of measures (PoMs), these PoMs have not been fully implemented. A lack of adequate finance is likely to continue to present an obstacle also to implementing the second PoMs as no less than 50 % of RBDs have yet to secure finance for all relevant sectors.

Most Member States have made some progress in identifying the gap to good status for each significant pressure, and the level of implementation of measures required to achieve good status. This is a significant improvement that will allow for better identification and prioritisation of the measures. However, more work is needed to refine this for the third PoMs.

Not all Member States have reported other significant pressures. It is not clear whether this is because they are not relevant or because they have not assessed them. For those Member States that have identified other pressures, measures are in place to address them, the gap to good status has generally been identified, and indicators developed to identify the level of implementation required to achieve good status.

Measures to tackle main pressures on water bodies

A. Abstractions and water scarcity

More than 7 600 (7%) of Europe's surface water bodies are affected by significant water abstraction pressures and 16% of the area of groundwater bodies is affected by over-abstraction. Basic and supplementary measures are in place in most of the RBDs concerned with water scarcity. However, progress in reducing pressures is slow.

Some Member States still need progress in fulfilling previous recommendations to improve water scarcity management (Ireland, Spain, Portugal, Italy, Malta, Sweden, Slovenia). However, relevant action in extending metering, water abstraction controls and reviewing licenses has been found in some Member States (Cyprus, Hungary, Malta, Portugal, Slovenia, United Kingdom), while in others water abstraction datasets have improved. In most Member States, small abstractions are exempted from controls and/or registering, despite the fact that water bodies suffering from significant abstraction pressures are not achieving good status.

B. Pollution from agriculture

Agriculture is a major driver of failure of good chemical status to EU groundwater and surface waters, mainly due to diffuse pollution by nutrients (nitrogen and phosphorus) and pesticides. Water abstraction for agriculture is the main significant pressure, among others, causing failure of good quantitative status of groundwater bodies. The biggest challenges in addressing the poor quality of water related to agricultural activities were found in Bulgaria, the Czech Republic, Germany, Spain, Croatia, Hungary, Poland and the United Kingdom.

About half of the Member States, which reported on their RBMPs, have carried out a gap assessment in relation to agricultural pressures in order to identify the efforts needed to reach the WFD targets.

Basic measures under Article 11(3)(h)[13], to tackle diffuse pollution, are reported for all assessed Member States, but not for all RBDs and not for all diffuse pollutants. Furthermore,

[13] Article 11(3) WFD on basic measures, which are the minimum requirements to be complied with, include in Article11(3)(h) the measures for diffuse sources liable to cause pollution, measures to prevent or control the input of pollutants. Controls may take the form of a requirement for prior regulation, such as a prohibition on the entry of pollutants into water, prior authorisation or registration based on general binding rules where such a requirement is not otherwise provided for under Community legislation. These controls shall be periodically reviewed and, where necessary, updated.

many of the supplementary measures in the second cycle programmes of measures are voluntary. The voluntary nature of measures could be a limiting factor if their uptake by farmers remains low. Most Member States have defined, or are in the process of defining, specific zones including specific water protection measures to avoid pollution to drinking water from agriculture.

Engagement with farmers seems to have increased, as most Member States report having consulted with farmers or farmers associations when setting up the programmes of measures. However, few Member States report the provision of advisory support services for farmers on measures implementation.

C. Pollution from other sectors (including nutrients, organic matter and chemicals)

Basic measures to reduce pollution from non-agricultural sources, such as an authorisation and/or permitting regime to control wastewater point source discharges, the operation of registers of wastewater discharges, and the prohibition or limitation of all direct discharges to groundwater, and/or other measures to eliminate / reduce pollution from priority substances and other substances, are in place in most of the Member States.

The number of Member States identifying substance-specific measures in their second RBMPs is significantly higher than the number which did so in their first RBMPs, although even where Member States have identified such measures, the coverage of substances causing failure is not always complete.

Measures have generally been reported in relation to failure of good status, but not in relation to phasing out the emissions of priority hazardous substances in RBDs where failure has not been observed.

D. Hydro-morphological alterations

The majority of Member States, with few exceptions (Croatia, Malta, Romania, French overseas RBDs), have reported operational Key Types of Measures (KTMs) to address significant hydro-morphological pressures (fish ladders, removal of structures, etc.). In the second RBMPs, information on the links between measures, hydro-morphological pressures and water uses/sectors has substantially improved. In some Member States, such as in Austria and Sweden, there will be small to medium progress in terms of closing the gap for hydro-morphological pressures by 2021, and the main progress is expected between 2021 and 2027. In other Member States, the information reported indicates that no or very little progress is expected in closing the gap for significant hydro-morphological pressures between 2015 and 2021, or this information has not been reported, such as in Bulgaria, Czech Republic, Denmark, Spain, Finland, Luxembourg, Latvia.

Establishing ecologically based flow regimes is an important hydro-morphological measure since to have a sufficient ecological flow regime is a prerequisite to reach good ecological status in rivers and it is crucial to maintain a flow throughout the river continuum. In most Member States, the work on defining and implementing ecological flows is still ongoing in the second cycle. The ecological flow has been reported as fully defined and implemented in Hungary and the Netherlands.

E. Cross-cutting measures requiring improved implementation

Economic analysis and water pricing policies

The WFD promotes the application of sound economic principles[14], methods and instruments for supporting the achievement of its objectives in the EU, including incentive pricing, cost recovery and the application of the polluter pays principle.

The ex-ante conditionality for water under the Common Provisions Regulation for the European Structural and Investment Funds for the period 2014-2020 has facilitated the preparation, timely adoption and reporting of several of the RBMPs. It also incited a number of Member States to address shortcomings in the implementation of the WFD, including by upgrading their water pricing policies, thereby improving the quality and legality of relevant investments[15].

Despite these efforts, still more progress is needed in implementing the changes to water pricing policies. In particular, the incomplete implementation of the principle of cost recovery and the limited use of economic instruments put a strain on the potential of promoting efficient water management through this instrument. In many cases methodologies to calculate costs are insufficiently documented and essential information is missing. A significant number of Member States has widened the definition of water services to include water use activities that have a significant impact on water bodies, such as for example hydropower generation, navigation and flood protection, or self-abstraction for irrigation and industrial purposes. In Latvia, for example, a broad definition of water services has been used, and cost recovery rates are presented for all these services.

In Hungary and Slovakia, for example, pricing policies have been modified to increase cost recovery in agriculture. At the same time the application of Article 9.4[16], which provides the

[14] Article 9 WFD
[15] SWD(2017) 127 final
[16] Article 9(4) WFD: Member States shall not be in breach of this Directive if they decide in accordance with established practices not to apply the provisions of paragraph 1, second sentence, and for that purpose the relevant provisions of paragraph 2, for a given water-use activity, where this does not compromise the purposes

possibility not to apply the principle of cost recovery to certain water services, varies across Member States, and also across RBDs in the same Member State.

Considerable work is reported by all Member States calculating financial costs of water services; nevertheless; the transparency of the calculation methods could be further improved. Environmental and resource costs are treated more specifically in this second cycle. There are evident efforts to calculate these costs and more information is available on methodologies and approaches, next to more transparency on whether these costs have been internalized or not. Nevertheless significant gaps remain and there is room to improve the transparency on how these costs have been dealt with. Overall, limited changes in the water-pricing policies have taken place in order to implement the Article 9 provisions.

Protected areas

The 'additional measures in protected areas' refer to those measures needed to achieve more stringent objectives than good status required by Article 4 of the WFD. More stringent objectives are those that have been set out in in relevant EU law under which the individual protected areas have been established.

Reporting of monitoring specifically targeted towards protected areas, including for shellfish, is very limited – in certain countries even missing. Especially regarding groundwater (both for drinking water, but also for groundwater dependent habitats and species), the gap between the actual level of reported and needed monitoring is large. Specific objectives have only been set for a limited number of protected areas and for a considerable part of water bodies with a specific objective, the more stringent objectives are already met, meaning that no further effort is needed.

The evaluation of the Drinking Water Directive (DWD)[17] assessed the coherence with the WFD and identified a missing link in the DWD as regards protecting drinking water resources. Therefore, the 2018 proposal for a recast of the DWD is introducing a risk based approach from abstraction to tap, and improving communication between Member States' authorities and water suppliers to ensure there is a full governance cycle for water. The proposal aims to improve coherence between the two Directives and ensure that the polluter pays principle and the precautionary principles both apply.

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and the achievement of the objectives of this Directive. Member States shall report the reasons for not fully applying paragraph 1, second sentence, in the river basin management plans.

[17] Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption

For nearly half the protected areas related to the Habitats and Birds Directives, no objectives have been set, because the additional needs for improvement are not yet known. Furthermore, for a significant part of the water bodies related to protected areas, GES is reported as sufficient also to reach the more stringent objectives according to other Directives. Therefore, the need for additional measures in protected areas can be described only for a very small number of water bodies. The second RBMPs will not bring significant progress in the status of protected areas, as the additional needs for setting specific water objectives for most of them are not yet known. This leaves a significant task for the third cycle for most Member States to live up to the requirements.

Adaptation to droughts and climate change

Only in about half of the Member States droughts were considered as a relevant feature for water management (e.g. Cyprus, Greece, Spain, the Netherlands, Portugal).

The key management measure to mitigate drought impact although not explicitly mentioned in the Water Framework Directive, is a Drought Management Plan. However, the Drought Management Plan has not been adopted in all relevant RBDs. A few Member States have, however, progressed in their drought management since the first cycle by developing drought indicators and extending the number of RBDs with Drought Management Plans (Slovenia, United Kingdom). The adoption of elements within the RBMPs that address clearly the key elements for drought mitigation (indicators, measures, organisational set-up) can provide a step-wise approach. Greece developed Strategic Drought and Water Shortage Contingency Plans (Drought Management Plans) already in the first cycle, which were included in the first RBMPs. No update of the Drought Management Plans has been reported in the second cycle, but a new measure for their update has been included in all second RBMPs.

Most Member States (e.g. Bulgaria, Germany, France, Italy, Slovakia) have reported that they have used the Common Implementation Guidance number 24 (“River Basin Management in a changing climate”), have done a climate proofing of the POMs and have a national Climate Change Strategy or Plan. However, the effectiveness of the climate proofing methodologies is unclear, and in general, green infrastructures and water retention measures are underused. Thus, it remains important that technical measures and planned infrastructures duly take into account climate change predictions, especially for the occurrence of extreme phenomena and changes in river flows.

International co-operation

Member States are obliged to coordinate their work under the WFD for each river basin that crosses national borders of EU countries. With non-EU countries they need to make reasonable efforts to coordinate. A large number of river basins is indeed international in the EU, including some very large ones like the basin of the Rhine and the Danube. The degree of cooperation differs from basin to basin. Usually, there is an international agreement in place, often also an international coordinating body and, in a more limited number of cases, a joint RBMP. Only a few international basins in the EU have none of these arrangements.

Overall, good progress has been made in the international coordination for shared river basins. Governance structures have been improved and further formalised, RBMPs have increasingly been developed and improved and comparability of findings improved as did compatibility of approaches developed in response to pressures. Generally, the stronger the governance of the basin and the more developed the RBMP, the better the results in terms of achieving WFD objectives.

1. INTRODUCTION

EU water policy has delivered significant improvements to water quality over the past four decades. Thanks to EU water legislation and the implementation efforts of Member States, we are increasingly able to reconcile life in a densily populated continent, with growing economies, with an improvement of water quality. There are still significant pressures on water quality and quantity, but an effective approach to mitigate or even eliminate these pressures has unmistakebly been chosen. Vigilance in implementation, and even intensification of efforts will however been needed throughout the EU to achieve the objectives of the WFD.

This Commission Staff Working Document is part of the Commission's fifth implementation report[18] as required by Article 18 of the WFD and is based on the assessment of the RBMPs for the period 2015-2021 reported by Member States. The report describes the results of the assessment based on the information reported by Member States. The report also covers the requirements of Article 11 of the Groundwater Directive and Article 5 of the EQSs Directive.

This document is accompanied by Staff Working Documents describing the results of the assessment by the Commission of the RBMPs relating to each Member State that reported on time and provided its information through the Water Information System for Europe (WISE), as well as the international RBMPs. The report on of the European Environment Agency on the State of Water 2018 provides a detailed overview and analysis of actual progress in quality of Europe's 80,000 water bodies.

[18] Earlier WFD implementation reports are available at : http://ec.europa.eu/environment/water/water-framework/impl_reports.htm

This document covers 28 EU Member States[19]. Lithuania, Ireland and Greece, as well as the Canary Islands[20], were added to the analysis after late reporting to WISE. The UK are included except for the RBMPs of Gibratar.

2. MAIN ELEMENTS OF THE WFD

The WFD introduced new and ambitious objectives to protect aquatic ecosystems in a more holistic way, considering all uses and users of water, and managing water on the scale of river basins. It introduced a number of key principles into the management and protection of aquatic resources:

(1) The integrated planning process at the scale of river basins, from characterisation to the definition of measures to reach the environmental objectives.
(2) A comprehensive assessment of pressures, impacts and status of the aquatic environment, including from the ecological perspective.
(3) The economic analysis of the measures proposed/taken and the use of economic instruments.
(4) The integrated water resources management principle encompassing targeting environmental objectives with water management and related policies objectives.
(5) Public participation and active involvement in water management.

The key objective of the WFD is to achieve good status for all water bodies by 2015. This comprises the objectives of good ecological and good chemical status for surface waters and good quantitative and good chemical status for groundwater.

The key tool for the implementation of the WFD is the RBMP and the accompanying POMs. The planning process is a step-by-step procedure in which each step builds on the previous one. Each step is important, starting from the transposition and the administrative arrangements, followed by the characterisation of the RBD, the monitoring and the assessment of status, the setting of objectives, the establishment of an appropriate POMs and its implementation including the monitoring and evaluation of the effectiveness of the measures supporting the following RBMP cycle.

The PoM is the tool designed to enable the Member States to respond appropriately to the relevant pressures identified at RBD level during the pressures and impacts analysis, with the objective of enabling the river basin/water body to reach good status. For example, if a

[19] By judgment of 26 December 2018, the Paris Administrative Court annulled the RBMP (SDAGE) of the Seine-Normandy basin for the period 2016-2021.

[20] Spain notified the Commission that the RBMP for La Gomera was endorsed on 17 September 2018, Tenerife, La Palma on 26 November 2018, Fuerteventura, Lanzarote, El Hierro on 26 December 2018, and Gran Canaria on 21 January 2019.

significant pressure is overlooked during the pressures and impacts analysis, the monitoring programme may not be designed to assess the pressure, and the POMs may not envisage action to address it.

The RBMP is a comprehensive document describing the implementation of water management and identifying all actions to be taken in the RBD.

The first RBMPs started in 2009 and ended in 2015. The plans were expected to deliver the objectives of the WFD including non-deterioration of water status and the achievement of good status by 2015. The preparatory process for the plans has already been subject to two Commission implementation reports[21], in 2007 and 2009. The Commission adopted its assessment of the first RMBPs in 2012, in the third implementation report while a fourth report, in 2015, covered the implementation of the planned Programmes of Measures that were due in 2012[22].

Implementation of the WFD continues to be supported by an informal network of Member States, EEA/EFTA countries and stakeholders under the banner of the Common Implementation Strategy (CIS), led by Water Directors of Member States and the Commission. The CIS has successfully delivered a large number of guidance documents and is now increasingly turning to promoting better implementation through exchange of best practice and discussion of policy developments.

3. Approach to the assessment of the River Basin Management Plans

The RBMPs are comprehensive documents that cover many aspects of water management, consisting of hundreds to thousands of pages of information, published in national languages. The assessment of the RBMPs has been a very challenging and complex task that has involved dealing with extensive information in more than 20 languages. While the RMBPs are used as a basis for the Commission's assessment, and the EEA State of Water report, they are primarily key management instruments for Member States.

In the frame of the CIS of the WFD Member States agreed that besides submitting their RBMPs to the Commission they would report pre-defined key information of their RBMPs electronically through the WISE; http://water.europa.eu). [23] WISE is a web-portal entry to water related information ranging from inland waters to marine that helps streamlining reporting under different water related EU legislation and allows the different European bodies to more easily collect and share information as well as public access to water data and information

[21] http://ec.europa.eu/environment/archives/water/implrep2007/index_en.htm#first
[22] http://ec.europa.eu/environment/water/water-framework/impl_reports.htm#third
[23] http://cdr.eionet.europa.eu/help/WFD/WFD_521_2016/Guidance/WFD_ReportingGuidance.pdf

reported by Member States. WISE has been improved over the last years and further investments are planned to create an even more user-friendly, shared environmental system, with amongst others better visualisation capacities.

The quality of the Commission assessments relies on the quality of the Member States' reports. Incomplete or deficient reporting can lead to wrong and/or incomplete assessments. It is recognised that reporting is a big effort for Member States, in particular the electronic reporting to WISE. There are examples of very good, high quality reporting. However, there are also cases where reporting contains gaps or contradictions.

In the context of the preparation of its assessment, the Commission maintained regular informal contact with the Member States to validate its findings and to ensure that the assessment reflects reality.

According to the WFD, the deadline for reporting was March 2016. Figure 4.1 presents the state of play regarding the adoption of the RBMPs[24]. 25 Member States have adopted and reported the RBMPs for their national parts of the RBDs.

Lithuania, Ireland, Greece and Gibraltar (UK) as well as Norway[25] adopted their RBMPs on time butd finished the reporting in WISE late. In Spain, the seven plans for the Canary Islands were also been adopted late[26]. The reporting for Ireland was also completed late. These countries have thus been added to the original report in a later process to be finalised by the end of 2021.

Overall geographical scope of the RBMPs

There are 177 RBDs designated in the EU, of which 94 are international. The number of RBMPs adopted is 174. The geographical scope of the RBMPs does not correspond exactly to the number of RBDs, and a number of different models can be identified:

- Most Member States have prepared one RBMP for each RBD exclusively within their territory.

[24] Updated overview at http://ec.europa.eu/environment/water/participation/map_mc/map.htm

[25] Norway is implementing the WFD under a specific timetable agreed pursuant to the Agreement on the European Economic Area (EEA). The RBMPs prepared in 2015 represent the first planning cycle following the formal entry into force of the Directive in Norway. The RBMPs were adopted by County Councils before the end of 2015, and approved by the Central Government on 1 July 2016, and are being implemented for the period 2016-2021.

[26] Spain notified the Commission that the RBMP for La Gomera was endorsed on 17 September 2018, Tenerife, La Palma on 26 November 2018, Fuerteventura, Lanzarote, El Hierro on 26 December 2018, and Gran Canaria on 21 January 2019.

- Most Member States who have part of an international RBD within their territory have produced one RBMP for the national part of the international RBD. In some cases they have also reported international RBMPs produced for the whole international RBD. Where such international RBMPs are available, this can be seen as being a successful result of the implementation of the WFD.
- One Member State has prepared one plan covering all of their territory (but which includes sections on each of the relevant RBDs. In these cases, they have been counted as having prepared one RBMP per RBD.
- Some Member States have prepared several RBMPs for each RBD and for sub-basins. For instance, in Romania all of the territory falls within the Danube RBD and is covered by the Danube International RBMP (A-level), as well as by the national Romanian Danube RBMP (B-level). In addition, and fully in accordance with the Directive (Article 13.5 WFD), more detailed sub-RBMPs have been prepared for each of the 11 sub-basins. For the purpose of this assessment, the Romanian Danube RBMP has however been considered as one RBMP.

4. OVERVIEW OF ACTIVITIES TO ENSURE BETTER IMPLEMENTATION

The Commission's recent Communication on "EU law: Better results through better implementation"[27] ("the EU law Communication") foresees that the Commission employs a wide variety of tools at its disposal to ensure better compliance with Union legislation. In the frame of the WFD such tools range from informal compliance promotion activities and a focus on working together with Member States on shared implementation challenges (notably in the context of the CIS) to more formal legal action (pilots, infringements, court cases).

4.1 Legal action

The Commission has pursued targeted legal action to enforce the WFD since the transposition deadline of 2003.

a) Brief history and priorities

Legal action initially focused on two main priorities[28]:

[27] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017XC0119(01)&from=EN.

[28] A more detailed picture of enforcement during the initial stages can be found in the Commission's 3rd Implementation report, Staff Working Document (2012) 379 final, Chapter 6. See: http://ec.europa.eu/environment/water/water-framework/pdf/3rd_report/CWD-2012-379_EN-Vol1.pdf.

Enforcement of the deadlines: whenever a reporting deadline lapsed, the necessary legal steps were taken against those Member States which failed to respect those deadlines. For the WFD itself this concerned the following deadlines:

- 2003: transposition
- 2004: RBD delineation, competent authorities and administrative arrangements
- 2007: adoption of the monitoring programmes
- 2009: adoption of RBMPs (reporting deadline 22.3.2010)
- 2015: adoption of updated RBMPs (reporting deadline 22.3.2016)

The Commission has prioritised these actions as they represent key milestones for the implementation of the Directive. For example, without the adoption of RBMPs, there is no plan for the effective implementation of the Directive on the ground, as well as the inclusion of a POMs to achieve environmental objectives. This has necessitated the Commission going to Court in the past (see below section on Court Cases).

Correct transposition: The Commission also pursued actions to address issues of **non-conformity** of the national legislation transposing the provisions related to the RBMPs with a view to ensuring that the national legal framework correctly reflects the different EU requirements for the WFD. Correct transposition has been highlighted as one of the key priorities for enforcement under the Commission's recent Communication referred to above.

Infringement proceedings for the most part have been closed with the Member States.This is not surprising given the fairly advanced stage of the WFD implementation process (update of RBMPs). However, a number of non-conformity cases concerning the WFD are pending.

The Commission, in view of the fact that correct transposition is considered a key priority for enforcement, will continue to stay alert for such issues as they affect the achievement of the objectives of the Directive. It is, therefore, important that Member States systematically communicate to the Commission changes to their national laws in the field governed by this Directive (Article 24(2) WFD).

Non-conformity cases are also taken up in relation to the related Directives adopted in accordance with Article 16 (EQSs) and 17 (Groundwater) of the WFD.

b) Bad application cases

A rather extensive number of so called 'bad application' infringement cases have been opened since 2003 in relation to the implementation of the WFD. Such cases have increased as time has progressed in the implementation of the Directive.

Bad application refers to the Commission's assessment that an infringement of EU law is not due to deficiencies in the legislative framework but due to non-respect by the authorities of that framework.

In general terms, bad application cases can be classed into three main categories:

i. failure to meet reporting requirements

In the past, reporting requirement cases have concerned the failure to report administrative arrangements (Article 3) or to submit the report on the characterisation of the RBDs (Article 5) as explained in the first implementation report. It concerns cases for failure to report monitoring networks (Article 8) as explained in the second implementation report.. Details in relation to these cases can be found in the 3rd implementation report of the Directive.[29]

The Commission has continued to follow its strict line in relation to the timely adoption and reporting of the updated RBMPs (reporting date: 22.3.2016). Numerous enquiries with Member State authorities and, when necessary, infringements were initiated. This has resulted in a far quicker uptake than in the previous cycle. Finally, the Commission will ensure timely reporting of the progress of delivering POMs under Art 15(3) WFD (by 22.12.2018). This is to ensure that Member States continue to deliver on their proposed measures to achieve environmental objectives.

ii. Targeted follow-up to the assessment of RBMPs

In relation to its first RBMP assessment, the Commission has strived to identify important gaps in implementation and to highlight them to the Member State concerned, notably by recommendations. Such recommendations pertain normally to important issues highlighted in a given Member State (lack of measures to address important pressures such as diffuse pollution, issues concerning exemptions, monitoring, HMWB issues, governance).

These can be followed up with the Member State through bilateral dialogue. If action is not forthcoming then more formal legal action may be warranted. This can involve the opening of an investigation against the Member State or, if necessary, recourse to an infringement procedure.

[29] A more detailed picture of enforcement during the initial stages can be found in the Commission's 3rd Implementation report, Staff Working Document (2012) 379 final, Chapter 6. See: http://ec.europa.eu/environment/water/water-framework/pdf/3rd_report/CWD-2012-379_EN-Vol1.pdfv

On the basis of the first RBMP, 10 investigation procedures were initiated against different Member States of which 5 remain open. In one case, the matter was taken forward to infringement.

The second RBMP assessment will provide an opportunity to take stock of the steps taken by the Member States concerned and indeed whether there are other important issues that have arisen in the meantime and require follow-up.

iii. Cases arising from complaints

There are also bad application cases arising pursuant to complaints. Citizens, non-governmental organisations, parliamentary questions and petitions can be a reliable source of information in relation to implementation challenges that can arise under complex environmental legislation such as the WFD.

The approach taken to complaints follows the Commission's recent communication on "Better Results through Better Application".[30] In general terms, the Commission aims to prioritise cases, taking due account of the Framework nature of the Directive and that in many instances national authorities are best placed to address the bulk of individual cases which often involve technical in nature. It is therefore necessary to focus on important issues that can make a difference to overall practice within that Member State.

Key complaints concern inter alia existing or future projects which may impact on water status (such as the construction of new hydropower facilities and works related to navigation which allegedly fail to give proper attention to the impact on the ecological and chemical status of the water) and existing or future activities which impact water (such as discharges of salt resulting from mining activities into fresh water negatively affecting water quality or the over-abstraction concerning water dependent protected areas which could have an impact on groundwater quantitative status, interpretation of key concepts such as "water services"). These complaints are all assessed individually and, where needed, the Commission enquires with the Member State authorities as a preliminary step towards formal enforcement action. In this context, it should be highlighted that the overall objective is to ensure better compliance with the Directive to maintain its levels of ambition which also reflects the high levels of ambition for the environment set in the Treaty on the Functioning of the EU.

Complaints sometimes invoke particular deficiencies in the RBMPs, such as that the measures proposed are not sufficient or that certain exemptions under Article 4 of the WFD are

[30] https://ec.europa.eu/info/publications/communication-commission-eu-law-better-results-through-better-application_en

unlawfully invoked by the authorities. Where possible, complaints related to the RBMPs as such are pursued under the on-going assessment of the RBMPs by the Commission. Further information on infringements

The Commission publishes all infringement decisions undertaken. It also has produced press releases about the infringements and statistics for infringements in the entire environment policy domain.

4.2 Court rulings related to the WFD

The Court of Justice of the European Union (ECJ) has issued several rulings on the basis of the WFD. Initially, these cases dealt with provisions of the WFD which may be seen as straightforward (such as non-communication of the transposing measures, late reporting, late adoption of monitoring programmes and RBMPs). However, in recent years there have been numerous preliminary rulings on key concepts of the WFD as well as its interaction with horizontal environmental measures such as the Environmental Liability Directive and access to justice. There have also been a few enforcement cases under the WFD.

Relevant case law by the ECJ:

Commission vs. Luxembourg (Case C 32/05, ruling of 30.11.2006) Non Communication Transposition	The Court ruled that Luxembourg had failed to transpose, or to notify transposition, of the Directive to the Commission. Luxembourg argued that their existing legal framework was sufficient; the Court found that this was not the case. Luxembourg has since complied and the case is closed.[31]
Commission vs. Germany (Ref. Case C 67/05, ruling of 15.12.2005) – Non Communication Transposition	The Court ruled that Germany had failed to transpose, or to notify such transposition of the Directive to the Commission within the deadline, since the law had not been transposed into the legislation of all Bundesländer. Germany has since complied and the case is closed.[32]
Commission vs. Italy (Case C85/07, ruling of 18.12.2007) and vs. Greece (Case C264/07, ruling of 31.1.2008) – Bad application - Non-reporting	For failing to submit the reports required under Article 5 of the Directive, on Characterisation of the RBDs, review of the environmental impacts of human activity and economic analysis of water use. Italy

[31] http://curia.europa.eu/juris/liste.jsf?language=en&num=C-32/05.
[32] http://curia.europa.eu/juris/liste.jsf?language=en&num=C-67/05 ..

	and Greece have since complied and the cases are closed.[33]
Commission vs. Spain (Case C-516/07, ruling of 7.5.2009) – Administrative arrangements	Spain had failed to notify all competent authorities in accordance with Article 3. In this case the Court also emphasised the importance of designating the RBDs in accordance with the hydrological boundaries rather than administrative boundaries. Spain has since complied and the case is closed.[34]
Commission vs. Malta (Case C-351/09, ruling of 22.12.2010) – Bad application - Monitoring networks	For not having established a network for monitoring of inland waters, and for failure to submit a summary report to the Commission. In this ruling, the court found that even if the Maltese inland surface water bodies are small, there is a need to ensure monitoring.[35]
Commission vs. Greece (Case C -297/11, ruling 19.4.2012.), vs. Belgium (Case C-366/11, ruling 24.5.2012), vs. Portugal (Case C-223/11, ruling 21.6.2012), and vs. Spain (case C-403/11, ruling 4.10.2012) – Non reporting	On the failure to adopt and report RBMPs for all of their respective RBDs.[36]
Case C-41/10 on the Acheloos in Greece - preliminary ruling was issued on 11.09.2012	On the interpretation of the WFD 2000/60/EC, of Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment, of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment and of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.[37]
Commission vs. Germany (C-525/12, judgment of 11 September 2014) – bad application	The judgment held that Germany, in the circumstances of the case and complaints made, had not failed to fulfil its obligations under Articles 2(38) and 9 of Directive 2000/60.[38]

[33] http://curia.europa.eu/juris/liste.jsf?language=en&num=c-85/07 ..
[34] http://curia.europa.eu/juris/liste.jsf?language=en&jur=C,T,F&num=c-516/07&td=ALL
[35] http://curia.europa.eu/juris/liste.jsf?language=en&num=C-351/09
[36] (C-297/11) http://curia.europa.eu/juris/liste.jsf?num=C-297/11&language=EN;
(C-366/11) http://curia.europa.eu/juris/liste.jsf?num=C-366/11&language=EN;
(C-223/11) http://curia.europa.eu/juris/liste.jsf?num=C-223/11&language=EN;
(C-403/11) http://curia.europa.eu/juris/liste.jsf?language=en&num=C-403/11 .
[37] http://curia.europa.eu/juris/liste.jsf?num=C-43/10&language=EN
[38] http://curia.europa.eu/juris/liste.jsf?language=en&num=C-525/12.

Case C-461/13 Bund für Umwelt und Naturschutz Deutschland e.V. v Bundesrepublik Deutschland (the Weser case) Preliminary ruling of 1 July 2015.	The ruling concerned the environmental objectives relating to surface waters and the concept of deterioration of the status of a body of surface water. [39]
Case C-529/15 Folk Preliminary ruling of 15 July 2015	The ruling concerned the interaction between the Environmental Liability Directive and the WFD. [40]
Commission vs. Poland (Case C-648/13, judgment of 30 June 2016).	The judgment held that Poland had incorrectly transposed numerous provisions of the WFD.[41]
Case C-686/15 *Vodoopskrba i odvodnja d.o.o. v Željka Klafurić*. Preliminary ruling of 7 December 2016	The ruling concerned the recovery of the costs of services connected with water use which included a variable component related to actual consumption and fixed component independent of that consumption.[42]
Case C-664/15 Protect Natur-, Arten- und Landschaftsschutz Umweltorganisation v Bezirkshauptmannschaft Gmünd. Preliminary ruling of 20 December 2017.	The ruling concerned the relationship between the WFD and the access to justice provisions under the Aarhus Convention.[43]

4.3 Better national implementation: working with Member States and stakeholders

Member States have primary responsibility for ensuring the correct implementation and application of this Framework Directive. The Commission employs a number of tools to facilitate in this regard.

a) The Common Implementation Strategy

In this context, it should be noted that the Commission working jointly with the Member States and relevant stakeholders has developed a CIS[44] in order to facilitate a common understanding and approach which is crucial to the successful and effective implementation of the Directive.

This has played an important role with regard to best practice and thus better implementation on the ground. Apart from being a good forum on diverse subjects of WFD and related Directives' implementation, the CIS strategy has produced a substantial amount of best practice

[39] http://curia.europa.eu/juris/liste.jsf?language=en&jur=C,T,F&num=C-461/13&td=ALL.
[40] http://curia.europa.eu/juris/liste.jsf?num=C-529/15
[41] http://curia.europa.eu/juris/liste.jsf?language=en&num=C-648/13
[42] http://curia.europa.eu/juris/liste.jsf?language=en&num=C-686/15.
[43] http://curia.europa.eu/juris/liste.jsf?num=C-664/15.
[44] http://ec.europa.eu/environment/water/water-framework/objectives/implementation_en.htm.

guidance (approximately 50) which should improve application by Member State authorities.[45] This assists with a strategy which is focused on prevention, rather than cure.

A recent noteworthy example was the substantial guidance produced in relation to Article 4(7) which should assist with ensuring better practice in relation to the permitting of projects, thus leading to improved compliance on the ground by national authorities.[46]

The CIS also acts a forum for informed debate on various issues arising under the WFD umbrella and carries out a dedicated work-programme every few years. Further details concerning its work programme, key events and related documentation can be found online.

b) Integration – sectoral efforts

Effective implementation of water legislation cannot possibly be undertaken without the effective cooperation of key sectors which have major impacts on water bodies throughout the Union. This need to integrate water considerations into sectoral policy areas at all levels (including Commission, Member State authorities and relevant stakeholders) is a major challenge. Examples of sectors which do impact on water include agriculture, energy (hydropower), navigation and chemicals/pollution. The Commission also factors in water considerations into cohesion policy funding. For the 2014-2020 funding period, ex-ante conditionality was introduced to ensure a proper transposition and implementation of EU water legislation for investments in the water sector. This has proved to be a very useful tool in closing the relevant implementation gaps identified in the first River Basin Management Plans. It has been a driver for many Member States to implement improvements in areas such as pricing policies and to adopt the second generation of River Basin Management Plans.[47]

c) Promoting networks

The Commission has also facilitated the development of networks composed of key stakeholders in order to increase public awareness of water issues and thus lead to better implementation on the ground. Two such examples are the European Innovation Partnership (EIP)[48] and the Urban Water Agenda[49].

d) Implementation of horizontal legislation

[45] http://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm
[46] https://circabc.europa.eu/sd/a/e0352ec3-9f3b-4d91-bdbb-939185be3e89/CIS_Guidance_Article_4_7_FINAL.PDF
[47] SWD (2017)127
[48] http://ec.europa.eu/environment/water/innovationpartnership/
[49] https://ec.europa.eu/futurium/en/urban-agenda-eu/urban-water-agenda-2030

EU environmental law also has developed numerous horizontal policies to improve uptake of environmental matters within Member States.

- **Environmental Liability**[50] - the Environmental Liability Directive establishes a framework based on the polluter pays principle to prevent and remedy environmental damage.

- **Access to Justice**[51] - notably the Aarhus Regulation which concerns the uptake of the Aarhus Convention in the Union and Member States. The Aarhus Regulation addresses the "three pillars" of the Aarhus Convention - access to information, public participation and access to justice in environmental matters - where those are of relevance to EU institutions and bodies and lays down related requirements. Such rules complement the existing public participation and consultation rules under the WFD. The Commission has also developed a recent Notice on Access to Justice in Environmental Matters[52].

The implementation of such policies also benefits the implementation of the WFD. This has also been reflected in recent case law involving these respective policy areas in the context of the WFD. Reference is made to the preliminary rulings in the cases of *Folk* (Environmental Liability) and *Protect Natur* (access to justice) - see above section on relevant ECJ case-law.

e) Environmental Implementation Review (EIR)

The Commission has developed the Environmental Implementation Review (EIR) which can serve as a useful poltical forum to support the delivery of the objectives of existing EU environmental policies and legislation.[53] In the water area, the CIS and the EIR complement each other.

f) Compliance assurance

The Commission has recently placed greater emphasis upon the notion of compliance assurance.[54] In essence this covers three notions:

- Promote means helping businesses and others to comply;

[50] http://ec.europa.eu/environment/legal/liability/index.htm.
[51] http://ec.europa.eu/environment/aarhus/legislation.htm
[52] The WFD is explicitly cited in Annex II https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C:2017:275:FULL&from=EN
[53] http://ec.europa.eu/environment/eir/index_en.htm
[54] http://ec.europa.eu/environment/legal/compliance_en.htm.

- Monitor means using inspections and other checks to collect information about levels of compliance and provide solid evidence for enforcement;
- Enforce means stopping those who disregard the rules, sanctioning them and obliging them to rectify the damage.

The foregoing notions can well complement the CIS to achieve better implementation by Member State authorities themselves within the field of the WFD. For example, in the *Commission Action Plan on environmental compliance and governance*[55], targeted action is foreseen to produce guidance on how to better ensure compliance in rural areas. This includes guidance for farmers and Member State authorities can ensure better practice in relation to EU water law in rural areas. This is of importance given the impact of agriculture as a pressure on water bodies within the EU.

4.4 Legal implementation of related Directives adopted in accordance with Article 16 (EQSs) and 17 (Groundwater) of the WFD

Two closely related Directives have been adopted since 2000, one further specifying the legal requirements in relation to groundwater status (Directive 2006/118/EC, also known as the Groundwater Directive) the second regarding the chemical status of surface waters (Directive 2008/105/EC, also known as the EQSs or Priority Substances Directive).

The Commission has continued with the process of conformity checks for both Directives. On the Groundwater Directive the first steps were taken (requests for clarification sent through investigations); there are two open infringement cases and one pilot on non-conformity.

Both Directives have been amended (Commission Directive 2014/80 amending Annex II of the Groundwater Directive 2006/118 and Directive 2013/39/EU which amends the EQS Directive 2008/105). Therefore, the Commission is in the process of checking the conformity of this amending legislation. There are presently a number of non-communication cases concerning Commission Directive 2014/80.

As implementation of these Directives goes hand in hand with that of the WFD, the variety of tools listed for that Directive is equally applied here. To note, that there are dedicated working groups under the CIS for both Chemicals and Groundwater.

[55] http://ec.europa.eu/environment/legal/pdf/COM_2018_10_F1_COMMUNICATION_FROM_COMMISSION_TO_INST_EN_V8_P1_959219.pdf

5. RESULTS OF THE ASSESSMENT AT EU LEVEL AND RECOMMENDATIONS

This chapter includes the results of the assessment of the second RBMPs adopted and reported by Member States.

5.1 Governance

5.1.1 Introduction

The WFD creates a framework for the integrated management of all aspects of water policy. A robust framework and appropriate and effective multi-level governance structures are essential pre-requisites for successful integrated river basin management. Some of the key aspects of water governance in the context of the implementation of the WFD are to ensure an adequate territorial approach, the clear identification of responsibilities, coordination and cooperation across sectors, interests and borders as well as ensuring adequate human and financial resource are allocated.

Transparency on this whole process within a clear governance structure will encourage public participation in both the development and delivery of necessary measures to deliver sustainable water management.

Assessment of implementation and compliance with the WFD requirements in the 2nd cycle

Administrative arrangements – river basin districts

The criteria for successful water governance structures are inter alia clear and effective alignment of objectives and adequate territorial approaches which take the whole catchment as the basis for the integrated water management. The Directive defines the RBD as the main unit for management of river basins, for which competent authorities that apply the rules of the Directive need to be identified. There is a requirement to co-ordinate the actions (nationally and internationally) to achieve the environmental objectives established by the Directive through the planned Programmes of Measures.

The designation of RBDs is thus one of the core aspects of the integrated river basin management approach setting out the geographical extent for the co-ordination of water resources. In most cases, the RBDs have been established respecting the hydrological boundaries of the river basins.

Administrative arrangements – competent authorities

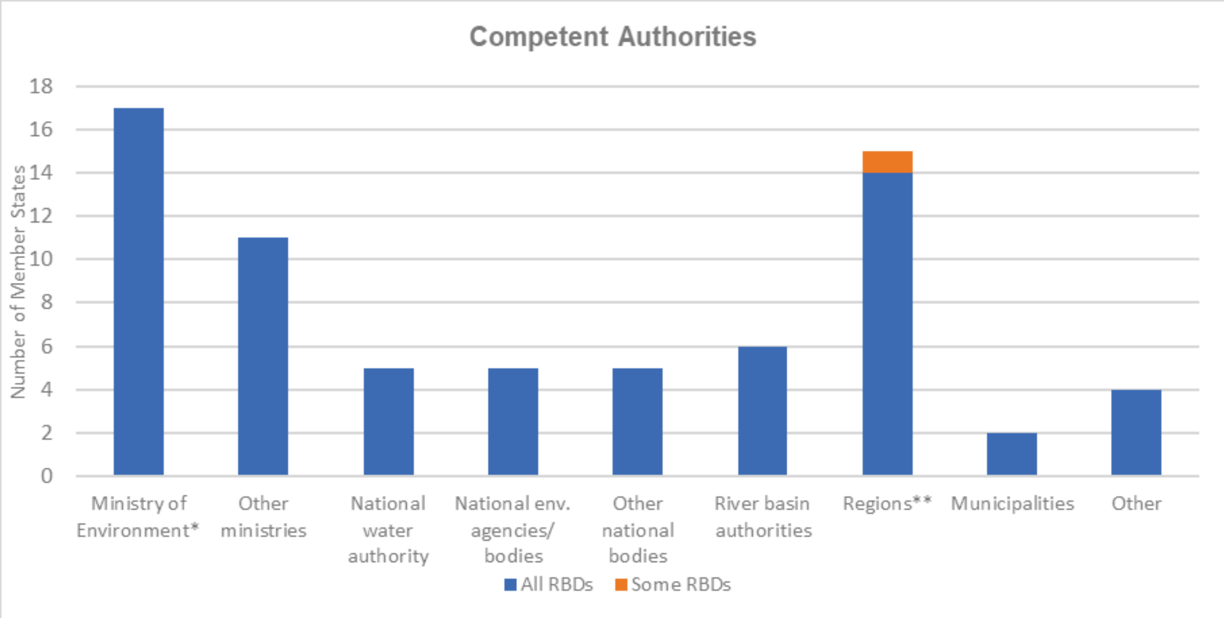
The clear identification of responsibilities and roles of authorities is a pre-requisite for successful water management. The WFD therefore requires the designation of competent authorities for its implementation within each river basin district.

Member States have designated a range of competent authorities for the implementation of the WFD[56].

[56] Please note that in their RBMP reporting, Member States indicated the names of their competent authorities: the categories and the categorisation were created for the purpose of the assessment for this report. It should also be noted that the Member States have indicated authorities responsible for key aspects of the development and implementation of their RBMPs: these may include authorities additional to those reported under Article 3 of the WFD.

Figure ***1*** below provides an overview of the authorities that were identified. About one-fourth of Member States have a single authority responsible for all WFD roles. In some cases, only a single type of authority is responsible, for example the Federal States in Germany, but, for most Member States a range of authorities are responsible for different tasks.

Figure 1 Competent authorities for the development and implementation of the RBMPs



Source: WISE electronic reports 2016

*Notes: * Ministry of Environment or Ministry responsible for environmental protection. ** Regions include other sub-national administrative levels (e.g. provinces)*

In some Member States, specific RBD Authorities have been established for the purpose of the WFD: Bulgaria and Italy are examples. A few Member States have a national body responsible for water management: in Romania, for example, the National Administration for Romanian Waters is responsible for almost all WFD roles. Other Member States have adapted existing water administrations to ensure better implementation of the WFD.

Environment agencies and other national bodies are competent authorities in about half of the Member States. In some cases, these bodies play a leading role: in Portugal, for example, the Environment Agency holds all the main roles related to RBMP and WFD implementation in the mainland RBDs. In other cases, national bodies have specific roles, as is the case in Poland, where the Chief Inspector of Environmental Protection (head of the national Environmental Inspectorate) has roles for monitoring and assessment of water status, enforcement of regulations and implementation of measures.

Regional authorities play a role in about half of Member States. This category includes the Federal States in Germany and the provinces in the Netherlands. In France, department-level authorities are responsible for two RBDs, Corsica and Mayotte.

In a few Member States, municipalities also play a role: in both Bulgaria and Sweden, for example, these are among the bodies responsible for the implementation of measures.

As noted, the great majority of Member States have more than one competent authority. This division between different authorities necessitates that co-ordination is clear and adequate to ensure integrated water management. The WFD indeed requires coordination: Member States should ensure that all requirements of the Directive are co-ordinated in order to achieve the environmental objectives at the level of the RBD.

Several Member States strengthened coordination in the second cycle. In Germany, for example, LAWA – the Working group on water issues, which brings together the Federal States and the Federal Government, represented by the Ministry of Environment – prepared updated guidance in several areas such as surface water monitoring as well as a catalogue of measures for the WFD, Floods Directive and MSFD. In Italy, there was a stronger coordination among regions within RBDs, supported by national legislation, including further national methodologies to ensure common approaches across the RBDs.

RBMPs – structure (subplans)

RBMPs are the main tool for water management of all water bodies within RBDs. Clear plans are important in order to ensure overview and accountability, including policy integration with relevant areas affecting water resources and water management such as energy production, agriculture, transport and industry.

Most Member States have prepared RBMPs for each RBD within their territory and in some cases there are several river basins in each RBD. The WFD leaves the decision on the use of sub-plans to Member States. Sub-plans may offer Member States the opportunity to provide more details on the issues and actions impacting at different levels within the RBD. In the second cycle, more than one-third of Member States had sub-plans for their RBMPs. Coordination is needed to ensure that the implementation of RBMPs and sub-plans is coherent.

The WFD includes key requirements on how the RBMPs shall be the framework for integrating different policies and sectors. The consideration of all types of significant anthropogenic pressures is at the core of the WFD with one of the main building blocks being 'the review of impacts of human activity on the status of water' (Article 5). All potential policy sectors shall therefore be addressed by the RBMPs, including those not part of traditional water management, for instance the agriculture sector, energy production and the transport sector.

All discharges into surface waters shall be controlled in accordance with the 'combined approach' in the WFD. This reinforces policy integration which goes beyond the implementation of point source control measures such as the IPPC/Industrial Emissions Directive, Urban Wastewater Treatment Directive, or policies related to diffuse pollution like the Nitrates Directive. The combined approach is often necessary in order to reach good status and more stringent measures therefore have to be put in place for sources controlled by those Directives and any other relevant legislation.

The assessment has shown improved co-ordination and policy coherence in Member States due to the implementation of the WFD. Member States can learn from each other's experience as well as further enhance the inclusion of other sectors in the water management.

Strategic Environmental Assessment

The Directive on Strategic Environmental Assessment[57] integrates environmental considerations into plans and programmes, with the goal of promoting sustainable development. The Directive identifies, among the types of plans and programmes to be assessed, those related to water management (Article 3).

The assessment shows that the great majority of Member States carried out a Strategic Environmental Assessment (SEA) procedure for the RBMPs in all their RBDs. In a few Member States, the SEA screening step did not identify a need for a full update to the SEA carried out in the first cycle.

[57] Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32001L0042

Public consultation and the active involvement of stakeholders

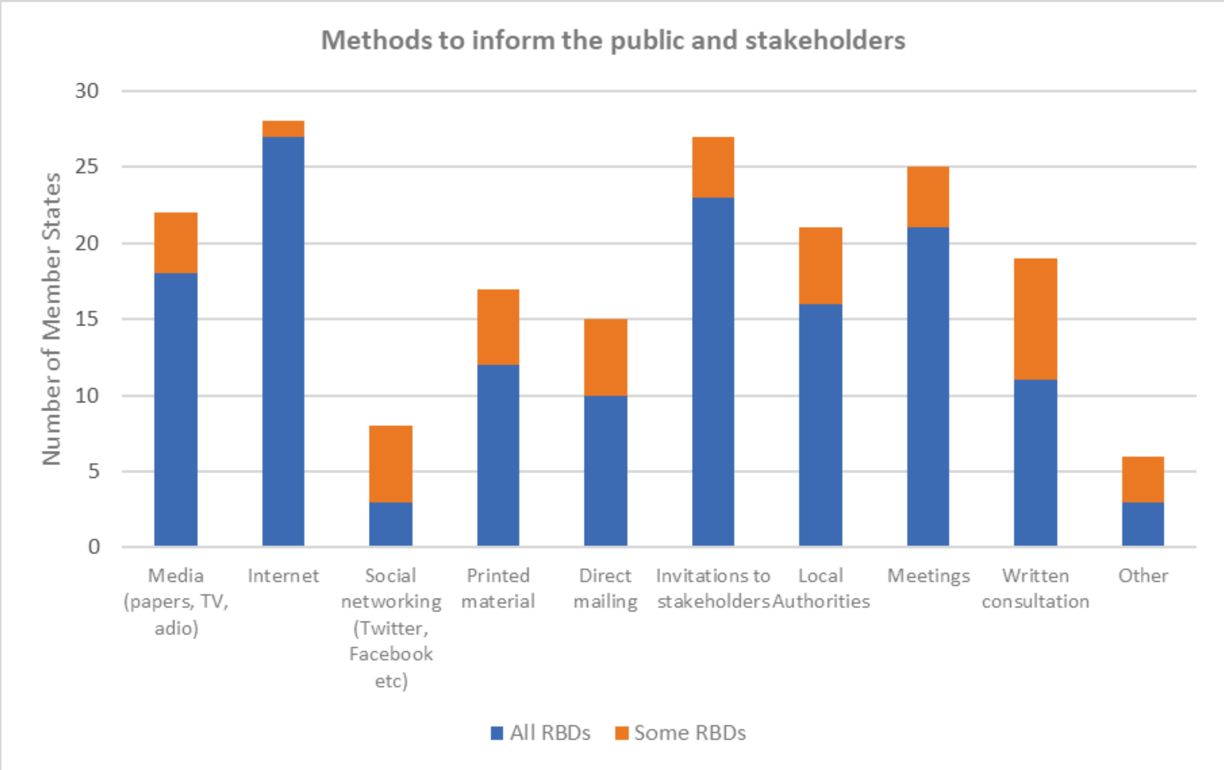
A key mechanism for sectoral and territorial integration is stakeholder involvement in the development of RBMPs. Member States have to ensure consultation and access to background information used for the development of RBMPs and to encourage active involvement of all interested parties. Drafts of the RBMPs, as well as of other key documents, such as the timetable, work programme and overview of significant water management issues shall be published and made available for public consultation for at least six months.

Providing information on the consultation and provision of documents

RBMPs can communicate to interested parties, including the public, how water management will be carried out. Interested parties shall be provided access to sufficient information to enable them to express their views in a meaningful way. This is not the case if only incomplete drafts of RBMPs are made available or background documents which are a part of the plan are not made available.

The requirement to conduct a consultation on draft RBMPs lasting six months was respected in almost all Member States. The Canary Islands' RBMPs were submitted to a legally endorsed emergency procedure, so the period of public consultation was reduced to three months.

Moreover, the Member States have undertaken considerable efforts in consulting stakeholders and the public and they have used a variety of different outreach methods (see Figure ***2*** below). On average, Member States used five of the ten information methods listed in the WFD Reporting Guidance. All listed more than one method, and one-fourth of the Member States used either eight or nine methods in at least some of their RBDs. ***Figure 2 Methods used by Member States to inform the public and stakeholders of the RBMP consultation***



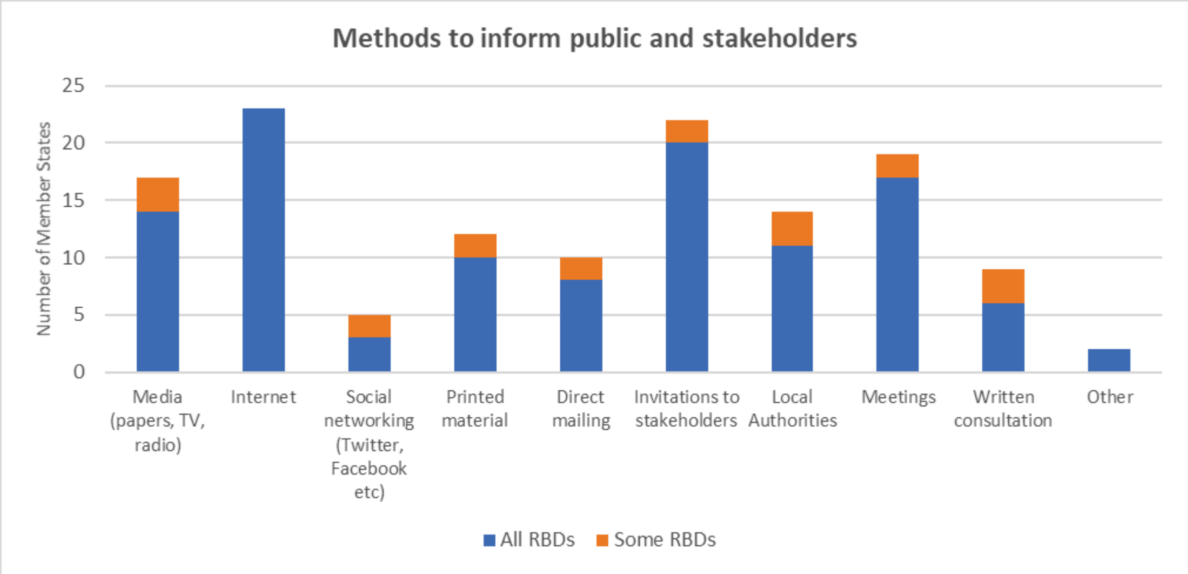
Source: WISE electronic reports 2016

The most common outreach methods were the Internet and direct invitations to stakeholders: both were used in almost all Member States. Some Member States have set up dedicated web portals on water issues that provided information on the consultation: Austria, notably has developed three – one to provide technical information for the interested public (WISA), another to provide general information to support public involvement in the WFD (Wasseraktiv), and the third to engage with young people (Generation Blue). Via a LIFE+ project called WATLIFE, Slovakia developed a web site called *voda je život* (water is life), providing information to the public on water issues. A small group of Member States used social networking among the information methods in at least some of their RBDs.

With regard to the provision of documents, 26 Member States made drafts for consultation available for download in all their RBDs (see Figure 3). In terms of other methods to provide the draft RBMPs, many Member States made paper copies available in municipal buildings, exhibitions, direct mailing via email and some by post.

Some Member States also provided relevant supporting documents during the consultation. In the Netherlands, for example, related plans (for example at provincial level) were provided as well as fact sheets on the conditions of each water body.

Figure 3 Methods used by Member States to provide draft RBMP documents for consultation



Source: WISE electronic reports 2016
(Table not including Greece, Lithuania, Ireland and Spain Canary Islands)

Active involvement of stakeholders

The WFD states that 'Member States shall encourage the active involvement of all interested parties in the implementation of this Directive'[58] which goes beyond consultation and implies that stakeholders are invited to contribute actively to the process and thus play a role in advising the competent authorities[59]. Active involvement can be fulfilled in various ways, for example through advisory councils or ad-hoc meetings.

Stakeholder groups were actively involved in the preparation of the RBMPs in all Member States assessed. On average, more than seven types of stakeholder groups listed in the WFD Reporting Guidance were actively involved (including the category of other) in all or some of their RBDs.

Water supply and sanitation, agriculture, local and regional authorities, non-governmental organisations and nature protection groups were actively involved in all or some of the RBDs (see

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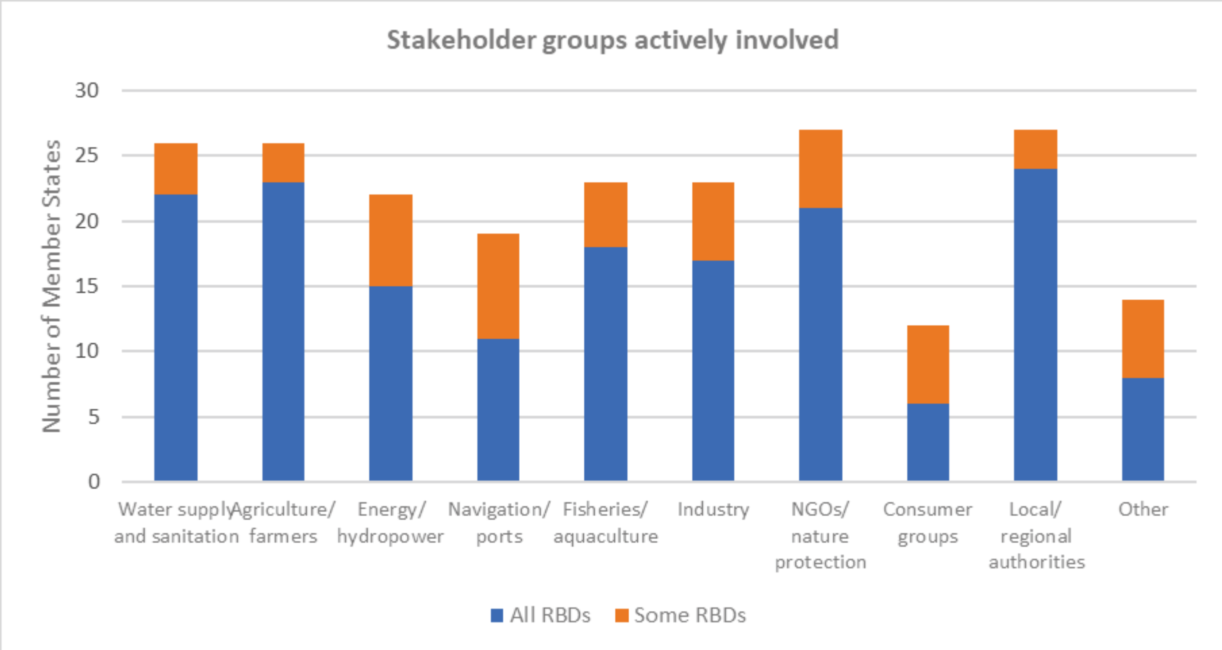
[58] Water Framework Directive Article 14

[59] European Commission, Public Participation in Relation to the Water Framework Directive, Guidance Document No 8 (of the Common Implementation Strategy for the Water Framework Directive), 2003. Available at: https://circabc.europa.eu/sd/a/0fc804ff-5fe6-4874-8e0d-de3e47637a63/Guidance%20No%208%20-%20Public%20participation%20%28WG%202.9%29.pdf

Figure ***4***) in most of the Member States. A few Member States indicated ‘other’ stakeholders, including: universities and research centres; associations of municipalities; landowners and forest owners; health authorities; and small and medium-sized enterprises.

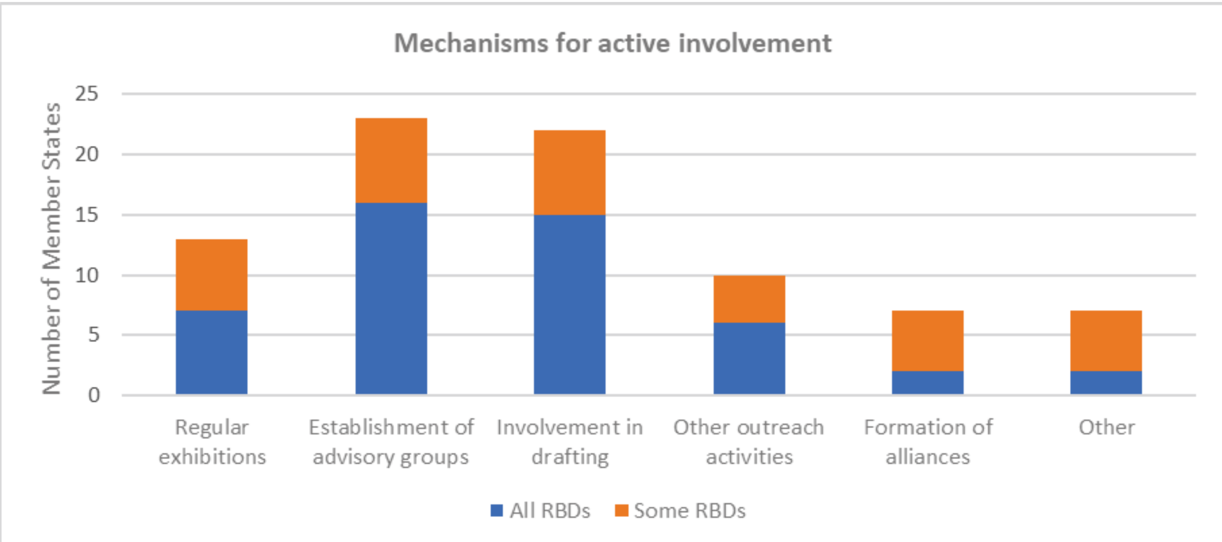
Figure 4 Types of stakeholder groups actively involved the preparation of RBMPs



Source: WISE electronic reports 2016

Concerning the mechanisms for active involvement, the majority of Member States established advisory groups and involved stakeholders in the drafting (see Figure 5). Some Member States identified 'other' mechanisms. These include, for example: web-based tools, as well as social media, meetings or conferences and River Basin Committees.

Figure 5 Mechanisms for the active involvement of stakeholders in the preparation of RBMPs



Source: WISE electronic reports 2016

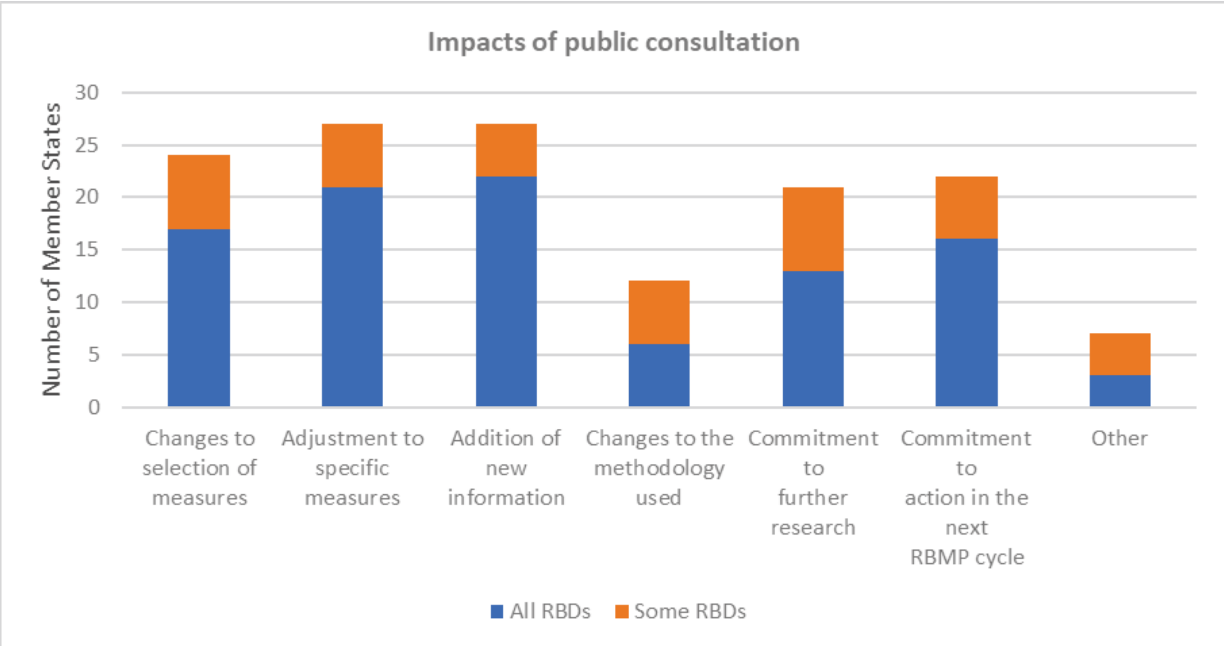
Several Member States strengthened the active involvement of stakeholders for the second cycle of RBMPs, for example by ensuring the participation of stakeholders in advisory groups.

Impact of the consultation

The purpose of stakeholder involvement is to ensure that the best and most cost-effective measures are identified and selected, and that acceptance of the measures are built in to the process. It should therefore be highlighted that in all 25 Member States assessed, the consultation of the draft RBMPs has had an impact on the final RBMPs (see Figure 6 below).

In almost all Member States consultation led to the addition of new information in the RBMPs for all or some of their RBDs and to the adjustment of measures, while changes to the selection of measures were made in the majority of Member States. In a high share of Member States, commitments to further work were made as a result of consultation (which possibly would not be reflected in changes to the second RBMPs), both in terms of action in the next cycle and in terms of further research. Finally, about one-third of Member States made changes to the methodology as a result of consultation and a few made other types of changes, for instance addition of new river water bodies, greater coordination of policies and finance, integration of RBMPs into territorial contracts, and improved linkages with FRMP.

Figure 6 Impacts of the consultation on the final RBMPs



Source: WISE electronic reports 2016

Overall, extensive consultation has been one of the major achievements of the WFD and has in general increased public awareness and provided valuable information for the further process. The Commission has however received information which indicates that some stakeholders still do not have the opportunity to contribute actively to the process and thus play a role in advising the competent authorities in a sufficiently inclusive way.

Integration with the Floods Directive and the MSFD

The framework established by the WFD in order to protect inland surface waters, transitional waters, coastal waters and groundwater contributes inter alia to the protection of territorial and marine waters (WFD Article 1) and Member States shall take the necessary measures including preventing and reducing pollution to the marine environment, in accordance with the MSFD (MSFD). The first step is for Member States to ensure that the necessary actions are taken to coordinate RBMPs with the MSFD objectives. About half of the Member States have started to do so by undertaking joint consultation of the RBMPs with the MSFD in all or some of their RBDs (see

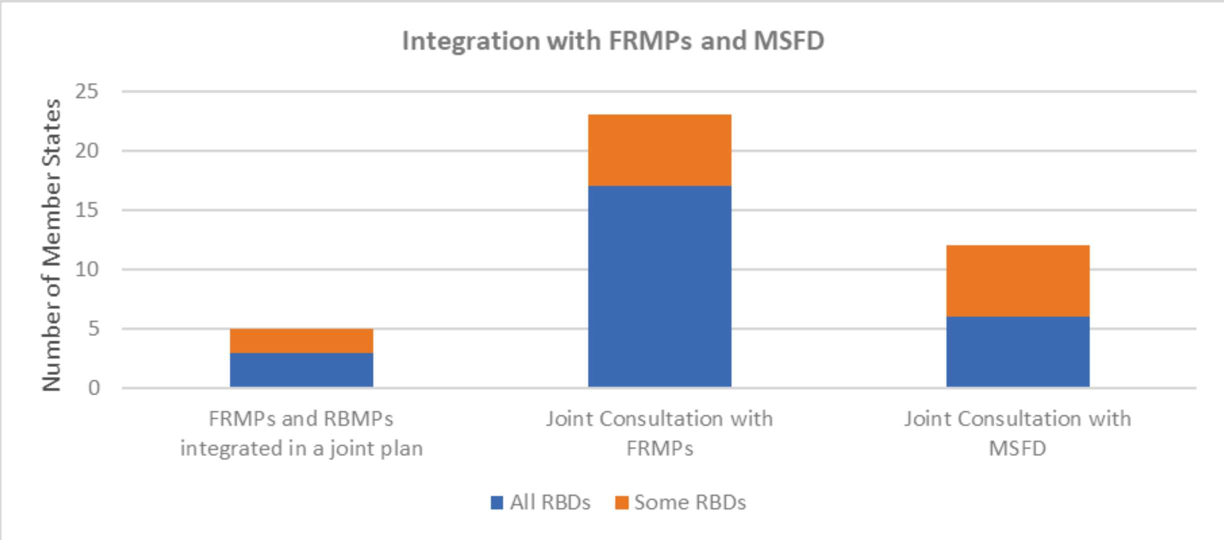
Figure *7*). However, there is still a lack of coordination, especially regarding coordination of the objectives[60].

Member States shall also take appropriate steps to coordinate actions under the Floods Directive and the WFD, focusing on opportunities for improving efficiency, information exchange and for achieving common synergies and benefits, including coordination of active involvement of interested parties, as appropriate.

The great majority of Member States has carried out a joint consultation of their RBMPs and the FRMPs, and a few Member States have also integrated the two plans into a joint plan.

[60] The adoption of the new GES Decision (2017/848/EU) brings closer the marine and freshwater policy frameworks together with the identification of the same elements to be assessed and used the same methodological standards (equivalent threshold values).

Figure 7 Integration of the RBMPs with FRMPs and with the MSFD



Source: WISE electronic reports 2016

International coordination and co-operation

One of the main elements introduced by the WFD was the legal requirement for transboundary co-operation. Indeed, 60% of EU territory is covered by international river basins, and all Member States except Cyprus and Malta share international river basins.

A river basin covering the territory of more than one Member State shall in accordance with the WFD be designated as an international river basin district (IRBD), and Member States concerned shall together ensure coordination with a view of producing a single RBMP.

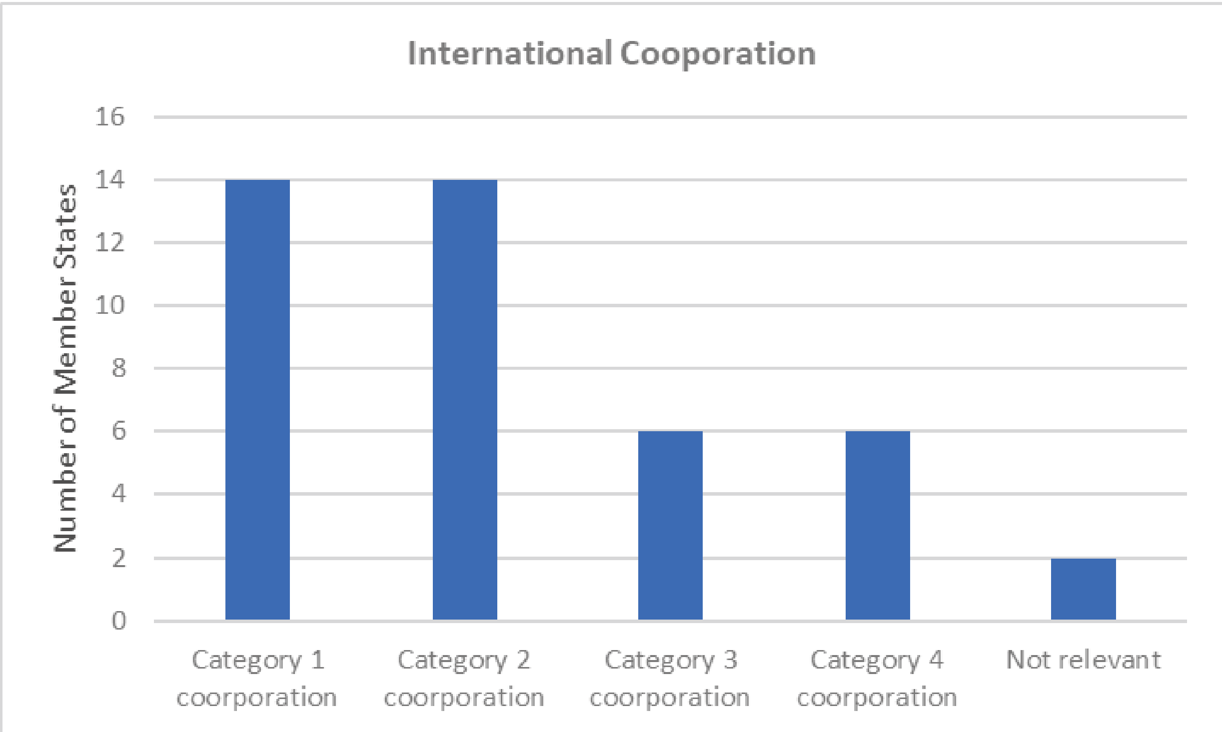
In some international river basins there was extensive co-operation even before the WFD, such as the Rhine where there was important progress on pollution reduction. Most existing international river conventions were amended to fulfil the role of co-ordination of the implementation of the WFD.

International cooperation is taking place in the frame of international agreements, permanent co- operation bodies and international RBMPs and PoMs. In six international RBDs that cover multiple Member States, all these elements are seen (designated as category 1 cooperation – see chapter 7 on international cooperation for further information). In total, half of the Member States participate in at least one international river basin with category 1 coordination. The Danube iRBD, for example, brings together nine Member States as well as five third countries (Figure 8 below provides an overview of Member States and international RBDs by level of coordination).

In other international RBDs, cooperation includes international agreements combined with permanent co- operation mechanisms, though not the preparation of common RBMPs and Programmes of Measures; close to half of the Member States share river basins at this level of coordination (designated as category 2). An example are the RBDs shared between Portugal and Spain, where cooperation takes place under the Albufeira Agreement, which created a conference of the Parties and a commission, under which a series of working groups are organised.

A few Member States have international agreements on water management without permanent co-operation mechanisms (category 3). In some of these cases, co-operation has been quite active: for example Estonia, Latvia and Lithuania have exchanged information on monitoring and on measures (moreover, after the preparation of their national RBMPs, Estonia and Latvia produced international "roof reports" summarising common challenges and actions in a shared RBD).

Figure 8 Member State participation in international RBDs, by level of coordination



Source: WISE electronic reports 2016

Note: Some Member States participate in several iRBDs at different levels of coordination. The figure only shows data for the Member States assessed.

Overall, international cooperation has significantly improved with the introduction of the WFD, and the co-ordination between Member States has continued to improve in the second RBMPs. There is still a need though for further strengthening international cooperation both within the EU and with neighbouring countries. Strengthening can for example be done through increased active exchange, coordination of monitoring, harmonisation of river basin specific pollutants and coordination on all aspects of WFD implementation for RBDs in general – especially within category 3 and 4 cooperation (more information provided in chapter 7).

Main changes in implementation and compliance since 1st cycle

This assessment has in general shown progress in the Member States' implementation of the governance requirements of the WFD since the first RBMPs. The assessment though carried out has focused on a few key reported indicators and the approach is not directly comparable to the assessment of the first RBMPs.

The assessment has shown improved co-ordination and policy coherence within many Member States due to the implementation of the WFD, as seen in the example of Italy, where coordination within RBDs was strengthened. In Ireland, the seven RBMPs developed during the first cycle were merged into a single national RBMP to ease administrative and reporting requirements, with the creation of a new governance structure coordinating local authorities at central level.

The assessment has also shown that most Member States undertook a range of actions to engage the public and stakeholders in the consultation process, in many cases going further than in the first cycle. In the second cycle, the most common methods reported were Internet and direct contacts with stakeholders, while a few Member States used web sites and social media to reach the public. In almost all Member States, a broad range of stakeholder groups were actively involved, in particular non-governmental organisation/nature protection groups, agriculture and local and regional authorities, followed by industry and water supply and sanitation. The consultation process has had an impact on water management in all Member States, for example via the addition of new information in the RBMPs and the selection of measures.

The implementation of the WFD has strengthened cooperation among Member States and with third countries on water management in shared river basins, and this process continued in the second cycle. Examples include strengthened coordination between Bulgaria and Greece and also among Estonia, Latvia and Lithuania. However, the cooperation of Turkey into the Joint Working Group for the management of the Thrace RBD in Greece was not demonstrated. In Lithuania, no cooperation was established with Russia but some cooperation projects were implemented with Belarus (in the Nemunas RBD).

5.1.2 Conclusions

In many Member States, several authorities are responsible for implementing different aspects of the WFD. This underlines the importance of coordination between government bodies and across administrative levels. Member States are becoming more aware of the necessity of clarity regarding both cooperation and responsibilities; while many have made progress, there is a need to enhance coordination in order to reach the objectives of the Directive.

Member States have undertaken considerable efforts in consulting stakeholders and the public and have used a variety of different outreach methods. Moreover, Member States used a range of mechanisms for the active involvement of stakeholders in the development of the RBMPs: in the great majority, advisory groups were established

The extensive consultation undertaken has been one of the major achievements of the WFD and has in general increased public awareness and provided valuable information for the further process. In all 28 Member States assessed, consultation on the draft RBMPs had an impact, such as the addition of new information and the adjustment of measures.

International cooperation has significantly improved with the introduction of the WFD, and co-ordination between Member States has continued to strengthen in the second cycle of RBMP. Specific recommendations for international cooperation under the WFD are provided in chapter 7.

Although the assessments conducted on the first and second RBMPs are not directly comparable due to different approaches used for the assessment, the general conclusion is that the patterns of governance appear to be largely similar with adjustments in responsible authorities, enhanced involvement from stakeholders, improved transparency, improved coordination and improved international coordination.

5.1.3 Recommendations

- Member States should continue to focus on improving stakeholder involvement in order to provide them with the opportunity to contribute actively to the process.
- Clarity regarding responsibilities between government bodies and across administrative levels as well as enhanced coordination should be ensured in order to reach the objectives of the WFD.
- Institutional arrangements for international cooperation should be further strengthened regarding relevant aspects of the WFD in the iRBDs, in particular in those iRBDs where international coordination bodies are not in place.

- International cooperation should be further strengthened in iRBDs shared with countries which are not members of the EU, including candidate and potential candidate countries [in support of the alignment to the EU environmental requirements in their process to join the EU].

[*more specific recommendations for international cooperation under the WFD are provided in chapter 7*].

5.2 Characterisation of the River Basin District

5.2.1 Introduction

Article 5 of the WFD requires Member States to undertake an analysis of the characteristics of each RBD or portion of an international RBD falling within their territory. The first characterisation of suface water and groundwater bodies was reported in March 2005. This included a general description of the characteristics of their RBDs (Annex VII, A.1). Under Article 5(2) the characterisation is required to be reviewed, and updated if necessary by 2013 and every 6 years after that. Therefore meaning the characterisation should have been reviewed by each Member State between the first and the second RBMPs.

Characterisation should identify all relevant categories and types of water bodies within the RBD. For surface waters, specific typologies and reference conditions have to be established. This step is an essential foundation for a robust classification systems and ecological status assessment.

Characterisation also involves correctly identifying water bodies at risk of failing objectives. The results of the risk assessment inform the monitoring of water bodies and the subsequent classification of status. These water bodies are then the subsequent focus for implementation of necessary measures for the achievement of objectives. It is crucial that risk assessment methodologies are fit for purpose, as objectives may be missed or measures not correctly targeted.

For operational purposes, the WFD defines a water body as a 'discrete and significant' element of water, which is the scale at which status is assessed. The size thresholds given in Annex II for System A typology (catchments larger than 10 km^2 and lakes larger than 50 Ha) have been used as a possibility for differentiating water bodies. However this approach should not exclude smaller water bodies from the protection of the Directive. Member States have flexibility to decide not to designate very small water bodies and can aggregate these small water bodies into groups or include them as part of a larger contiguous water body of the same surface water category and of the same type. The optimum size of a water body is the size that allows the objectives of the Directive to be most efficiently achieved.

Assessment of implementation and compliance with WFD requirements in second RBMPs

Delineation of surface water bodies

The following table presents an overview of the water categories available in each Member State. Throughout the EU, more than 118 000 surface water bodies have been defined in the second RBMPs (compared to around 127 000 in the first RBMPs and 70 000 reported for the initial characterisation completed in 2004). Approximately 80% are rivers, 16% lakes, and the remaining 4% coastal and transitional waters which is similar to results from the first RBMPs. The average size of water bodies in Member States is variable with average river water body lengths varying from 2.4 km in Denmark to close to the EU average (13 km) in Portugal, Croatia, and the UK, and up to an average of 54 km in Bulgaria. Sweden and Finland have the highest number of lake water bodies, 7 422 and 4 617, respectively. The EU average area of water bodies increases (as might be expected) from 4.5 km2 for lakes, to 19 km2 for transitional waters and to 102 km2 for coastal waters. This is similar to the first RBMPs with the exception of coastal waters for which the previous EU average area was 644 km2. The largest average coastal water body size in the second RBMPs was reported by Estonia equal to 907 km2 (in the first RBMPs, the largest average coastal water body size was reported by Spain with 8 700 km2).

Table 1: Number of water bodies under each water category in the Member States

Member State	River water bodies	Lakes water bodies	Transitional water bodies	Coastal water bodies	Territorial water bodies	Groundwater bodies
Austria (AT)	8065	62	Not relevant	Not relevant		138
Belgium (BE)	527	18	6	2	1	80
Bulgaria (BG)	873	37	28	17		169
Cyprus (CY)	174	8	None	22		21
Czech Rep (CZ)	1044	77	Not relevant	Not relevant		174
Germany (DE)	8998	730	5	75		1177
Denmark (DK)	7776	856	None	119	14	402
Estonia (EE)	645	89	None	16	2	39
Greece (EL)	1345	38	40	246		591
Spain (ES)	4390	326	186	260		762

Member State	River water bodies	Lakes water bodies	Transitional water bodies	Coastal water bodies	Territorial water bodies	Groundwater bodies
Finland (FI)	1913	4617	None	276		3733
France (FR)	10706	435	94	179		645
Croatia (HR)	1484	37	25	26		33
Hungary (HU)	963	115	Not relevant	Not relevant		185
Ireland (IE)	3192	812	195	111		513
Italy (IT)	7493	347	172	561	8	1052
Lithuania (LT)	822	357	4	2	1	20
Luxembourg (LU)	110	None	Not relevant	Not relevant		6
Latvia (LV)	203	259	3	5		22 (16)
Malta (MT)	3	2	5	9		15
The Netherlands (NL)	246	451	5	9		23
Poland (PL)	4586	1044	9	10		178 (172)
Portugal (PT)	1899	23	52	66		151
Romania (RO)	2891	130	2	4	1	143
Sweden (SE)	15092	7422	None	653	19	3311
Slovenia (SI)	137	12	None	5	1	21
Slovakia (SK)	1510	None	Not relevant	Not relevant		102
United	7506	1068	190	561		788

Member State	River water bodies	Lakes water bodies	Transitional water bodies	Coastal water bodies	Territorial water bodies	Groundwater bodies
Kingdom (UK)						

Source: WISE reporting 2016. Values in brackets were subsequently provided by Member States and differ from those reported in WISE.

There are five landlocked Member States (Austria, Czech Republic, Hungary, Luxembourg and Slovakia) for which transitional and coastal waters are not relevant. Six other Member States (Cyprus, Denmark, Estonia, Finland, Sweden and Slovenia) with a coastline have not designated any transitional waters though coastal water bodies have been identified. Some justifications for this were provided in the RBMPs. Sweden had defined transitional water bodies in the first RBMPs, but these were redefined as coastal water bodies because it was not possible to distinguish them from the nearby coastal waters. Malta had not included any rivers, lakes or transitional water bodies in its first RBMP but has done so for the second RBMP.

Some Member States have re-delineated surface water bodies for the second RBMPs. Overall, about 90% of surface water bodies are unchanged from the first to the second RBMPs. About 10% were reported to be deleted, markedly modified (split or aggregated) or newly created[61]. At a Member State level, the vast majority of surface water bodies in Denmark, Croatia and Ireland were deleted and created from the first to the second RBMPs. There was also a significant amount of splitting of surface water bodies in Bulgaria, Cyprus and Luxemburg. Very little explanation of the consequences of these changes for the comparability of status between cycles was found in the RBMPs. Poland was the only Member State to report no changes to surface water bodies.[62]

Generally Member States have included information on size thresholds that they have used to delineate river and lake water bodies. The following table presents the minimum size criteria used by Member States to delineate river and lake water bodies. A large majority have used the size thresholds in typology System A of WFD Annex II (catchments larger than 10 km2 and

[61] EEA (2018). European Waters – Assessment of status and pressures 2018, EEA Report No 7/2018, ISSN 1977-8449.

[62] Further information available for the different Member States at: https://tableau.discomap.eea.europa.eu/t/Wateronline/views/WISE_SOW_Evolution_Compare/SWB_Evolution_Country?:embed=y&:showAppBanner=false&:showShareOptions=true&:display_count=no&:showVizHome=no

lakes larger than 50 Ha). Some Member States have explicitly included smaller water bodies if they are protected under other legislation or if they are ecologically important in the basin. In Greece, the minimum catchment size for delineation of river bodies in Crete and Aegean Islands was set below 10 km2 due to the insular character of the areas. For the same reason, in the Aegean islands the reservoirs with less than 0.5km2 were also taken into account. In Finland and Latvia, the minimum catchment size for rivers was 100km2 which was significantly higher than the other Member States. However, both countries reported that smaller rivers have also been considered if they were particularly relevant for water management or if delineation was needed to achieve specific environmental quality objectives in protected areas. In Lithuania, research and monitoring data showed that rivers with a basin area of less than 30 km2 do not have permanent water flow, and depend on climatic conditions, the species diversity of aquatic organisms is poor and communities are fragile. Therefore, in the second RBMPs, only river water bodies with a basin area of more than 30 km2 were included. In Spain, the RBMPs of the Canary Islands have completed a specific assessment to identify eventual natural and artificial continental surface water bodies which led to the justification of the non-existence of continental surface water bodies, because of the extreme torrential nature of the rivers' regime.

Table 2: Minimum size criteria used by Member States to delineate river and lake water bodies

Member State	**Rivers**	**Lakes**
Austria (AT)	Catchment > 10 km2	Area > 50 Ha
Belgium (BE)	Catchment > 10 km2 (Meuse and Scheldt) BEMEUSE_RW is <10 km2	Area > 50 Ha (Meuse and Scheldt) BEMEUSE_RW is <50 Ha
Bulgaria (BG)	Catchment > 10 km2	Area > 50 Ha
Cyprus (CY)	Catchment > 10 km2	No information
Czech Rep (CZ)	Catchment > 10 km2	Area > 50 Ha
Germany (DE)	Catchment > 10 km2	Area > 50 Ha
Denmark (DK)	No information	Area < 5 Ha
Estonia (EE)	Catchment > 10 km2	Area > 50 Ha
Greece (EL)	Catchment > 10 km2 (<10 km2 additionally in Crete and Aegean Islands)	Area > 0.5 km2 (and <0.5 km2 in the Aegean Islands' reservoirs)

Spain (ES)	Catchment > 10 km2 (Balearic Islands are > 5 km2)	Area > 5 Ha (Western Cantabrian, Guadiana, Segura all > 50 Ha)
Finland (FI)	Catchment > 100 km2	Area > 50 Ha
France (FR)	Catchment > 10 km2	Area > 50 Ha
Croatia (HR)	Catchment > 10 km2	Area > 50 Ha
Hungary (HU)	Catchment > 10 km2	Area > 50 Ha
Ireland (IE)	No information	No information
Italy (IT)	Catchment > 10 km2	Area > 50 Ha
Luxembourg (LU)	No information	Area > 50 Ha
Lithuania (LT)	Catchment > 30 km2	Area > 50 Ha
Latvia (LV)	Catchment > 100 km2	Area > 50 Ha
Malta (MT)	No information	No information
The Netherlands (NL)	Catchment > 10 km2	Area > 50 Ha
Poland (PL)	Catchment > 10 km2	Area > 50 Ha
Portugal (PT)	Catchment > 10 km2	Area >5 Ha
Romania (RO)	Catchment > 10 km2	Area > 50 Ha
Sweden (SE)	Catchment > 10 km2	Area > 100 Ha
Slovenia (SI)	No information	Area > 50 Ha
Slovakia (SK)	Catchment > 10 km2	No information
United Kingdom (UK)	Catchment > 10 km2	Area > 50 Ha

Source: WISE reporting 2016; Note: The reported minimum size criteria were reported at the RBD level and have been summarised at Member State level in this table.

Typology for surface water bodies

As part of the characterisation, Member States have defined surface water body types (typology) for each surface water category (i.e. rivers, lakes, transitional waters or coastal waters) in each RBD, and have delineated surface and groundwater bodies in accordance with the methodology specified in Annex II of the WFD. This also includes the identification of HMWBs and AWBs, which is addressed in chapter 6.7. For each surface water body type,

type-specific reference conditions should have been established representing the values for that surface water body type at high ecological status.

The division of a surface water category into types is based on abiotic descriptors such as altitude, geology, size, etc. using System A or B (Annex II of WFD). The ecological relevance of the different theoretical types has to be demonstrated by cross-checking against biological data such as benthic invertebrates groups and/or species composition. Not all water categories occur in every RBD. Many Member States have still not validated their water body typology against biological data, or it is unclear if biological validation has taken place based on the information in the RBMPs.

The following table presents an overview of the number of types reported per water category and Member State. All water categories have types that have been developed in each Member State. The typologies between the first and the second RBMPs remained largely the same, however some individual Member States did have significant changes and these can be examined in the respective Member State reports.

Table 3: Overview of the number of types reported per water category and Member State

Member State	River water bodies	Lakes water bodies	Transitional water bodies	Coastal water bodies
Austria (AT)	49	14	Not relevant	Not relevant
Belgium (BE)	41	6	3	2
Bulgaria (BG)	20 (15)	10 (6)	5	9
Cyprus (CY)	4	3	None	4
Czech Rep (CZ)	35	16	Not relevant	Not relevant
Germany (DE)	39	16	2	10
Denmark (DK)	5	12 (11)	None	19
Estonia (EE)	7	8	None	6
Greece (EL) *(intercalibrated types)*	9	11	7	2
Spain (ES)	48	36	18	34
Finland (FI)	19	15	None	14
France (FR)	145	34	16	48
Croatia (HR)	28	15 (6)	4	5
Hungary (HU)	15	8	Not relevant	Not relevant
Ireland (IE)	13	16	2	4
Italy (IT)	364	29	40	39

Member State	River water bodies	Lakes water bodies	Transitional water bodies	Coastal water bodies
Luxembourg (LU)	6		Not relevant	Not relevant
Lituania (LT)	5	3	3	2
Latvia (LV)	6	9	1	4
Malta (MT)	1	1	1	4
The Netherlands (NL)	12	18	1	3
Poland (PL)	25	13	4	3
Portugal (PT)	23	2	5	10
Romania (RO)	56 (19)	14 (9)	2	4 (2)
Sweden (SE)	52	77	None	27
Slovenia (SI)	52	9	None	3
Slovakia (SK)	42	Not relevant	Not relevant	Not relevant
United Kingdom (UK)	57	36	10	19

Source: WISE reporting 2016. Note: Not relevant means there are no water bodies in this category. Values in brackets were subsequently provided by Member States and differ from those reported in WISE.

Member States were asked to report if there is no corresponding EU intercalibration common type for their national types. At EU level, the majority of national types for natural surface water bodies have been intercalibrated. However, there were often several national types that had not been intercalibrated.

Reference conditions

Member States are required to identify the ecological status of water bodies by comparing current status with near natural or reference conditions. The establishment of reference conditions is a basic pre-requisite so as to allow a relative comparison of the ecological status at one certain moment. Reference conditions have to be established for each of the surface water types. They represent the values for that surface water body type at high ecological status. According to WFD Annex II reference conditions can be established using different methods (without specific ranking):

- Spatially based reference conditions using data from monitoring sites if sufficiently undisturbed or minimally disturbed sites are available.
- When adequate numbers of representative reference sites are not available in a region/type, predictive modelling, using the data available within a region/type or borrowing data from other similar regions/types, can be used in model construction and calibration.

- A combination of the above approaches.
- Where it is not possible to use these methods, reference conditions can be established using expert judgement.

Establishing reference conditions for many quality elements may involve using more than one of the methods described.

The establishment of reference conditions and the establishment of ecological class boundaries (i.e. boundary between high and good) are closely interconnected. Considerations assumed and methodologies for the establishment of reference conditions are crucial for the judgement of the risk that individual water bodies will fail to reach the overall objective of good water status.

The figure below shows by water category for all Member states whether type-specific reference conditions have been developed for all, some and none of the biological, physicochemical and hydro-morphological quality elements for all surface water body type. The proportion of Member States who established reference conditions for all types and for all quality elements (i.e. biological, hydro-morphological or physicochemical) is, for the different water categories, 10% for rivers and 17 % lakes, 4% for transitional water bodies and 7% for coastal water bodies. A few Member States have established all reference conditions for all water categories, including Austria, Hungary and Poland. Only a small proportion of Member States have no type specific reference conditions at all for rivers (7%) and for transitional waters (4%), and 11% of Member States have no reference conditions for lakes. A large proportion of Member states have partly established reference conditions, which means they established them for all types of a water category but not for each quality element (partly - all types), or only for some types (partly - some types). It is the case for 75% of rivers, 68% of lakes, 50% of transitional waters and 68% of coastal water bodies.

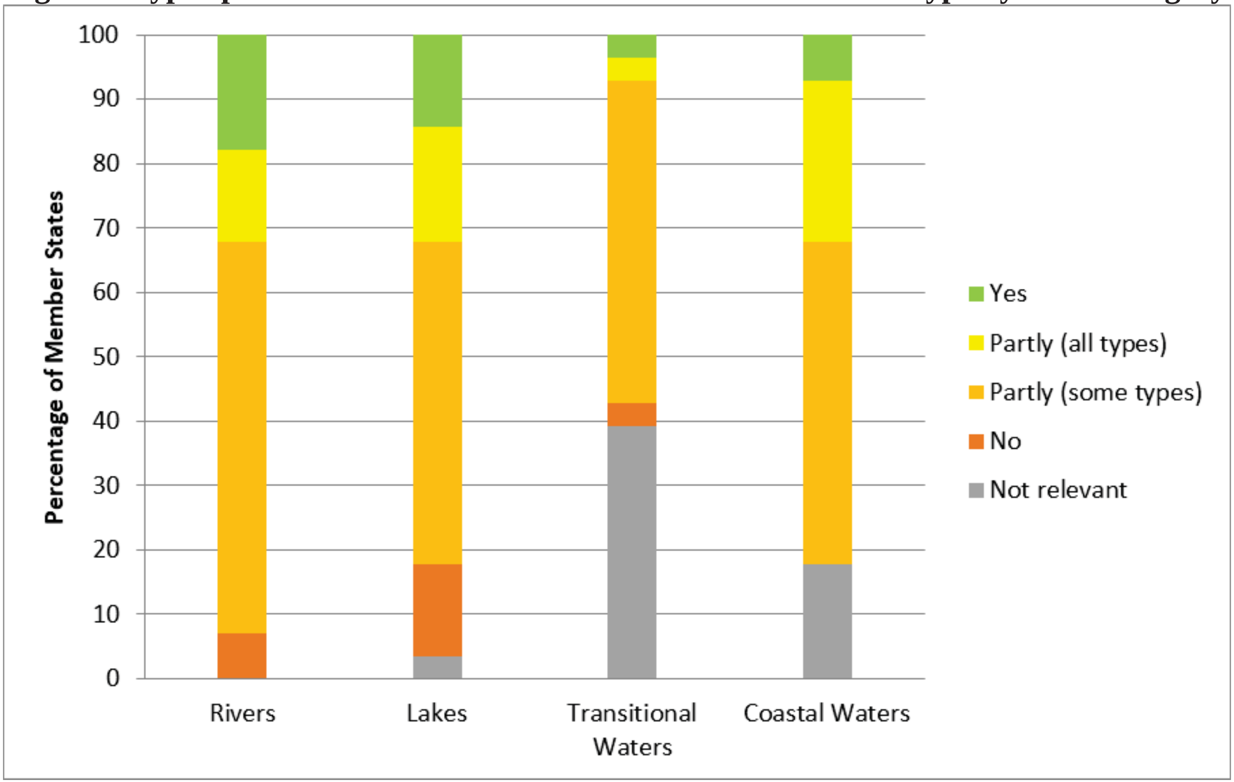
Table 4 shows the percentage of surface water body types in the EU with reference conditions established for all, some and none of the biological, hydro-morphological and physicochemical quality elements. It clearly highlights that the quality elements with the least type specific reference conditions established are hydro-morphological quality elements, with 74% of types having none established. In most of the cases, Member States established reference conditions for some water types, but 10 Member States didn't establish reference conditions for hydro-morphological quality elements for any type (including Denmark, Finland, France, Croatia, Ireland[63], Italy, Latvia, Luxembourg, Malta and Slovakia). Regarding the other quality

[63] Ireland has subsequently informed the Commission that reference conditions for hydromorphological elements are in place.

elements, 89% and 55% of biological quality elements and physicochemical quality elements (respectively) have type-specific reference conditions established for all or some types.

Overall the situation is similar to the first RBMPs with little improvement shown at the EU level. Some Member States have shown improvements and this information can be obtained in the individual Member State reports.

Figure 2 Type-specific reference conditions for each surface water type by water category



Source: WISE reporting 2016;

Notes: Yes = when reference conditions have been established for all types for each quality element (i.e. biological, hydro-morphological or physicochemical)
Partly (all types) = when reference conditions have been established for all types but not for each quality element (i.e. biological, hydro-morphological or physicochemical)
Partly (some types) = when reference conditions have been established for some types but not for each quality element (i.e. biological, hydro-morphological or physicochemical)
No = when reference conditions have not been established
Not relevant = water category not delineated

The situation may be different between RBDs but the data is summarised at a national level.

Table 4: Percentage of surface water body types in the EU with reference conditions established for all, some and none of the biological, hydro-morphological and physicochemical quality elements.

Water types	Biological quality elements	Hydro-morphological quality elements	Physicochemical quality elements
All	58%	13%	18%
Some	31%	13%	37%
None	10%	74%	45%

Source: WISE reporting 2016.

Delineation and further characterisation of groundwater bodies

Approximately 1453 groundwater bodies have been delineated in the EU with the highest number being reported by Finland (3 773) and the lowest by Luxembourg (6). The average size of groundwater bodies in the EU is around 316 km^2 with the smallest by far on average being in Finland (2.6 km^2), and the largest in Latvia (3 460 km^2). Around 70% of the groundwater bodies (by area) have not changed from the first to the second RBMPs, while 29% of those from the first RBMPs have been deleted and replaced by new ones[64].

In the assessment of the first RBMPs, it was recommended that the delineation of groundwater bodies should be better harmonised and that related guidance documents should be improved. The CIS Guidance Document no. 26 on the “Risk Assessment and the Use of Conceptual Models for Groundwater” provided more guidance on the refinement of water body delineation. Since the first RBMPs, most Member States have further characterised their groundwater bodies by providing information on their geological formation and whether they are layered or not. In addition, the majority of Member States have provided an inventory of associated surface systems, including terrestrial ecosystems and bodies of surface water with which the groundwater body is dynamically linked.

Pressures and impacts on surface and groundwater bodies

The WFD requires identification of significant pressures from point sources of pollution, diffuse sources of pollution, modifications of flow regimes through abstractions or regulation and morphological alterations, as well as any other pressures. ‘Significant’ is interpreted as meaning that the pressure contributes to an impact that may result in the failing of environmental objectives.

For the second RBMPs, Member States have reported on significance of pressures at a disaggregated level, i.e. for different types of pressure-driver combinations, which helped to better identify the link between pressures, sectoral drivers and measures. The identification of

[64] EEA (2018). European Waters – Assessment of status and pressures 2018,EEA Report No 7/2018, ISSN 1977-8449.

significant pressures can involve different approaches: numerical tools (e.g. modelling); expert judgement or a combination of both tools. The magnitude of the pressure is compared with thresholds or criteria, relevant to the water body type to assess its significance. Figure 3 shows the types of tools reported to be used to assess the significance of the main types of pressures. For most pressure types, most Member States use a combination of numerical tools and expert judgement (see Figure 3).

In addition, the criteria used to define significance of pressures have been further developed by some Member States. The significance of pressures has been defined using thresholds for 61% of surface water bodies and 68% of groundwater bodies. The significance of pressures has also been linked to the failure of environmental objectives for 84% of surface water bodies and 29% of groundwater bodies. Whilst there have been advancements since the first RBMPs, there is room for improvement and the criteria could be made more explicit in the RBMPs and supporting documents.

Member States also reported which significant pressures were not assessed, however it was often unclear from the RBMPs and supporting documents what the rationale for excluding these pressures were. Moreover, no justification has been provided to discard certain pressures that had been reported in the first RBMPs.

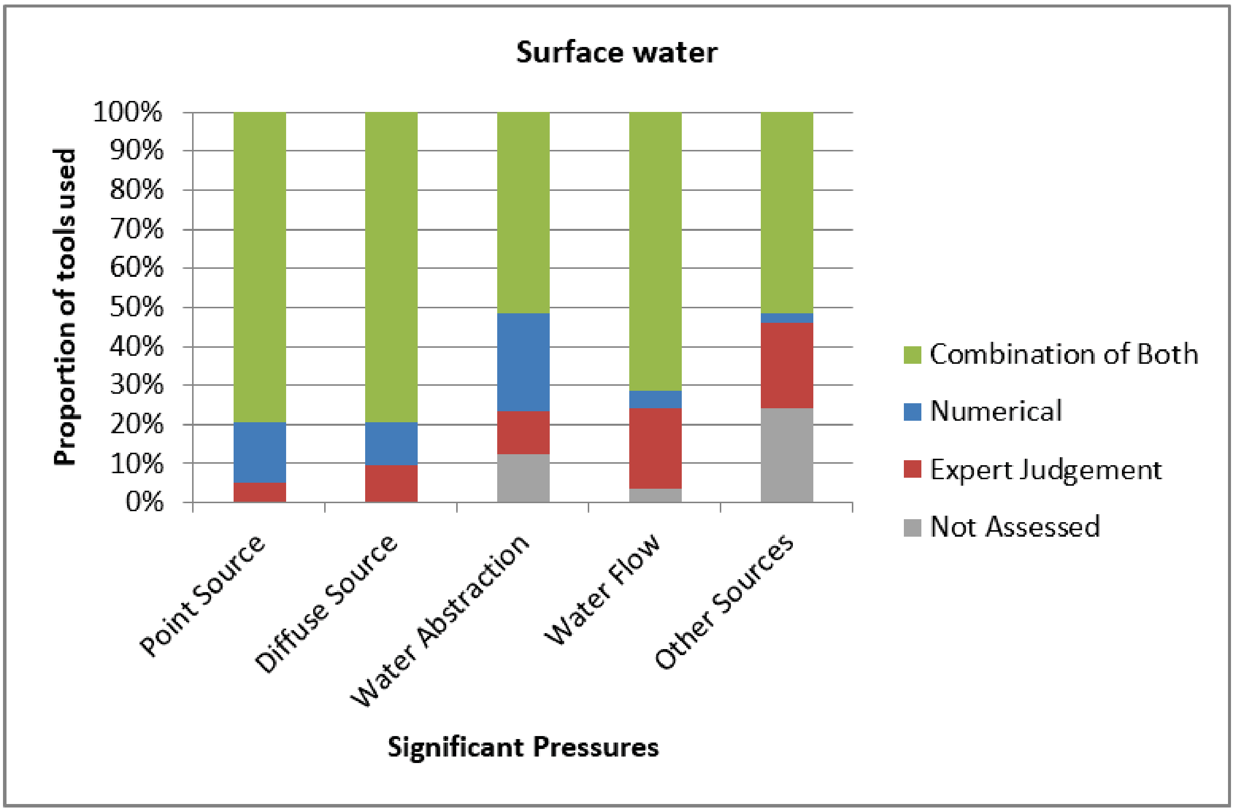
The EEA State of Water Report 2018 provides a wide overview of the identification of significant pressures and impacts at EU level. As shown in Figure 4, the main significant pressures affecting surface water bodies are hydro-morphological pressures (38% of surface water bodies affected), diffuse source pollution (38%) and point source pollution (17%)[65] In Lithuania, a relatively high proportion of pressures are still identified as ‘unknown’ for surface water bodies. Most countries report diffuse sources of pollution as being a pressure for groundwater (26 out of 27 Member States), while 21 Member States report point sources as a pressure. The main pressures affecting groundwater bodies are: diffuse pollution from agriculture which is identified as the major pressure causing failure of good chemical status affecting 27% of groundwater bodies (by area), and water abstraction and change in groundwater level with over-abstraction affecting 14% of the total groundwater area. In particular, water abstraction for public water supply, agriculture and industry is the main significant pressure causing failure of good quantitative status. In Lithuania, ‘no significant pressure’ was reported for 100% of groundwater bodies.

Pressures and impacts should be apportioned to the responsible drivers, sectors and activities to give a clear picture of the most important sources for a given impact so that specific measures

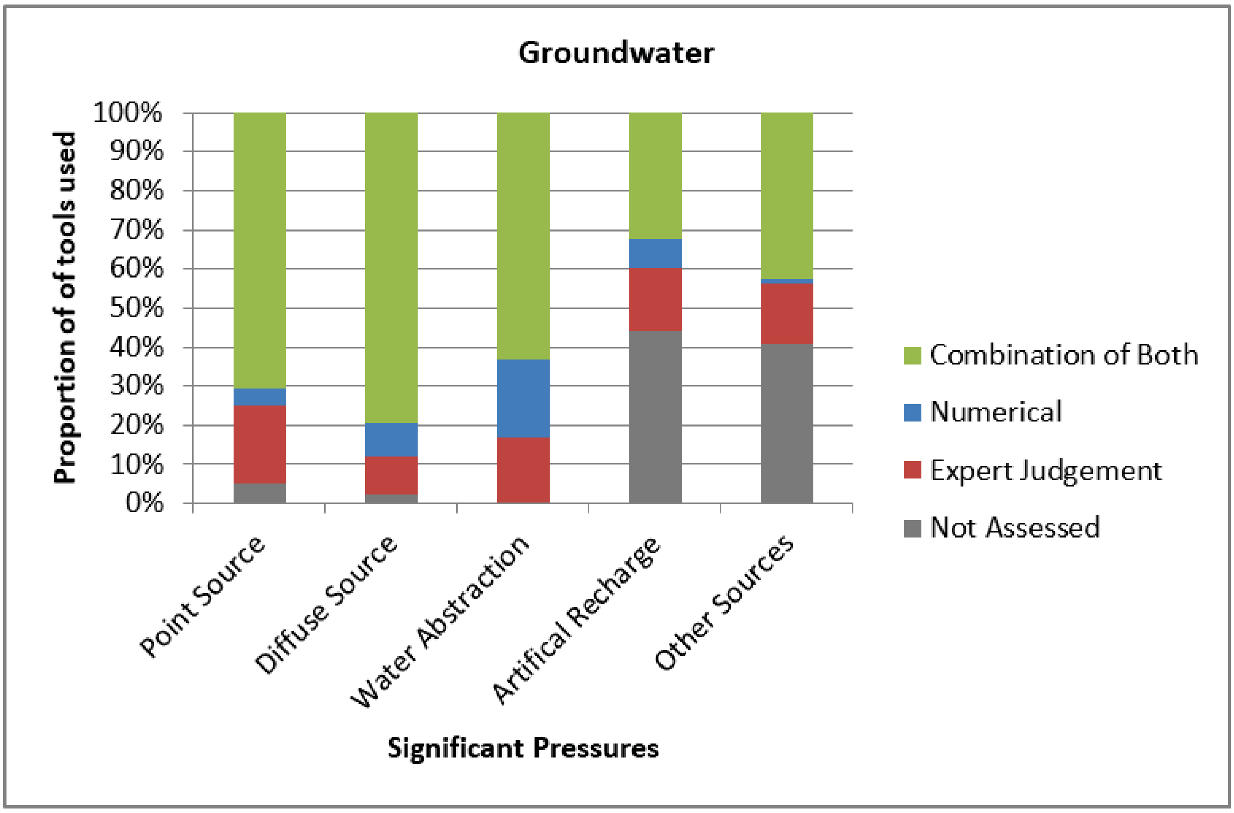
[65] EEA (2018). European Waters – Assessment of status and pressures 2018,EEA Report No 7/2018, ISSN 1977-8449.

can be set within their POMs to address particular pressures. The main drivers for point source pollution pressures were urban wastewater, followed by industrial plants and storm overflows. For diffuse source pollution, the main driver was agriculture, followed by atmospheric deposition and discharges not connected to sewerage plants[66].

Figure 3 The types of tools reported to be used to assess the significance of the main types of pressures in surface water and groundwater



[66] EEA (2018). European Waters – Assessment of status and pressures 2018,EEA Report No 7/2018, ISSN 1977-8449.



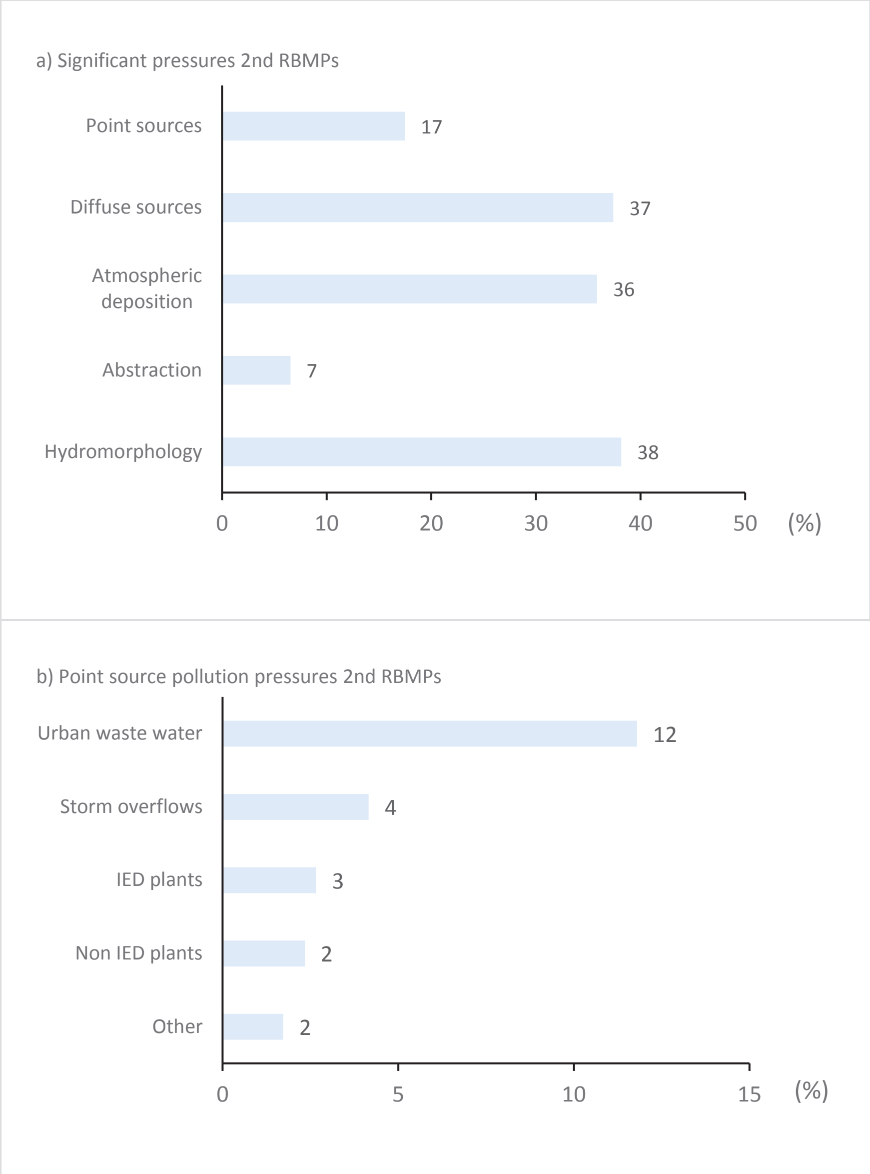
Source: WISE reporting 2016

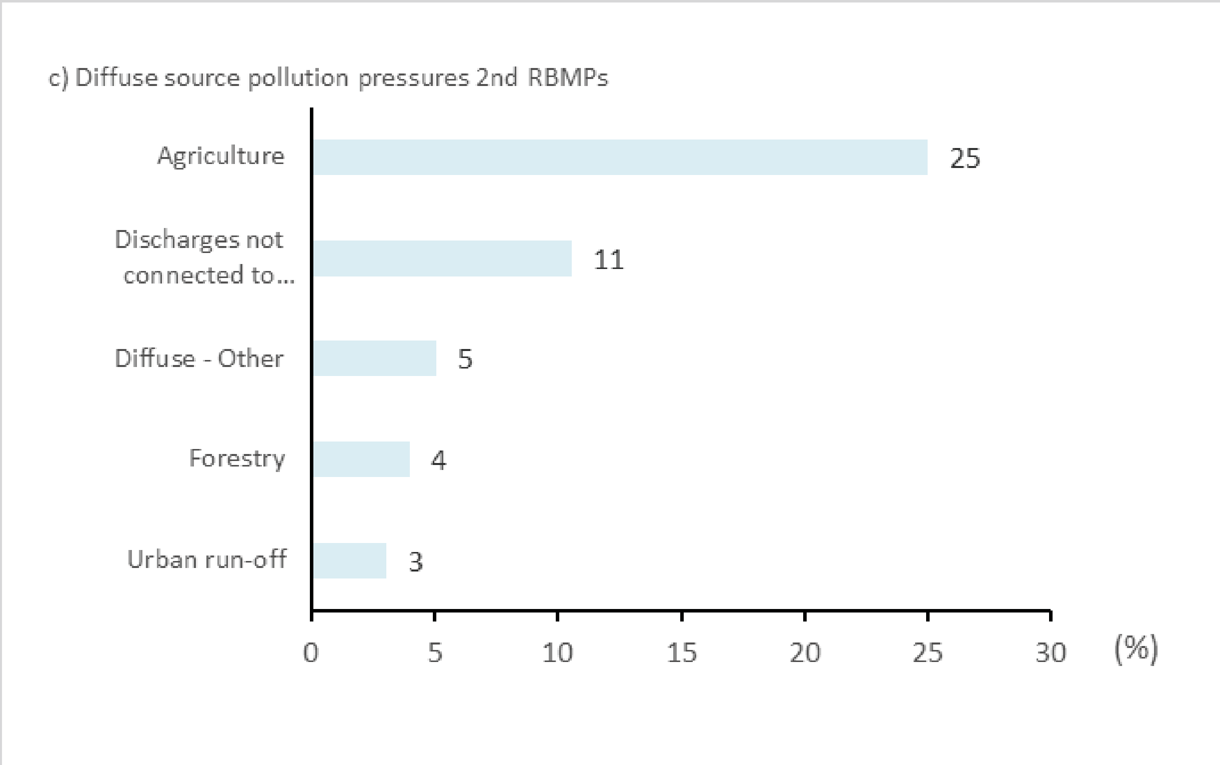
The main impacts on surface water bodies are nutrient enrichment, chemical pollution and altered habitats due to morphological changes, reflecting the key pressures[67]. It is highlighted that a higher proportion of transitional and coastal water bodies are affected by pollution pressures compared with rivers and lakes.

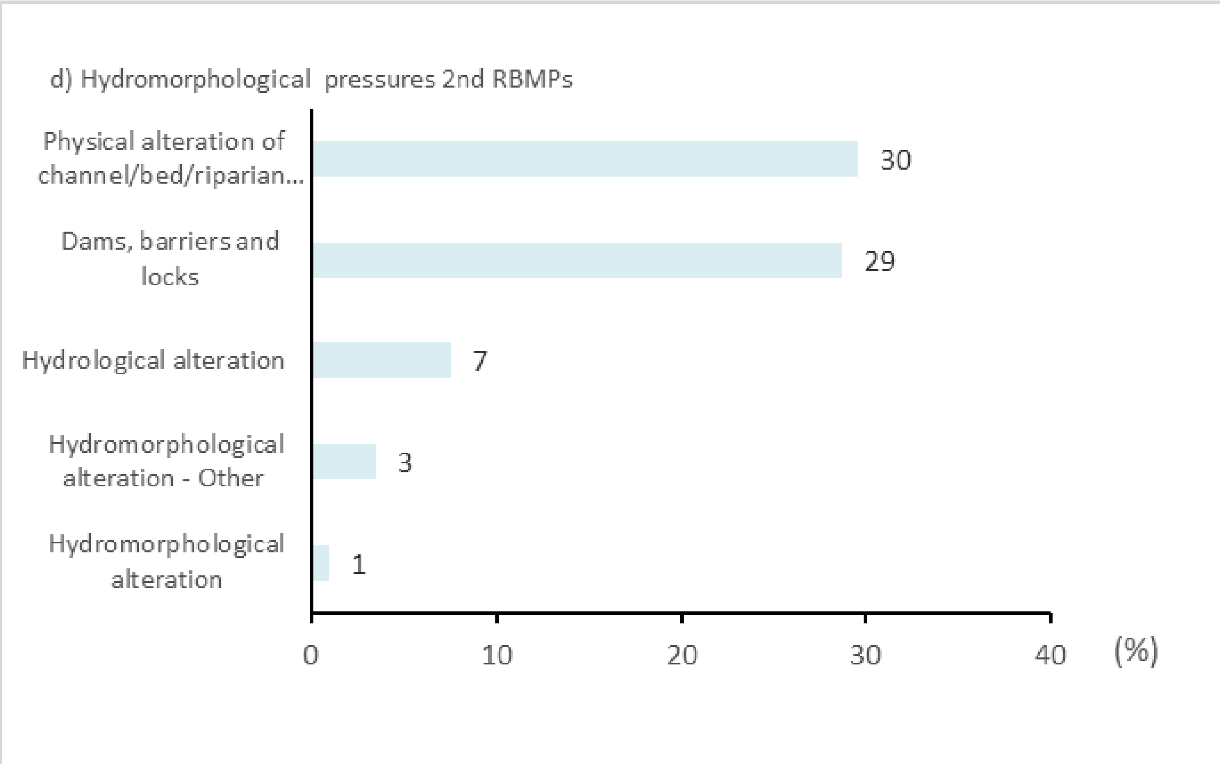
Unknown impacts of anthropogenic origin were also reported for a large proportion of water bodies in several Member States, which would indicate that the pressures and impacts have not been fully apportioned to activities or sectors. Also in the case of hydro-morphological pressures, many Member States have not clearly apportioned these to specific sectors, according to the WISE reporting (see further information in chapter 6.13).

[67] EEA (2018). European Waters – Assessment of status and pressures 2018,EEA Report No 7/2018, ISSN 1977-8449.

Figure 4 Proportion of surface water bodies affected by main pressures and sources of pressures







Notes: Proportion of water bodies with specific pressures; for example, point sources affect 17 % of water bodies, and the main point source pressure is discharges from urban waste water treatment plants, which affect 12 % of all surface water bodies. A water body may be affected by more than one pressure; therefore, the sum of percentages is greater than 100 %. IED plants are industrial emissions covered by the Industrial Emissions Directive (EC, 2018e).

Source: EEA (2018). European Waters – Assessment of status and pressures 2018, EEA Report No 7/2018, ISSN 1977-8449.

Establishment and use of inventories of discharges, emissions and losses of chemical substances

Article 5 of the EQSD (2008/105/EC) requires Member States to establish, on the basis of the information collected in accordance with Articles 5 and 8 of the WFD and other available data such as that collected under Regulation (EC) No 166/2006, an inventory of emissions, discharges and losses of all Priority Substances and the 8 other pollutants listed in Part A of Annex I EQSD for each RBD, or part thereof, lying within their territory. These inventories should allow Member States to further target measures to tackle pollution from priority substances. It should also inform the review of the monitoring networks, and allow the assessment of progress made in reducing (resp. suppressing) emissions, discharges and losses for priority substances (resp. priority hazardous substances).

The transposition deadline for the EQSD was July 2010, after the adoption of the first RBMPs. This meant an inventory precisely according to Article 5 of the EQSD did not have to be established by the time of submission of the first RBMPs. However, the obligations for gathering data under Articles 5 and 8 of the WFD were effectively in place by the end of 2006, as the list of substances was already known and emissions data on some substances have been gathered. In 35% of the RBMPs assessed for the first cycle, no clear information was found relating to inventories.

The CIS Guidance Document No. 28 "Technical Guidance on the Preparation of an Inventory of Emissions, Discharges and Losses of Priority and Priority Hazardous Substances"[68] published in 2012 addresses the preparation of the inventories at national RBD scale.

For the second RBMPs, each Member State reported for the first time which Priority Substances had been included in an inventory of discharges, emissions and losses and all RBDs reported an inventory for at least some Priority Substances. Only a few countries have complete inventories, including Austria, Cyprus, Luxembourg, Lithuania, Latvia and Slovenia. For the remaining Member States, the inventories are not complete. In some cases, justification for not including the missing Substances in the inventory was provided but not always. Some Member States included less than 10 substances in their inventories, it is particularly the case for Bulgaria, Croatia, Malta, Sweden and Slovakia. In Greece or specific RBDs of Spain (Ceuta, Fuerteventura, Lanzarote, La Palma, La Gomera and El Hierro), no inventory of the emission of discharges and losses of all Priority Substances and the eight other pollutants was reported.

[68] http://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm

The CIS Guidance Document no. 28 recommends a two-step approach for compiling inventories. In the first step, substances considered to be less important are subject to only a basic estimation of significant inputs, whereas for the remaining substances, a more in-depth analysis should be performed 24 of the Member States reported that the two-step approach was applied, very few reported that it was not used and the remaining Member States used this approach for some, but not all Priority Substances. Analysis of inputs of Priority Substances was almost entirely based on assessment of point sources with diffuse source inputs not being given due consideration.

As required by Article 5 of the EQS Directive, the Commission will assess progress in reducing (respectively suppressing) emissions, discharges and losses of priority substances (respectively priority hazardous substances). This will be done after Member States have reported their second inventories as part of their third RBMPs.

Main changes in implementation and compliance since first RBMPs

Overall at an EU level about 56% of surface water bodies remained unchanged in terms of delineation since the first RBMPs. However, in certain Member States, it can be seen that a large proportion of surface water bodies did change (splitting, creation and deletion) since the first RBMPs. Around 70% of the groundwater bodies (by area) had not changed. Since the first RBMPs most Member States have further characterised their groundwater bodies by providing information on their geological formation and whether they are layered or not. In addition, the majority of Member States have provided an inventory of associated surface systems, including terrestrial ecosystems and bodies of surface water with which the groundwater body is dynamically linked.

Overall since the first RBMPs there have been no significant improvements in the development of typologies and reference conditions for surface waters. In particular many gaps in terms of type-specific reference conditions still remain.

For most pressure types, most Member States use a combination of numerical tools and expert judgement to identify significant pressures. This is similar to the first RBMPs, although many Member States have shown improvements in the methodologies for individual pressure types. In addition, the criteria used to define significance of pressures have been further developed by some Member States. The significance of pressures has been defined using thresholds for 61% of surface waters and 68% of groundwaters. The significance of pressures has also been linked to the failure of environmental objectives for 84% of surface water bodies and 29% of groundwater bodies.

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As to changes in reporting of inventories, the transposition deadline was July 2010, meaning an inventory precisely according to Article 5 of the EQSD did not have to be established by the time of submission of the first RBMPs. Therefore, 35% of the first RBMPs assessed had no clear information relating to inventories. For the second RBMPs, almost all Member State reported which Priority Substances had been included in an inventory of discharges, emissions and losses for each RBD, however only a few countries have complete inventories. No inventory was reported in Greece or specific RBDs of Spain (Ceuta, Fuerteventura, Lanzarote, La Palma, La Gomera and El Hierro).

5.2.1 Conclusions

Overall at an EU level about 56% of surface water bodies have remained unchanged in terms of delineation since the first RBMPs although in certain Member States, a large proportion of surface water bodies did change since the first RBMPs. Around 70% of the groundwater bodies (by area) have not changed. Nevertheless, little explanation of the consequences of these changes for the comparability of status between cycles was found in the RBMPs.

Reference conditions have not been established for all water body types in a number of Member States for all water categories. The situation is similar to the first RBMPs with little improvement shown at the EU level. Hydro-morphological quality elements were found to be the quality elements whose type-specific reference conditions show the most significant gaps for surface water body types.

The identification of significant pressures by Member States involves different approaches such as numerical tools (e.g. modelling), expert judgment or a combination of both. For most pressure types, most Member States use a combination of numerical tools and expert judgement. The criteria used to define significance of pressures have been further developed by some Member States since the first RBMPs. However, there remain significant gaps that will need to be addressed in the current cycle, particularly in defining thresholds; in addition, the criteria used could be made more explicit in the RBMPs or in supportive documents. Member States reported which significant pressures were not assessed, however it was often unclear from the RBMPs and supporting documents what the rationale for excluding these pressures were. Further work is required by Member States on the apportionment of pressures to sectors and activites to better inform the targeting of measures. For the second RBMPs, Member States have reported on significance of pressures at a disaggregated level, i.e. for different types of pressure-driver combinations, which helped to better identify the link between pressures, sectoral drivers and measures. However, unknown impacts of anthropogenic origin and pressures of unknown drivers (especially hydro-morphological pressures) were reported for a large proportion of water bodies in some Member States, which would indicate that the pressures and impacts have not been fully apportioned to activities or sectors.

For the second RBMPs, each Member State reported which Priority Substances had been included in an inventory of discharges, emissions and losses, however only a few countries have complete inventories, with the reasons for incomplete inventories generally not being reported. 24 of the Member States reported that the two-step approach for compiling inventories, as recommended in the CIS Guidance Document no. 28, was applied although analysis of inputs of Priority Substances. However, it was almost entirely based on assessment of point sources with diffuse source inputs not being given due consideration.

5.2.2 Recommendations

- Member States should address the existing gaps in the definition of reference conditions for surface waters. Reference conditions should be established for all water body types and for all relevant quality elements, in order to improve the reliability of status assessment. A particular effort has to be done for hydro-morphological quality elements.

- Improvements are further needed in the evaluation of significance of pressures and in the apportionment of those pressures to sectors and activities, in order to better inform the targeting of measures. In particular, all pressures should be assessed with methodologies that enable a reliable quantitative assessment.

- Member States should complete their inventories of discharges, emissions and losses of Priority Substances from point and diffuse sources, in order to cover all Priority Substances, and provide clear information on the reasons for not including certain substances when that is the case.

5.3 Monitoring, assessment and classification of ecological status in surface waters

5.3.1 Introduction

The main objectives of the WFD include the achievement of GES/potential by 2015. Member States had to establish surface water monitoring networks to provide a coherent and comprehensive overview of ecological (and chemical) status within each river basin that allows for the classification of water bodies into five classes consistent with the normative definitions given in Annex V of the WFD. The quality elements used for the classification of ecological status comprise biological elements, hydro-morphological elements supporting the biological elements; general physicochemical elements and RBSPs supporting the biological elements.

The WFD specifies the types and objectives of monitoring to be undertaken, including surveillance monitoring which should be carried out in sufficient surface water bodies to provide an assessment of the overall ecological status/potential within each catchment or subcatchments within the river basin district. Surveillance monitoring should be able to detect the impact of all potential anthropogenic pressures and natural long-term changes. This requires a range of different quality elements to be monitored. Operational monitoring should. establish the status of those bodies identified as being at risk of failing to meet their environmental objectives, and. assess any changes in the status of such bodies resulting from the programmes of measures. Operational monitoring generally focuses on the quality elements most sensitive to the specific pressures and impacts on water bodies.

Annex V of the WFD provides guideline monitoring frequencies for the different quality elements. In any case, frequencies should be chosen so as to achieve an acceptable level of confidence and precision in the results of monitoring, and in the subsequent assessment and classification of ecological status/potential of water bodies. Estimates of the confidence and precision attained by the monitoring system used should be stated in the RBMPs. The level of confidence and precision achieved in the classification of water bodies should enable the measures needed to achieve WFD objectives to be effectively targeted.

Before the implementation of the WFD many Member States had developed their own systems for monitoring and assessing the quality of water bodies. However, these were generally developed for specific stressors or types of impact, such as organic pollution and acidification. Considerable efforts have subsequently been made by Member States to develop assessment methods for the biological quality elements, and the supporting hydro-morphological and physicochemical quality elements that meet the requirements of the WFD. This includes the establishment of type- specific reference conditions for all water body types for all relevant quality elements: this aspect has been assessed in this document in the chapter on characterisation.

The WFD provides for a process to ensure the comparability between the biological monitoring results of Member States and their monitoring system classifications. These are compared through an intercalibration network comprised of monitoring sites in each Member State and in each ecoregion of the Union. Member States should apply the results of the intercalibration exercise to their national classification systems, in order to set the boundaries between high and good status and between good and moderate status for all their national types. There have been three phases of the intercalibration exercise, each resulting in a Commission Decision. It is expected that the results of the first two exercises would have been used in the development of the second RBMPs, while the results of the third exercise should be used in the next river basin planning cycle.

According to the one-out-all-out principle, that the status of a water body should be classified according to the biological quality element with the lowest status class and the status class should be downgraded to moderate if the worst biological quality element is good and one or more of the supporting quality elements are less than good. When combining with the supporting quality elements, an aggregated level can be used for the supporting quality elements belonging to the same impact (e.g. phosphorus, nitrogen, Secchi depth), based on averaging the class for single quality elements within each impact category, before applying the one-out-all-out principle.

Monitoring of ecological status/potential in surface waters

Monitoring programmes

Table 3.1 gives the number of monitoring programmes reported by Member States for each of their relevant water categories. Monitoring programmes may include more than one water category and hence the numbers in the surface water column are not necessarily the sum of the programmes for each water category. Territorial waters are not a water body category under the WFD. However, it should be noted that under Article 2(1) of the WFD, territorial waters are included for the assessment and reporting of chemical status.

Table 3.1: Number of surface water monitoring programmes reported by Member States. Note: NR = water category not relevant to land-locked Member State.

	Number of monitoring programmes					
Member State	Surface waters	Coastal waters	Lakes	Rivers	Transitional waters	Territorial waters
AT	8	NR	2	6	NR	NR

	Number of monitoring programmes					
Member State	Surface waters	Coastal waters	Lakes	Rivers	Transitional waters	Territorial waters
BE	26	2	3	19	2	2
BG	36	4	11	18	3	
CY	6	2	2	2		
CZ	2	NR	2	2	NR	NR
DE	10	7	10	10	4	
DK	4	1	3	5		
EE	3	4	4	5		2
EL	27	24	15	27	9	
ES	204	52	65	159	43	
FI	21	6	8	7		
FR	51	20	20	26	16	
HR	1	1	1	1	1	
HU	11	NR	4	7	NR	NR
IE	3	3	3	3	3	
IT	85	30	31	48	19	
LU	13	NR		13	NR	NR
LT	4	1	4	4	1	1
LV	1	2	2	2	2	
MT	2	1	1	1	1	
NL	1	1	1	1	1	
PL	11	5	11	11	6	
PT	18	8	14	17	9	
RO	4	1	3	4	1	1
SE	15	12	15	14		5
SI	4	2	4	4		2
SK	6	NR		6	NR	NR
UK	27	10	8	12	9	
EU 28	604	199	247	434	130	13

Source: WISE electronic reports.

In total 604 monitoring programmes were reported by EU Member States including 13 for territorial waters reported by 6 Member States. There are many differences in how Member States have designed and reported their monitoring programmes. There are examples where there are separate programmes for surveillance and operational purposes and/or separate programmes for each relevant water category. Several Member State-specific gaps have been identified in the reported programmes, especially the lack of operational or surveillance monitoring programmes for lakes, transitional or coastal waters in some Member States.

Some Member States also reported monitoring programmes that are not explicitly related to the WFD (e.g. Bathing Water Directive and Nitrates Directive programmes for surface waters). Some programmes were also time limited and in one Member State it appears that no monitoring programmes are planned for the duration of the second cycle.

Monitoring sites

a) Second RBMPs

Tables 3.2 and 3.3 present the number of surveillance and operational monitoring sites reported by Member States in the second RBMPs. It is apparent that Member States have interpreted differently what is meant in the reporting guidance by ecological monitoring and chemical monitoring: i.e. are river basin specific pollutants included in chemical monitoring and/or in ecological monitoring. Also no explicit differentiation had been made between chemical and ecological monitoring in the data reported for the first RBMPs. For these reasons the data in the tables below make no allowance for whether sites are used for chemical or ecological monitoring.

Table 3.2: Number of sites used for surveillance monitoring for the second RBMPs.

Member State	CW	LW	RW	TeW	TW
AT	NR	32	76	NR	NR
BE	6	1	122	1	3
BG	14	5	492		28
CY	20	6	52		
CZ	NR	8	85	NR	NR
DE	75	162	306		43
DK	781	818	790		
EE	128	360	315	10	
EL	49	13	305		
ES	543	156	2 355		299
FI	93	1126	481		
FR	133	201	1 699		79
HR	49	6	40		81
HU	NR	27	118	NR	NR
IE	82	743	165		120
IT	304	166	1 647		40
LT		214	193		
LU	NR		5	NR	NR
LV		25	33		
MT	5				
NL	10	80	69		11

Member State	CW	LW	RW	TeW	TW
PL		322	338		
PT	118	116	334		114
RO		22	1234		
SE	1144	3379	5 512	16	
SI	2	4	25	1	
SK	NR		875	NR	NR
UK	677	463	2 634		513
EU (28)	4 233	8 455	20300	28	1 331

Source: WISE electronic reports.

Notes for table: CW: coastal waters; LW: lakes; RW: rivers; TeW: territorial waters; TW: transitional waters. NR = water category not relevant to land-locked Member States. No allowance has been made as to whether the sites are for ecological or chemical monitoring. This is because this makes the data more comparable with the data from the first RBMPs.

Table 3.3 Table: Number of sites used for operational monitoring for the second RBMPs.

Member State	CW	LW	RW	TeW	TW
AT	NR		2 025	NR	NR
BE	6	89	664	2	10
BG	6	14	285		15
CY	4		34		
CZ	NR	62	997	NR	NR
DE	98	716	13 106		15
DK	781	262	12 464		
EE	34	7	72		
EL	30	20	150		30
ES	298	71	2 312		80
FI	227	627	591		
FR	47	222	3 085		51
HR	29	14	135		23
HU	NR	102	1 078	NR	NR
IE	177	858	2 916		335
IT	439	170	1 494		428
LT	6	143	385	9	17
LU	NR		218	NR	NR
LV	20	218	186		8

Member State	CW	LW	RW	TeW	TW
MT	5				
NL	10	465	344		14
PL	10	373	1 813		9
PT		32	495		3
RO	28	72	422	3	8
SE	714	1524	4 030	7	
SI	6	14	248	1	
SK	NR		277	NR	NR
UK	325	448	21 316		462
EU (28)	3 300	6513	71142	22	1 508

Source: WISE electronic reports.

Note for table: CW: coastal waters; LW: lakes; RW: rivers; TeW: territorial waters; TW: transitional waters. NR = water category not relevant to land-locked Member States. No allowance has been made as to whether the sites are for ecological or chemical monitoring. This is because this makes the data more comparable with the data from the first RBMPs.

At the EU level (26 Member States assessed for this report), more sites were used for the monitoring of rivers than for the other water categories with more being used for operational purposes (71142) than for surveillance (20300). The reverse was the case for lakes (8 455 for surveillance monitoring and 6 513 for operational), while similar numbers were used for both purposes in transitional and coastal waters.

b) Changes since the first RBMPs

Table 3.4 summarises the changes in the numbers of surveillance and operational monitoring sites between the first and second RBMPs. The assessment is made at the Member State level and summarises the changes in terms of small, medium and large differences in numbers.

Table 3.4 Number of Member States with changes in the numbers of surveillance and operational monitoring sites between the first and second RBMPs.

	Surveillance				Operational			
	CW	LW	RW	TW	CW	LW	RW	TW
Large increase (>50%)	8	6	5	4	7	7	10	3
Medium increase (10% to 50%)	2	3	3	1	2	2	6	0

	Surveillance				Operational			
	CW	LW	RW	TW	CW	LW	RW	TW
Small increase (up to 10%)	2	3	6	0	0	2	5	0
No change	0	1	0	0	1	0	0	0
Small decrease (up to 10%)	1	2	4	2	3	3	0	1
Medium decrease (10% to 50%)	4	5	8	3	5	7	6	6
Large decrease (>50%)	4	5	1	5	2	6	1	5

Source: WISE electronic reports.

Note to Table: CW: coastal waters; LW: lakes; RW: rivers; TW: transitional waters. No allowance has been made as to whether the sites are for ecological or chemical monitoring. The cells show the number of Member States where there have been increases, decreases or no changes between the first and second RBMPs. Only the RBDs with reported information for both cycles were used in the analysis.

Only for one Member State was there no change between the first and second RBMPs, in the case of surveillance monitoring of lakes. In many Member States there were large increases or decreases in the numbers of sites used for either purpose in all water categories. For example, for six Member States there was at least a 50 % increase in lake surveillance sites and in five others at least a 50 % decrease.

Member State's RBMPs were examined to look for the reasons behind these changes. For instance, in one Member State, the reasons for the changes included the abolishment of a number of measuring stations that were deemed to be not necessary (e.g. stations used to determine reference conditions), some stations have been changed for reasons of safety (safe access) or for a more rational planning of the network. In general, it would have been expected there would be changes because of filling of methodological and monitoring gaps identified in the first RBMPs. For example, some Member States have adopted a series of national methodological and guidance documents on different topics of water management since the first RBMPs, to ensure a common approach across the RBDs. In other Member States, changes to the monitoring programme were due to the experience gained during the first planning cycle and also reflect the Commission's recommendations on the first RBMPs. For instance, in one Member State, the river network was expanded to cover rivers with non-permanent flow and to ensure the monitoring in water bodies that were identified as not being in good status in the first RBMP.

The number of monitoring sites may also have changed because of the new delineation of water bodies (e.g. by merging old water bodies or creating new water bodies). In some cases, there was an extension of the monitoring network in order to increase representativeness or a reduction of the network due to a risk-based approach determining the extent of the monitoring.

Further details on changes to the monitoring programmes are given in the Member State-specific reports. Monitoring of quality elements excluding RBSPs

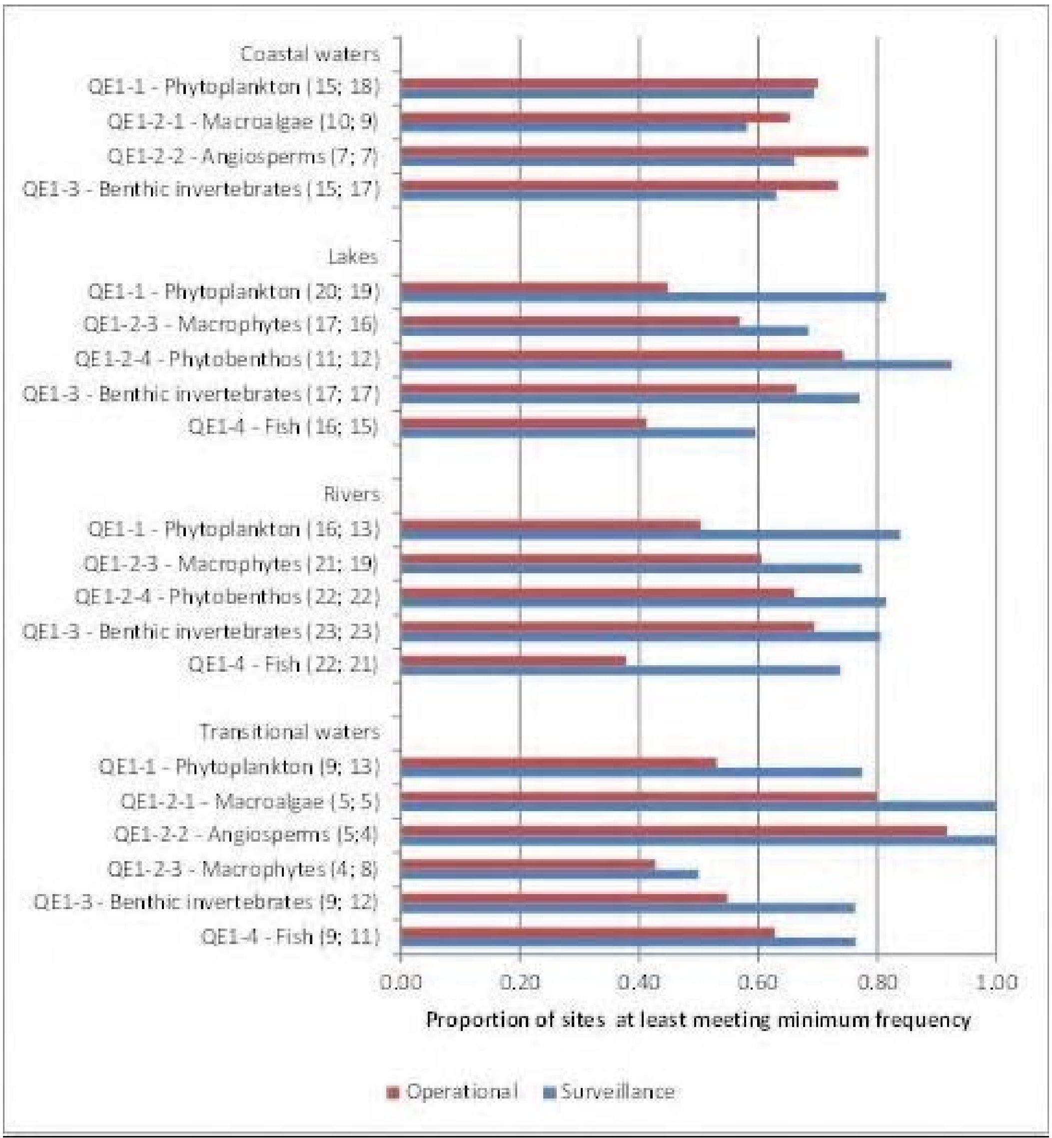
The WFD requires that parameters indicative of all biological quality elements, all hydro-morphological quality elements, all general physicochemical quality elements, those priority list pollutants (described in Chapter 6.4) which are discharged into the river basin or sub-basin and those other pollutants discharged in significant quantities in the river basin or sub-basin (described here as river basin specific pollutants) are monitored in water bodies included in surveillance monitoring.

For operational monitoring, Member States are required to monitor for those biological and hydro-morphological quality elements which are most sensitive to the pressures to which the water bodies are subjected (Annex V, 1.3.2 Selection of quality elements).

Annex V of the WFD provides guidance on the frequency of monitoring of the different quality elements. Surveillance monitoring should be carried out for each monitoring site for a period of one year during the six-year period covered by a RBMP. For phytoplankton this should be done twice during the monitoring year and for the other biological quality elements once during the year. As a guideline, operational monitoring should take place at intervals not exceeding once every six months for phytoplankton and once every three years during the six-year cycle for the other biological quality elements. Greater intervals may be used if they are justified on the basis of technical knowledge and expert judgement.

Figure 3.1 shows, at the EU level, the average proportion of sites used for the operational and surveillance monitoring of biological quality elements in each water category where at least the minimum recommended frequency is applied. There are only two cases where biological quality elements are monitored at least at the minimum recommended frequency at all monitoring sites at which they are monitored: these are for macroalgae and angiosperms in transitional waters for surveillance purposes. The monitoring of fish in rivers and lakes for operational purposes had the smallest proportion on sites that were sampled with at least the minimum recommended frequency: 38 % and 41 % of sites, respectively.

Figure 3.1 Average proportions of sites meeting the minimum recommended frequency for the monitoring of biological quality elements in different water categories.



Source: WISE electronic reports.

Note: Average calculated from the proportion of sites meeting the recommended frequencies in each Member State that reported the element. The numbers in parenthesis are the number of Member States reporting the quality element to be monitored for surveillance and operational purposes, respectively.

Annex V of the WFD indicates which quality elements are expected to be monitored in each water category: a full range of quality elements is required so that the effects of all pressures and impacts can be detected.

There are still significant gaps in the quality elements monitored in each water category. This is particularly so for the hydro-morphological quality elements but there are still significant gaps also in the monitoring of biological quality elements. For example, more than half of the Member States with coastal waters that have reported do not monitor morphological conditions, and half of the Member States with coastal waters do not monitor tidal regime. In terms of biological quality elements, approximately a quarter of the the Member States with coastal waters do not monitor angiosperms and macroalgae in coastal waters.

Table 3.5 summarises at the aggregated level the percentage of water bodies included in surveillance monitoring where all required quality elements are monitored.

Table 3.5: Number of water bodies included in surveillance monitoring and percentages where all required quality elements are monitored.

		Water bodies included in surveillance monitoring			
		Number	% with all required biological quality elements	% with all required hydro-morphological quality elements	% with all general physicochemical quality elements
CW	EU (17)	1 081	23%	8%	35%
LW	EU (20)	4 991	7%	2%	33%
RW	EU (23)	12 739	33%	10%	34%
TW	EU (11)	337	10%	11%	53%

Source: WISE electronic reports.

Note: The number in brackets next to EU is the number of Member States with reported information. The analysis includes water bodies where ecological monitoring is reported to be undertaken for surveillance purposes.

It is clear from Table 3.5 that nowhere near all water bodies included in surveillance monitoring are monitored for all required quality elements. The hydro-morphological quality elements have the lowest proportion (2 % to 11 %) of water bodies where all required elements are included, followed by the biological quality elements (7 % to 33 %) and general physicochemical quality elements (33 % to 53 %).

Table 3.6 further summarises this issue by presenting the number of Member States where all and none of the required biological, hydro-morphological and physiochemical quality elements are monitored in water bodies included in surveillance monitoring. Very few Member States monitor all required hydro-morphological quality elements in all water bodies, and a significant number monitor none.

Table 3.6: Number of Member States where all or no water bodies included in surveillance monitoring are monitored for all required biological, hydro-morphological and general physicochemical quality elements.

Category	Biological quality elements		Hydro-morphological quality elements		General physicochemical quality elements		Number of Member States included in the analysis
	All	None	All	None	All	None	
CW	3	6	2	11	2	6	17
LW	1	9	1	11	4	9	20
RW	1	2	1	13	5	6	23
TW	0	6	0	8	0	4	11

Source: WISE electronic reports.

Note: The analysis includes water bodies where ecological monitoring is reported to be undertaken for surveillance purposes.

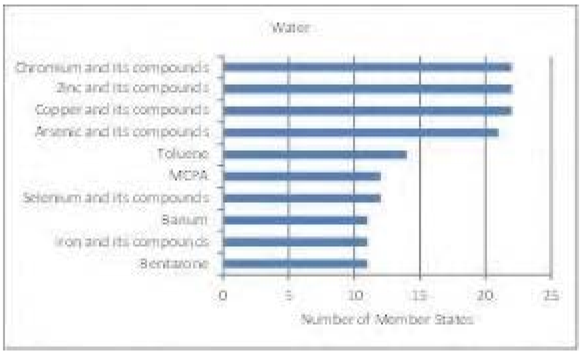
Monitoring of RBSPs

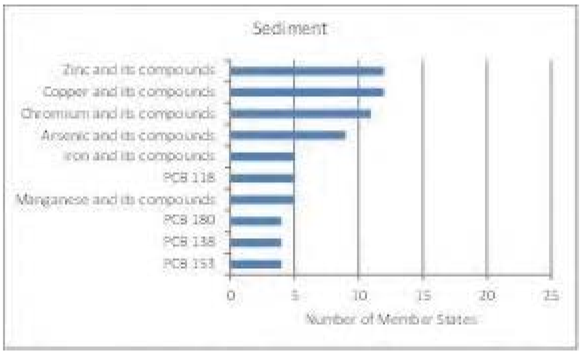
Member States were asked to report the chemical substances monitored at each site. The reporting did not explicitly differentiate between Priority Substances, RBSPs and "other" substances. According to the reporting guidance, chemical substances monitored in surface water that were not Priority Substances should be RBSPs. It is clear that some Member States may have misreported which chemical substances should be considered as RBSPs. Substances reported as "other chemical substances" were not included in this analysis because their inclusion would make the assessment unreliable for some Member States as many "other chemical substances" are, on close examination, the same substance with slightly different reporting formats (e.g. use of underscore or hyphen) or were inappropriate (e.g. phytoplankton).

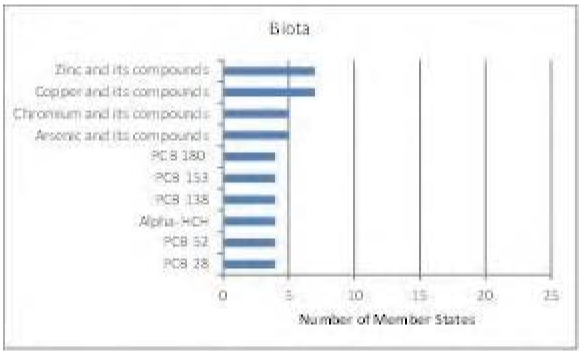
All of the 28 Member States assessed reported that RBSPs were monitored in water in at least one water category. At the EU level 402 different RBSPs were reported to be monitored in water, 173 in sediment and 81 in biota.

The RBSPs monitored by most Member States in water, sediment and biota are shown in Figure 3.2. Metals such as chromium, copper and zinc are monitored by most Member States in all three matrices. Water is monitored by most Member States followed by sediment and biota.

Figure 3.2: The RBSPs monitored by most Member States in water, sediment and biota.







Data from 28 Member States for water, 14 Member States for sediment and 12 Member States for biota. Sediment equates to sediment (unspecified), suspended sediment or settled sediment. Biota equates to biota (unspecified), fish or biota other than fish. Substances reported as "other chemical substances" were excluded from the analysis. Source: WISE electronic reports.

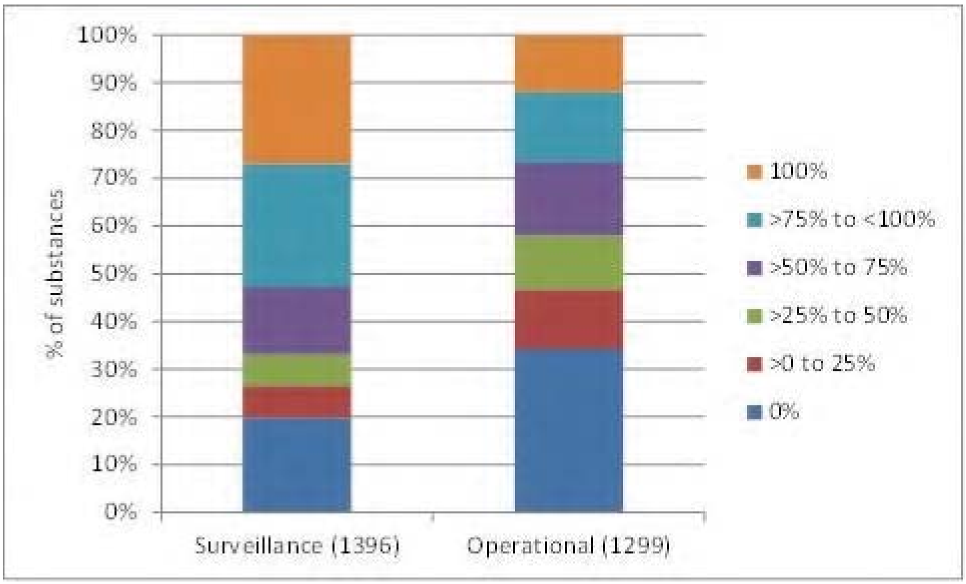
Annex V, section 1.3.4 of the WFD provides guidance on the frequency of monitoring of the different quality elements: once every three months is recommended for "other pollutants" in water, which are taken here to equate to RBSPs. Surveillance monitoring should be carried out for each monitoring site for a period of one year during the six-year period covered by a RBMP. For RBSPs this should be done four times for the year when surveillance monitoring was undertaken, and for operational monitoring four times a year for each year of the cycle.

Figure 3.3 shows that a significant proportion of the substances monitored in water at the EU level are not monitored at least at the minimum recommended frequency at all the sites where they are monitored. For around 20 % and 35 % of the substances monitored for surveillance and operational monitoring, respectively, there are no sites where they are sampled at least at the minimum frequency.
Annex V, section 1.3.4 of the WFD does not explicitly define the matrices to which the minimum recommended frequency of monitoring of RBSPs ("Other Pollutants") applies. Required monitoring frequencies are specified for Priority Substances in biota and sediment in

Article 3(2)(c) of the EQS Directive[69]: this is once per year for operational and surveillance monitoring purposes. For consistency, this required frequency of once per year has been applied to the monitoring of RBSPs in biota/sediment.

Of the 173 different chemical substances (assumed to be RBSPs) monitored at the EU (13 Member States) level in sediment, 13 % were sampled at least at the required frequency at all of the sites where they were monitored and 34 % at none of the sites. Of the 81 different chemical substances (assumed to be RBSPs) monitored in biota, 29 % (in 12 Member States) were sampled at least at the required frequency at all of the sites where they were monitored and 4 % at none of the sites.

Figure 3.3: Proportion of RBSPs where different proportions of sites are sampled at least at the WFD recommended minimum monitoring frequency for surveillance and operational purposes.



Source: WISE electronic reports.

Note: Numbers in brackets are the sums of the number of river basin specific pollutants monitored in the 25 Member States that reported information. Substances reported as other chemical substances were not included in the analysis because their inclusion would skew the results as many are the same substance with slightly different reporting formats (e.g. underscore or hyphen) or were inappropriate (e.g. phytoplankton).

69 Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on EQSs in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council

Surveillance and operational monitoring of surface water bodies

Annex V.1.3.1 of the WFD indicates that 'surveillance monitoring shall be carried out of sufficient surface water bodies to provide an assessment of the overall surface water status within each catchment or sub-catchments within the river basin district'. To that end, it might be expected that surveillance monitoring includes water bodies covering the range of statuses within the RBD and Member State. It is not expected that all water bodies will be included in surveillance monitoring. Representative monitoring sites should be selected to provide an overall picture of the status of water bodies in the basin.

Table 3.7 Comparison of proportion of water bodies included in surveillance and operational monitoring between the first and second RBMPs.

	Surveillance					Operational			
	CW	LW	RW	TW		CW	LW	RW	TW
Large increase (>50%)	0	2	0	1		1	2	1	1
Medium increase (10% to 50%)	5	4	3	4		7	4	9	4
Small increase (up to 10%)	2	6	9	2		5	3	7	1
No change	3	0	0	2		2	2	0	4
Small decrease (up to 10%)	4	4	12	1		2	5	7	1
Medium decrease (10% to 50%)	3	3	0	2		2	6	0	3
Large decrease (>50%)	2	3	0	2		0	0	0	0

Source: WISE electronic reports.

Note: CW: coastal waters; LW: lakes; RW: rivers; TW: transitional waters. No allowance has been made as to whether the sites are for ecological or chemical monitoring. The cells show the number of Member States where there have been increases, decreases or no changes between the first and second RBMPs. Only the RBDs with reported information for both cycles were used in the analysis.

In the EU (24 Member States reporting information) a larger proportion of surface water bodies were included in operational monitoring than in surveillance monitoring for the first and second RBMPs. There was an increase in the proportion included in both surveillance and operational between the first and second RBMPs.

Some Member States reported an increase in the proportion of water bodies used for surveillance monitoring in all their water categories, while some reported a decrease also in all water categories.

Only very few Member States showed a decrease in the proportion of water bodies used for operational monitoring in all four water categories. In contrast, in several Member States, there were increases in the proportion of water bodies included in operational monitoring.

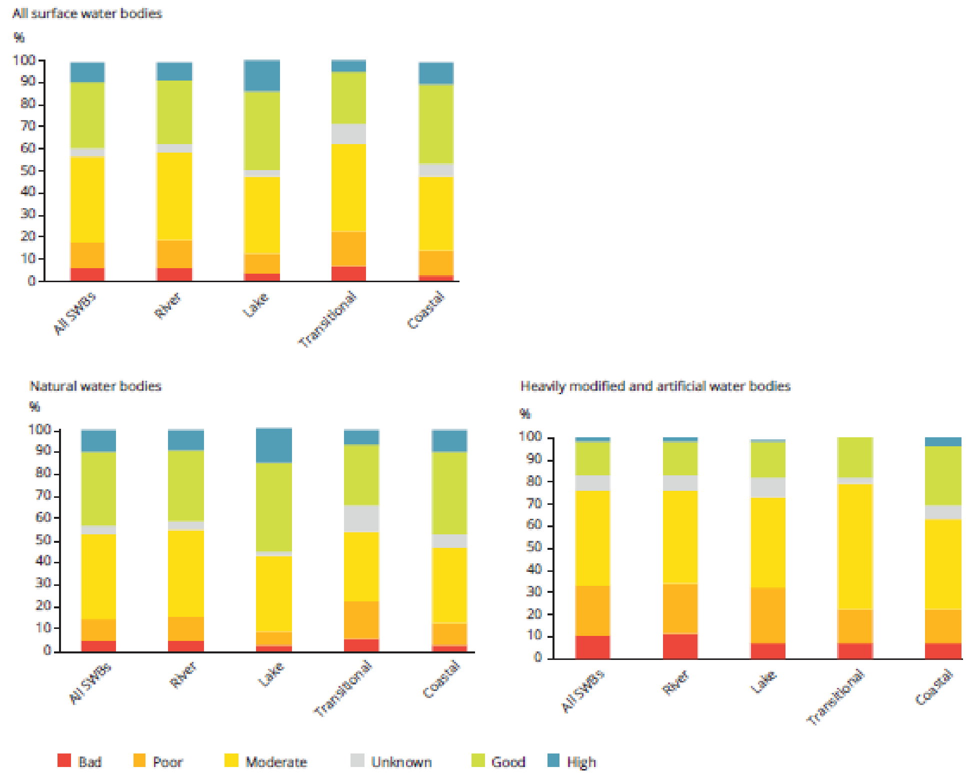
Assessment and classification of ecological status for surface waters

Ecological status or potential of surface water bodies

Overall, around 40 % of the surface water bodies are in good or better ecological status, while 60 % did not achieve good status (EEA 2018[70]) (Figure 3.4). Lakes and coastal waters are in better status than rivers and transitional waters. The ecological status of natural water bodies is generally better than the ecological potential of heavily modified and AWBs.

[70] European Environment Agency (2018) European waters – assessment of status and pressures 2018. EEA Report No 7/2018 - https://www.eea.europa.eu/publications/state-of-water

Figure 3.4: Ecological status/potential of rivers, lakes, transitional and coastal waters for the second RBMPs



Notes: All SWBs means all surface water bodies, comprising rivers, lakes, and transitional and coastal waters. The classification of rivers by length and of the other water categories by surface area shows a similar distribution of status classes to the classification by number of water bodies (see below links), except that a lower proportion of the area of transitional waters is classified as being in high or good quality status.

Source: Results are based on WISE-SoW database including data from 25 Member States (EU-28 except Greece, Ireland and Lithuania). Surface water bodies: Ecological status or potential and chemical status, by category.

Change in ecological status/potential between the first and second RBMPs

The overall ecological status/potential has not improved since the first RBMPs (Figure 3.5). In fact, the results show a slight reduction in the proportion of water bodies in good or better ecological status or potential for all the water body categories. Nonetheless, around 20 % (16 000 surface water bodies) have improved in ecological status/potential class since the first RBMPs, generally by one class but sometimes by 2-3 classes (EEA 2018)[71].

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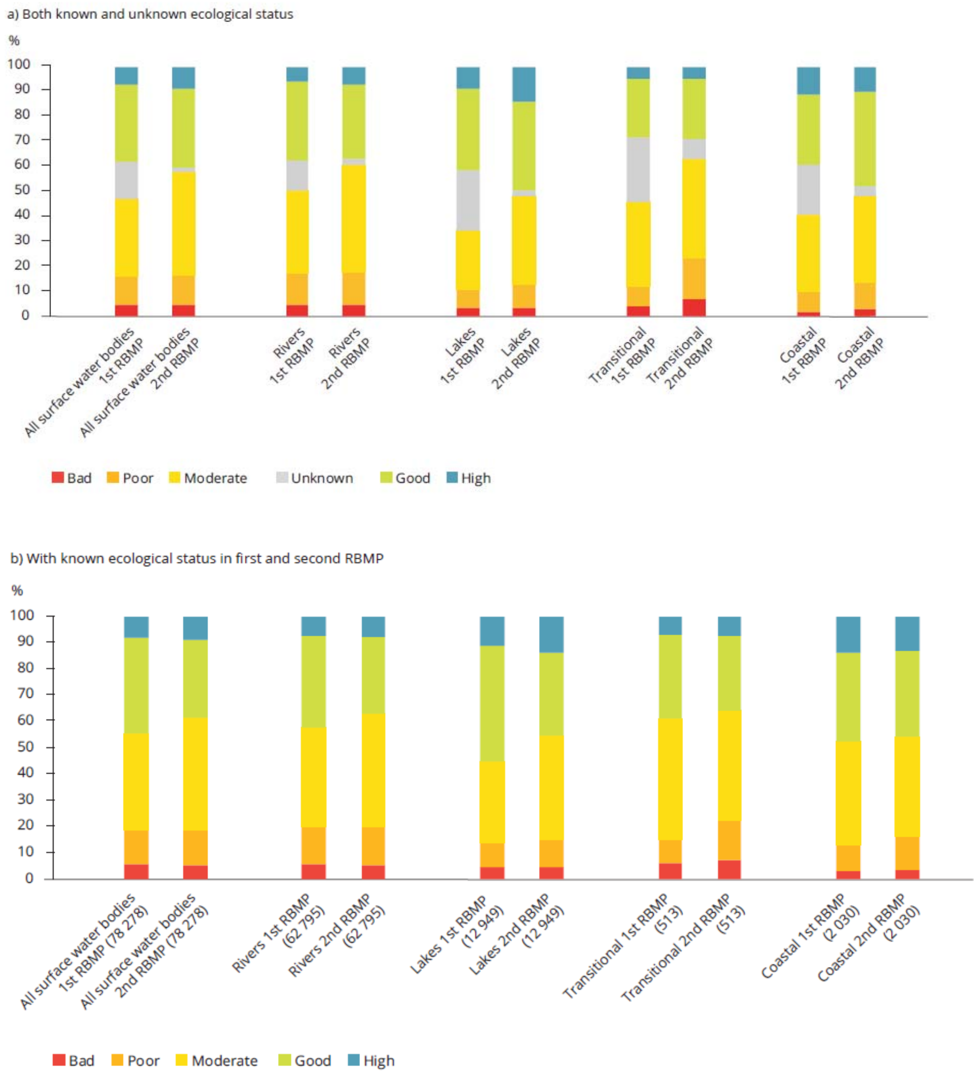
[71] European Environment Agency (2018) European waters – assessment of status and pressures 2018. EEA Report No 7/2018 - https://www.eea.europa.eu/publications/state-of-water

Figure 3.5: Ecological Status or potential of all surface waters, rivers, lakes, transitional and coastal waters in the two RBMPs



Notes: In both a) and b), water bodies that are unchanged from the first to the second RBMPs are included.
a) illustrates that the status for some of the unknowns in the first RBMPs is now known.
b) compares only water bodies that had known ecological status in both the first and the second RBMP cycle.

Source: Results are based on the WISE-SoW database including data from 25 Member States (EU-28 except Greece, Ireland and Lithuania). Surface water bodies: Ecological status or potential, by category in the second and first RBMPs.

Confidence in ecological status assessment

Member States were asked to report the confidence on their ecological status or potential classification. The criteria used by Member States to assess confidence vary considerably, but in general low confidence may equate to no monitoring data; medium confidence to supporting quality element data and/or limited data on one biological quality element; and high confidence to good data for at least one biological quality element and the most relevant supporting quality element.

Overall, the proportion of water bodies with unknown ecological status has decreased from 16 % to 5 %, and the confidence in the classification has improved from one third of water bodies with high or medium confidence in the first RBMPs to 58 % of the water bodies in the second RBMPs (EEA 2018[72]).

Classification of ecological status at the quality element level

a) Second RBMPs

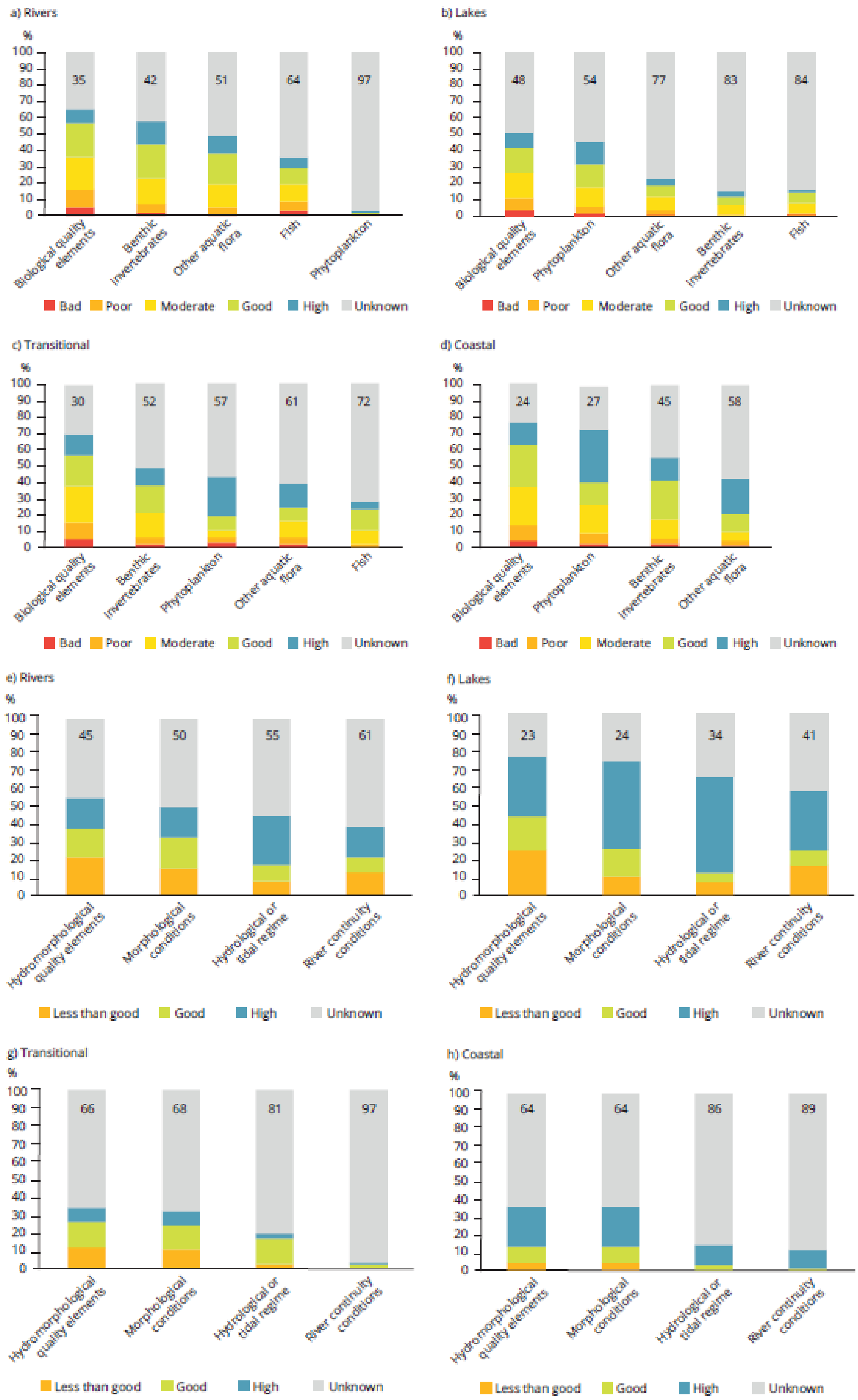
Although a large proportion of water bodies is not classified for each single quality element (grey bars in Figure 3.6), more than two-thirds of all water bodies are classified with at least one biological quality element (EEA 2018[73]). The most frequently classified biological quality elements are: for rivers, benthic invertebrates, phytobenthos/other aquatic flora/macrophytes and fish; for lakes, phytoplankton; and for transitional and coastal waters, phytoplankton and benthic invertebrates.

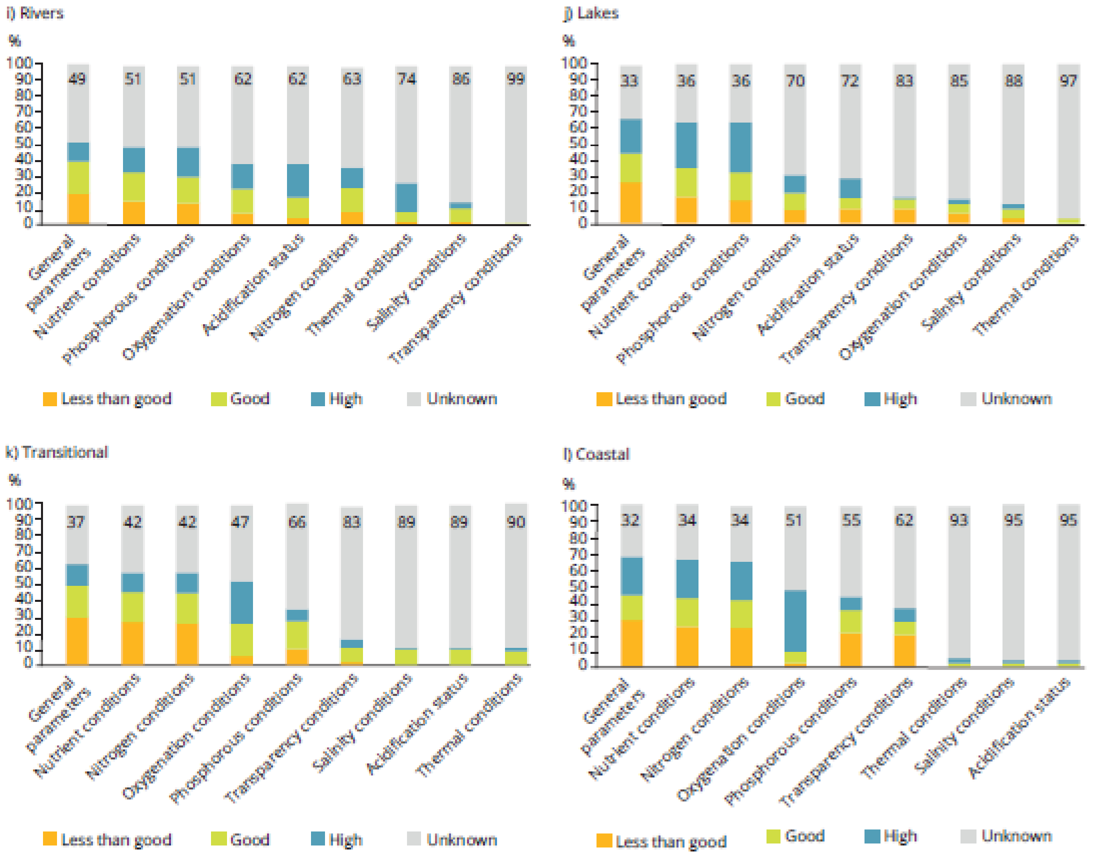
The ecological status for individual quality elements is much better than the overall ecological status classification. For rivers, for example, 50-70 % of the classified water bodies have high or good status for several biological quality elements, while the overall ecological status is only high or good for less than 40 % of the river water bodies. For the general physicochemical and hydro-morphological quality elements, more than two-thirds of the water bodies have at least GES.

[72] European Environment Agency (2018) European waters – assessment of status and pressures 2018. EEA Report No 7/2018 - https://www.eea.europa.eu/publications/state-of-water.

[73] European Environment Agency (2018) European waters – assessment of status and pressures 2018. EEA Report No 7/2018 - https://www.eea.europa.eu/publications/state-of-water.

Figure 3.6 Ecological status/potential of biological quality and supporting elements in rivers, lakes, transitional and coastal waters





Notes: Ecological status for biological quality and supporting elements in water bodies classified for overall ecological status (100 %). The grey bars denote water bodies not classified for that particular quality element.
The first bar in each diagram represent the overall classification for the group of quality elements, calculated using the one out all out principle (the number of quality elements available per water body varies).

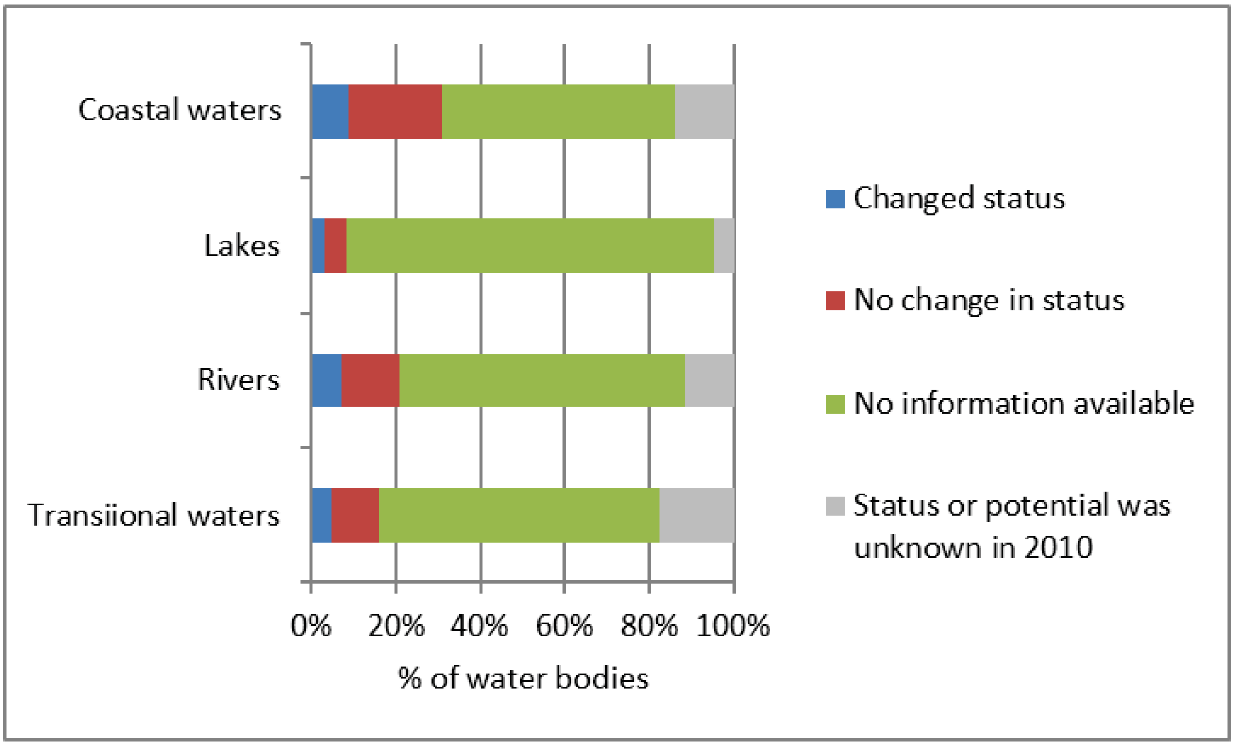
Source: Results are based on WISE-SoW database including data from 25 Member States (EU-28 except Greece, Ireland and Lithuania). Surface water bodies: QE group status, by category and Surface water bodies: QE status, by category.

b) Changes since the first RBMPs

It is difficult to make general comparisons of the ecological status/potential of surface waters between the first and second RBMPs because of, for example, re-delineation of water bodies and changes in monitoring programmes and assessment methods between the cycles. Recognising this difficulty, Member States were asked to report information on changes in ecological status/potential between the cycles for each water body and quality element, if the information was available.

Figure 3.7 summarises the information reported by Member States at an aggregated level for biological quality elements for each water category. For 81 % of surface water bodies there was no available information, or status or potential was unknown for the first RBMPs. Information was reported on changed status or no change in status for 31 % of coastal water, 8 % of lake, 20 % of river and 16 % of transitional water bodies.

Figure 3.7 Aggregated information of the changes between the first and second RBMPs reported for each relevant biological quality elements in each water category.

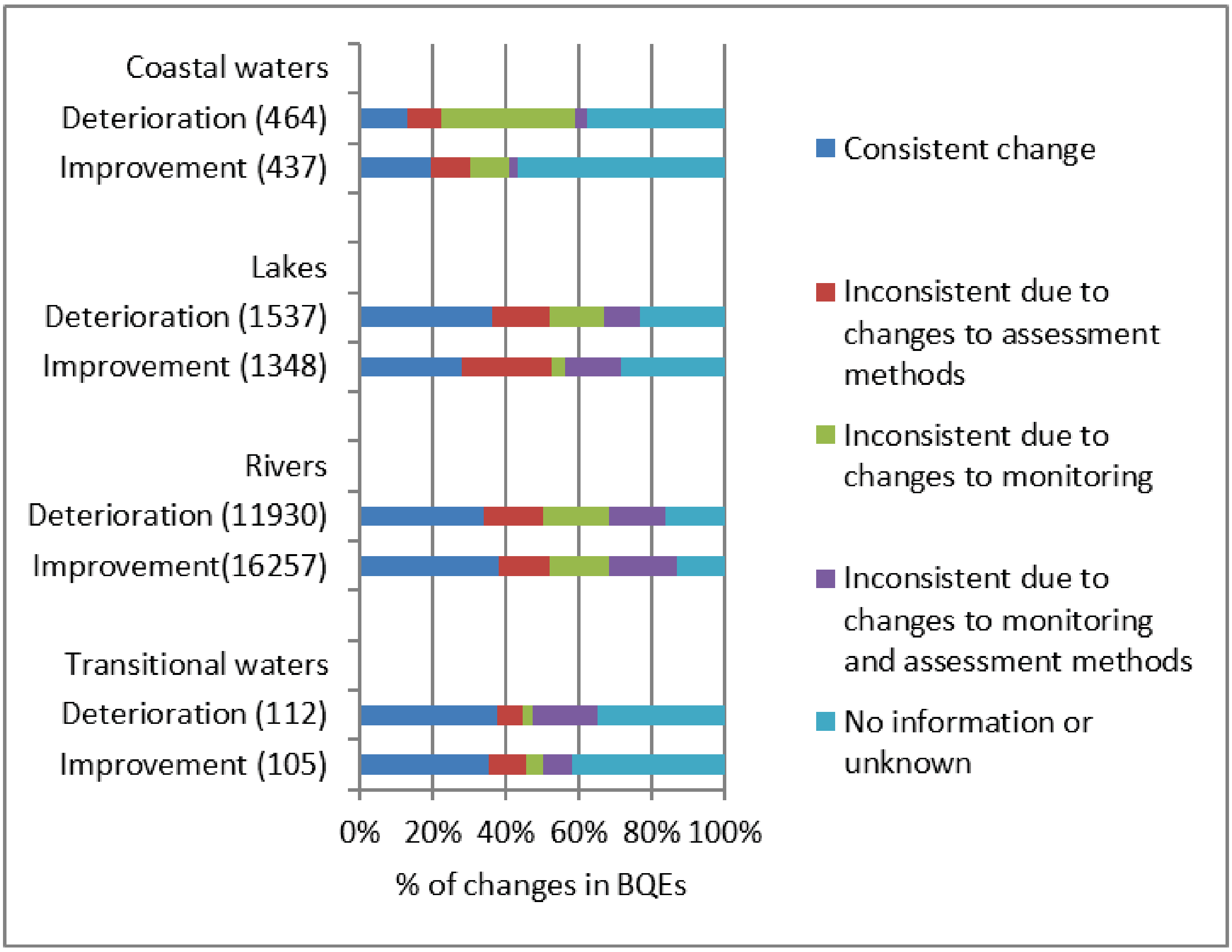


Source: WISE electronic reports.

Note: The biological quality elements relevant to each water category (as described in the WFD) were selected. As Member States had to report all quality elements irrespective of their relevance to a category, the non-relevant quality elements were removed before analysis: e.g. macroalgae in rivers. These were reported as "no information". In terms of "other aquatic flora", it was included for a Member State where changes in status had also been reported, as more Member States classified the component elements rather than using the generic "other aquatic flora". % of water bodies equates to the sum of water bodies that had been reported for each water category. For example if four biological quality elements had been reported for 100 water bodies, there were 400 water bodies summed in the calculation.

A total of 7 % of surface water bodies were reported to have a change in status/potential in terms of the biological quality elements between the first and second RBMPs. Member States were also asked to report the comparability and consistency of any changes in status between the two cycles, again at the quality element and water body level. Figure 3.8 summarises the reported information at the EU level. According to this information, 37 % of the improvements and 34 % of the deterioration in the status/potential of the biological quality elements in surface water bodies were reported to be consistent (as percentages of the water bodies for which there was information on changed status/potential, which was 7 % of the total). Improvements and deteriorations of status/potential that were reported to be inconsistent are due to changes to assessment methods, changes to monitoring, or both.

Figure 3.8: Consistency of changes in ecological status/potential of the biological quality elements since the first RBMP in each water category.



Note: The biological quality elements analysed were those relevant to each water category.

Source: WISE electronic reports.

Assessment methods for the biological quality elements

Each Member State is required to develop methods to assess ecological status for all biological quality elements. Assessment methods for the supporting quality elements must be linked to the biological quality elements, according to the normative definitions given in Annex V of the WFD. Methods should be developed for the full range of quality elements to allow detection of all pressures on surface water bodies and together provide a holistic picture of the ecological status of the aquatic environment.

In most Member States, WFD-consistent assessment methods for the classification of ecological status were not fully developed for all biological quality elements in time for the first RBMPs. The most common biological methods developed were phytoplankton (chlorophyll a) in lakes and benthic fauna in rivers. The biological quality elements that were least developed in rivers were phytoplankton and macrophytes, and in lakes phytobenthos, benthic invertebrates and fish. Assessment methods showed the most gaps for transitional waters (all biological quality elements) and for coastal waters, where particularly assessment methods for macroalgae and angiosperms were fully developed only in a few Member States.

In the second RBMPs, all Member States reported methods for nutrient pollution, organic pollution and altered habitats due to morphological changes. However, almost half of the Member States that reported chemical pollution as a significant impact do not have a biological assessment method that is sensitive to chemical pollution.

Table 3.8 summarises which biological quality elements are used to assess significant impacts. It is clear that a range of elements is used to assess the various impacts. Fish and benthic invertebrates are the most commonly used to assess hydro-morphological changes and phytoplankton, macrophytes and phytobenthos for nutrient pollution.

Table 3.8 Number of Member States that reported biological assessment methods in relation to significant impacts.

	Significant impact type							
Biological Quality Element	1	2	3	4	5	6	7	8
Phytoplankton	28	13	8	9	8	8	11	4
Other aquatic flora	6	3	1	2	2		1	1
Macroalgae	16	8	6	5	5	5	6	7
Angiosperms	13	5	2	3	2	3	6	11
Macrophytes	26	12	8	7	10	8	16	16
Phytobenthos	26	19	7	8	23	5	7	8
Benthic invertebrates	21	28	13	8	13	11	20	26
Fish	21	15	11	8	10	14	23	26
Other species	1							

Key:

1	Nutrient pollution		5	Acidification
2	Organic pollution		6	Elevated temperature
3	Chemical		7	Altered habitats due to hydrological

	pollution			changes
4	Saline pollution		8	Altered habitats due to morphological change

Source: WISE electronic reports.

Intercalibration of biological quality element methods

To ensure comparable definitions of GES across Europe, Member States are also required to intercalibrate the GES class boundaries of their methods, for each biological quality element in each water category, with other Member States having common types of water bodies. Intercalibration is a distinct obligation at EU level in addition to the obligation to develop national ecological status methods, i.e. the lack of success of intercalibration does not exempt Member States from the obligation of developing assessment methods for all biological quality elements.

After completion of the intercalibration exercise, it is the obligation of Member States to translate the results of the intercalibration exercise into their national classification systems, in order to set the boundaries between high and good status and between good and moderate status for their national types. Ideally, the class boundaries for the national types that differ from the intercalibrated types should be set in a way that ensures a level of anthropogenic disturbance comparable to that used for the same biological quality element for the intercalibrated types. For some types that are either very specific (e.g. volcanic lakes), very rare (e.g. some large lake type that occurs only once within some Member States), or even unique in Europe, it may not be possible to translate the intercalibration results to that type. In such cases, an explanation should be given for each type about why this is not possible.

Table 3.9 Percentage of surface water bodies that were reported to have no equivalent intercalibration type.

	CW	LW	RW	TW
AT		39%	1%	
BE	50%	22%	8%	
BG	41%	97%	65%	100%
CY		100%	6%	
CZ			54%	
DE	57%	52%	39%	
DK	70%	51%	4%	
EE	56%	37%	16%	
EL	18%	75%	98%	100%

	CW	LW	RW	TW
IT	3%	74%	16%	38%
LT	-	-	-	-
LU			3%	
LV		4%		100%
MT		100%	100%	100%
NL		17%		
PL			37%	67%
PT	58%	100%	33%	67%

ES	-	-	-	-		RO	75%	59%	50%	100%
FI	37%	45%	20%			SE	9%	7%	67%	
FR	51%	89%	30%	21%		SI	40%	75%	22%	
HR		100%	53%			SK			13%	
HU		46%	5%			UK	44%	67%	19%	14%
IE	-	-	-	-						

Source: WISE electronic reports.

Notes for table: CW: coastal waters; LW: lakes; RW: rivers; TW: transitional waters.

In most Member States and for most water categories, there are significant proportions of national water bodies that are of types that do not have a common intercalibration type (Table 3.9). It is, therefore, very important that the results of the intercalibration exercise are correctly translated to national types without an equivalent intercalibration type if a comparable assessment of ecological status/potential within Member States and across the EU is to be obtained. However, there was little relevant information on this issue in the examined RBMPs.

In several RBMPs there was no information on specific methods, but a general statement that the results of the intercalibration must be translated so that the national types obtain the same level of protection as the intercalibrated types.

Assessment of hydro-morphological quality elements

The values of the hydro-morphological quality elements must be taken into account when assigning water bodies to the high ecological status class and the maximum ecological potential class (i.e. when deciding between high ecological status or maximum ecological potential and GES/potential). For the other status/potential classes, the hydro-morphological elements are required to have "conditions consistent with the achievement of the values specified[74] for the biological quality elements."

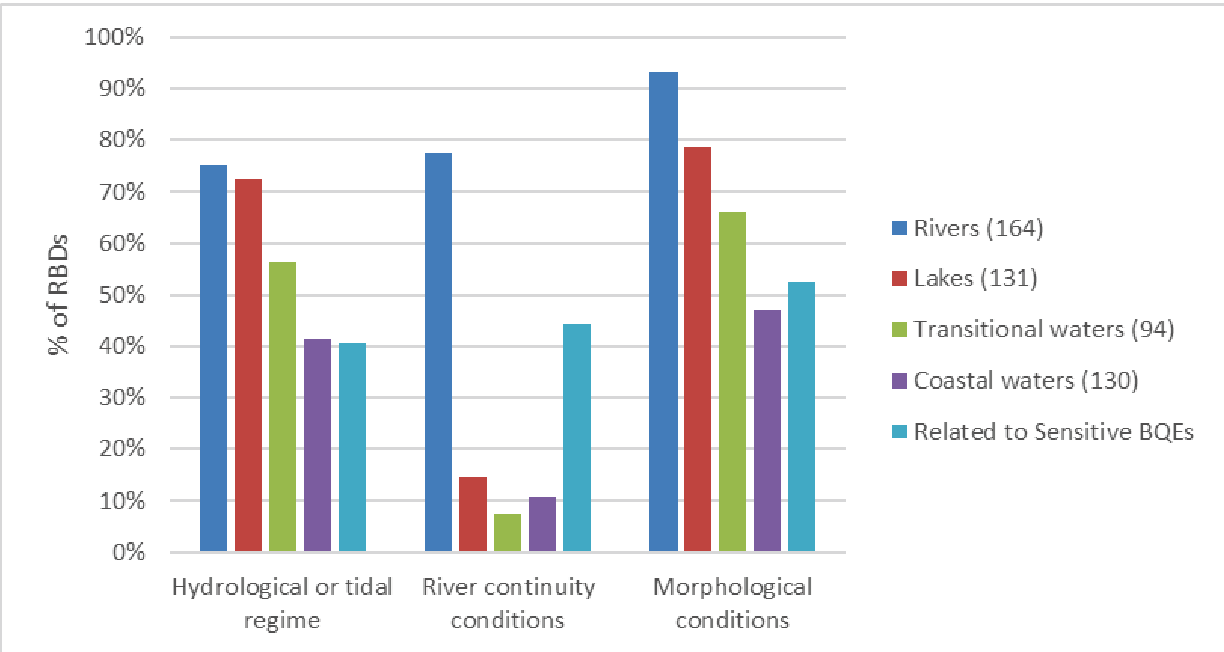
The ranges and levels (standards) established for the hydro-morphological quality elements must support the achievement of the values required for the biological quality elements at high status or maximum potential, as relevant. Since the values for the biological quality elements at high status will be type-specific, it is reasonable to assume that the ranges and levels established for the hydro-morphological quality elements should also be type-specific. Several types may share the same ranges or levels for some or all of the hydro-morphological quality elements.

[74] WFD, Annex V Tables 1.2.1 - 1.2.5

The assessment of the second RBMPs showed that standards have been set for some supporting hydro-morphological quality elements in some Member States and also that hydro-morphological standards were less well developed than those for general physico-chemical quality elements such as nutrients.

Hydrological/tidal regime was not assessed in terms of ecological status/potential in all of the RBDs where the water category is relevant (Figure 3.9). This was also the case for morphological conditions and river continuity. The water category where they were assessed in the smallest proportion of relevant RBDs was coastal waters. Also the classification boundaries of these elements were related to the class boundaries for the sensitive biological quality elements in only 36 % of RBDs for hydrological/tidal regime, 42 % for river continuity and 47 % for morphological conditions.

Figure 3.9: Proportion of RBDs where hydro-morphological quality elements are assessed in terms of ecological status/potential and where their classification boundaries are related to the class boundaries for the sensitive biological quality elements



Source: WISE electronic reports.

Note: The numbers of RBDs where the water category is relevant are given in parentheses next to the water category. The relevance of the classification to the sensitive biological quality elements is reported only once for each QE and is therefore not water category specific.

Assessment of general physicochemical quality elements

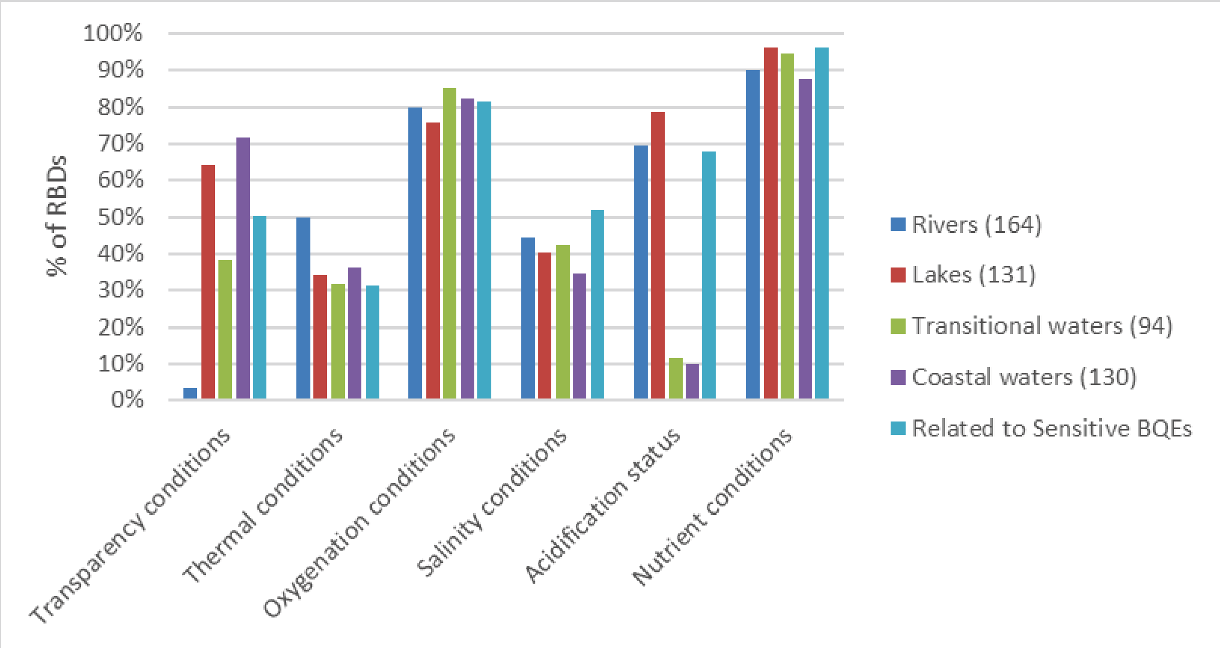
The ranges and levels established for the general physicochemical quality elements must support the achievement of the values required for the biological quality elements at good status or good potential, as relevant. Since the values for the biological quality elements at good status will be type-specific, it is reasonable to assume that the ranges and levels established for the general physicochemical quality elements should also be type-specific.

Several types may share the same ranges or levels for some or all of the general physicochemical quality elements. If the monitoring results for the biological quality elements, the general physicochemical quality elements and RBSPs in a water body meet the conditions required for GES/potential, the overall ecological status/potential of the water body will be good. However, if one or more of the general physicochemical quality elements or river basin specific pollutants do not meet the conditions required for GES/potential but the biological quality elements do, the overall ecological status/potential will be moderate.

The assessment of the second RBMPs showed that standards have been set by some Member States for some supporting general physicochemical quality elements. However, most of the general physicochemical standards related to nutrients and organic matter are, in most cases, not clearly linked to the good/moderate class boundaries for the sensitive biological quality elements.

Figure 3.10 shows the proportion of RBDs where the general physicochemical quality elements are reported to be assessed in terms of ecological status/potential. Also shown is the proportion of RBDs where the classification boundaries of these elements are related to the class boundaries for the sensitive biological quality elements.

Figure 3.10: Proportion of RBDs where general physicochemical quality elements are assessed in terms of ecological status/potential and where their classification boundaries are related to the class boundaries for the sensitive biological quality elements



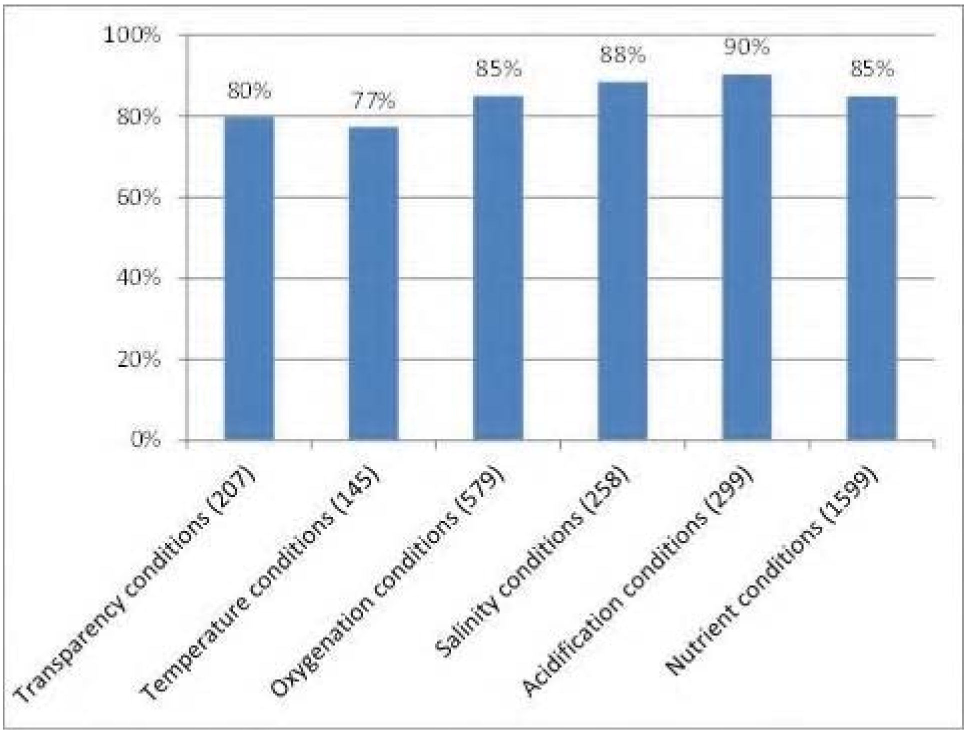
Source: WISE electronic reports.

Note: The numbers of RBDs where the water category is relevant are given in parentheses next to the water category. The relevance of the classification to the sensitive biological quality elements is reported only once for each quality element and is therefore not water category specific.

Oxygenation and nutrient conditions are assessed in terms of ecological status/potential in most RBDs in most water categories. The classification boundaries of these elements are also reported to be related to the classification of sensitive biological quality elements in the most RBDs. However, there are gaps for the other general physicochemical quality elements, as they are not assessed in relation to ecological status/potential in over half of the RBDs (e.g. thermal conditions in all water categories).

Overall, 20 Member States (112 RBDs) reported standards for acidification, 23 Member States (137 RBDs) for nutrient conditions, 22 Member States (129 RBDs) for oxygenation conditions, 17 Member States (77 RBDs) for salinity conditions, 14 Member States (60 RBDs) for thermal conditions and 17 Member States (84 RBDs) for transparency conditions. Most standards at the RBD level (1599) were reported for nutrient conditions. Figure 3.11 shows the percentage of these that are consistent with the good-moderate status boundary of the relevant sensitive biological quality element. A large proportion (~80%) of the standards in each type of general physicochemical quality elements are consistent with the good-moderate status boundary of the relevant sensitive biological quality elements.

Figure 3.11 Percentage of reported general physicochemical standards that are consistent with the good-moderate status boundary of the relevant sensitive biological quality elements.



Source: WISE electronic reports.

Note: The numbers in the brackets are the number of standards reported at the RBD level. Note that where the same standard is reported for more than one RBD in a Member State it is counted more than once.

Selection of RBSPs and use of EQSs

Information on how RBSPs were selected is available in the RBMPs of two-thirds of the 25 Member States assessed. Several Member States reported that this selection was based on some or all of the following: the inventories of emissions, information on the use of substances, the results of monitoring, or an analysis of pressures and impacts. In some cases, the Member States mentioned the RBSP selection took into account the list from Annex VIII of the WFD or other EU legislation such as the repealed Dangerous Substances Directive (76/464/EC).

The obligation to identify RBSPs and set EQSs for them was not equally observed in the second RBMPs, with some Member States identifying many more than others, and some standards being much less stringent than others for the same substances. This has implications for the comparability of conclusions drawn regarding ecological status/potential.

The WFD (Annex V, section 1.2.6) establishes the principles to be applied by the Member States to develop EQSs for Specific Pollutants that are ‘discharged in significant quantities into the body of water’. These are also known as RBSPs. Compliance with EQSs for RBSPs forms part of the assessment of ecological status/potential. EQSs are, therefore, key tools in assessing and classifying ecological status and can therefore affect the overall ecological status/potential classification of a water body. In addition, EQSs will be used to set discharge permits to water bodies, so that chemical emissions do not lead to EQSs exceedances within the receiving water.

Technical Guidance (the 2011 Technical Guidance Document n. 27[75]) has been developed to support the derivation of EQSs for priority substances and for RBSPs that need to be regulated by Member States according to the provisions of the WFD. The guidance focuses on the steps required to derive EQSs that comply with the requirements of Annex V of the WFD.

Tables 3.10 to 3.12 show the standards reported by Member States for RBSPs in water, biota and sediment. Standards were reported for 229 different RBSPs in water at the EU level. Standards for metals (zinc, chromium and arsenic) in water are reported by 20 of the 24 Member States that have reported information on this issue. Standards for organic substances such as toluene and xylene are reported by several Member States.

Table 3.10 Top-ten substances for which most Member States have reported EQSs for RBSPs in water

River Basin Specific Pollutant code	Number of Member States
CAS_7440-66-6 - Zinc and its compounds	20
CAS_7440-47-3 - Chromium and its compounds	20
CAS_7440-38-2 - Arsenic and its compounds	20
CAS_7440-50-8 - Copper and its compounds	19
CAS_108-88-3 - Toluene	13
CAS_1330-20-7 - Xylene	10
CAS_25057-89-0 - Bentazone	10
CAS_7782-49-2 - Selenium and its compounds	9
CAS_100-41-4 - Ethylbenzene	9

[75] https://circabc.europa.eu/sd/a/0cc3581b-5f65-4b6f-91c6-433a1e947838/TGD-EQS%20CIS-WFD%2027%20EC%202011.pdf

River Basin Specific Pollutant code	Number of Member States
CAS_94-74-6 - MCPA	9

Source: WISE electronic reports.

Note: 28 Member States reported information on standards in water. Substances reported as "Other chemical parameter" were excluded from the analysis.

EQSs were reported by three Member States for nine RBSPs in biota (Table 3.11).

Table 3.11 RBSPs for which Member States have reported EQSs in biota

River Basin Specific Pollutant code	Matrix	
CAS_1333-82-0 - Cr(VI)O3	Biota - fish	
CAS_143-50-0 - Chlordecone (Kepone)	Biota - fish	
CAS_1763-23-1 - Perfluorooctane sulfonic acid (PFOS) and its derivatives	Biota	
CAS_7440-38-2 - Arsenic and its compounds	Biota - fish	
CAS_7440-47-3 - Chromium and its compounds	Biota - fish	
CAS_7440-50-8 - Copper and its compounds	Biota - fish	
CAS_7440-66-6 - Zinc and its compounds	Biota - fish	
CAS_7782-49-2 - Selenium and its compounds	Biota - fish	
EEA_33-58-9 - Dioxins and dioxin-like compounds (7 PCDDs + 10 PCDFs + 12 PCB-DLs)	Biota	

Source: WISE electronic reports.

Note: Substances reported as "Other chemical parameter" were excluded from the analysis.

EQSs were reported by six Member States for 36 RBSPs in sediment (Table 3.11). Standards for zinc, copper and chromium in sediment were reported by four Member States. Standards were also reported for different polychlorinated biphenyl congeners by several Member States.

Table 3.12 RBSPs for which most Member States have reported EQSs for sediment

River Basin Specific Pollutant code	Number of Member States
CAS_7440-66-6 - Zinc and its compounds	4

River Basin Specific Pollutant code	Number of Member States
CAS_7440-50-8 - Copper and its compounds	4
CAS_7440-47-3 - Chromium and its compounds	4
CAS_7012-37-5 - PCB 28 (2,4,4’-trichlorobiphenyl)	3
CAS_35693-99-3 - PCB 52 (2,2’,5,5’-tetrachlorobiphenyl)	3
CAS_7440-38-2 - Arsenic and its compounds	3
CAS_37680-73-2 - PCB 101 (2,2’,4,5,5’-pentachlorobiphenyl)	3
CAS_35065-29-3 - PCB 180 (2,2’,3,4,4’,5,5’-heptachlorobiphenyl)	3
CAS_31508-00-6 - PCB 118 (2,3’,4,4’,5-pentachlorobiphenyl)	3
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)	2
CAS_1333-82-0 - Cr(VI)O3	2
CAS_35065-28-2 - PCB 138 (2,2’,3,4,4’,5’-hexachlorobiphenyl)	2
CAS_35065-27-1 - PCB 153 (2,2’,4,4’,5,5’-hexachlorobiphenyl)	2

Source: WISE electronic reports.

Note: Sediment (unspecified), settled sediment and/or suspended sediment are included. The table shows the RBSPs reported by two or more Member States. Substances reported as “Other chemical parameter" were excluded from the analysis.

A total of 64 % of the EQSs at the EU level were derived in accordance with Technical Guidance Document n. 27 (Table 3.13).

Up to 73 % of the derived standards for RBSPs in water, biota and sediment at the EU level had analytical methods that meet the minimum performance criteria laid down in Article 4(1) of the Commission Directive laying down technical specifications for chemical analysis and monitoring of water status (2009/90/EC)[76] for the strictest standard applied (Table 3.13). Of the

[76] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:201:0036:0038:EN:PDF

remaining 167 EQSs 89 % have analytical methods which are in line with Article 4(2) of the same Directive (Table 3.14).

Table 3.13: Number of standards for RBSPs for which the analytical method used meets the minimum performance criteria laid down in Article 4(1) of the Commission Directive laying down technical specifications for chemical analysis and monitoring of water status (2009/90/EC) for the strictest standard applied.

Member State	Matrix	Yes	No	Not reported		Member State	Matrix	Yes	No	Not reported
AT	Water	21				FR	Water	10	9	
BE	Sediment	9				HR	Water	6	1	
BE	Water	114	5			HU	Water	1	3	
BG	Water	24	24			IE	Water			3
CY	Water	6				IT	Sediment	27	3	
CZ	Water	57	13			IT	Water	83	40	
						LT	-			
DE	Sediment - suspended sediment			11		LU	Water	24	13	
DE	Water			76		LV	Water	2		
DK	Biota	2				MT	Sediment		5	
DK	Water	9				NL	Water	107		
EE	Water	14				PL	Water	25		
EL	-									
ES	Biota - fish	6				PT	Water	29		
ES	Sediment - settled sediment	12				RO	Water	10	1	
ES	Water	100	30			SE	Water	23	5	
FI	Sediment	1				SI	Water	29	1	
FI	Water	11	2			SK	Water	31		
FR	Biota - fish	1				UK	Water	29	17	

Source: WISE electronic reports.

Note: Substances reported as "Other chemical parameter" were excluded from the analysis.

Table 3.14: Number of standards for RBSPs where the analytical method corresponds to the requirements laid down in Article 4(2) of the Commission Directive laying down technical specifications for chemical analysis and monitoring of water status (2009/90/EC) for the strictest standard applied.

Member State	Matrix	Yes	No		Member State	Matrix	Yes	No
					IE	Water		3
BE	Water	2	3		IT	Sediment	3	
BG	Water	26			IT	Water	40	
CZ	Water	13			LU	Water	13	
ES	Sediment - settled sediment	6			MT	Sediment		5
EL	Water	-	-					
ES	Water	52			RO	Water	1	
FI	Water	2			SE	Water	3	2
FR	Water	9			SI	Water	1	
HR	Water	1			SK	Water		31
HU	Water	3			UK	Water	17	

Source: WISE electronic reports.

Note: Substances reported as "Other chemical parameter" were excluded from the analysis.

The European Environment Agency's 2018[77] assessment of status and pressures of European waters indicates that 5 % of surface water bodies did not achieve GES/potential owing to RBSPs. Another 40 % were reported as in good or high ecological status/potential for RBSPs, while the status of RBSPs was unknown in a significant proportion of surface water bodies (55 %). About 150 RBSPs were reported as causing failure to achieve GES/potential in at least one water body. Those most frequently reported as causing failure were the metals zinc, with 1 503 waterbodies failing to achieve GES, and copper (845). As individual substances, most RBSPs caused fewer than 100 waterbodies to fail GES.

[77] European Environment Agency (2018) European waters – assessment of status and pressures 2018. EEA Report No 7/2018 - https://www.eea.europa.eu/publications/state-of-water.

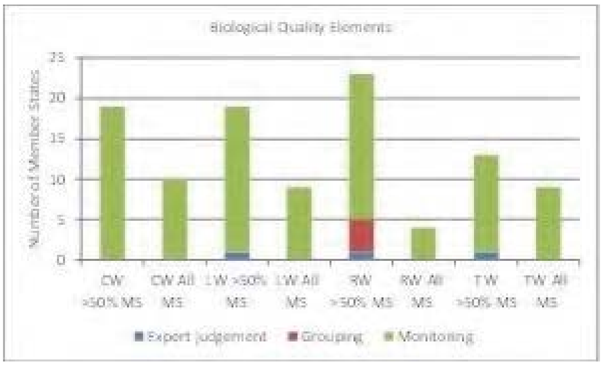
Use of monitoring results for classification

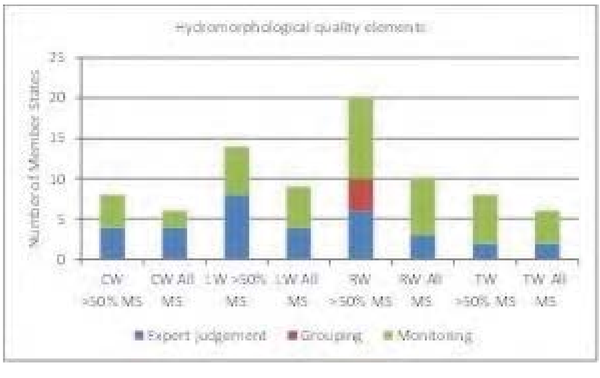
Member States were asked to report the classification results in terms of each of the biological quality elements monitored in each water body. Status in terms of a particular biological quality element in a monitored water body might also be extrapolated to non-monitored water bodies in the same group. Not all biological quality elements are appropriate or will be monitored for all water categories and some are considered to be not applicable in some water body types.

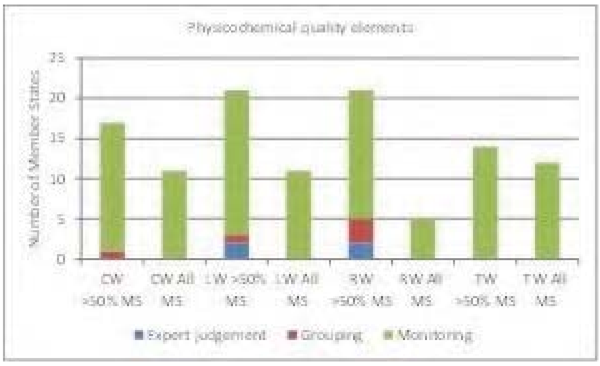
In cases where the number of monitored water bodies is greater than the number of classified water bodies for any particular quality element there may be a lack of confidence in the monitoring results, and only the monitoring results/assessments with high and perhaps medium confidence are used in classification. Where the number of monitored water bodies is the same as the number of classified water bodies for any particular quality element the classification is based on monitored water bodies. There may also be examples of where the number of monitored water bodies is less than the number of classified water bodies for any particular quality element. This indicates that there has been extrapolation of status from monitored water bodies to non-monitored water bodies, through grouping or expert judgment.

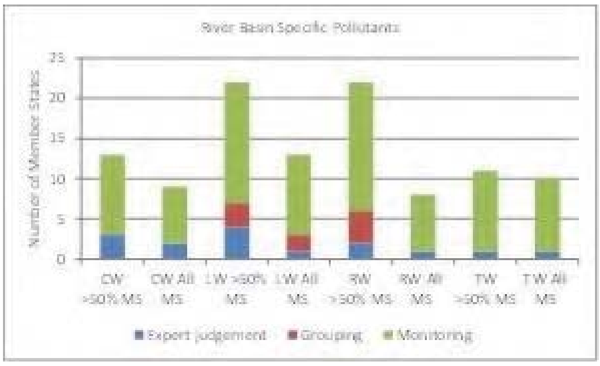
Figure 3.12 summarises the means of classification of the different types of quality elements and river basin specific pollutants in the different water categories. The results of monitoring are predominantly used for the classification of the biological and general physicochemical quality elements. Expert judgement plays a significant role in the classification of the hydro-morphological quality elements and river basin specific pollutants in some Member States and water categories. Grouping is not used to a great extent, except for the biological and general physicochemical quality elements in rivers, for which around a fifth of water bodies are classified by this means.

Figure 3.12: Means of classification of biological, hydro-morphological and general physicochemical quality elements, and of river basin specific pollutants in the four water categories.









Source: WISE electronic reports

Note: ">50% MS": at least 50% of water bodies classified by this means in the Member State. "All Member States": all water bodies classified by this means in the Member State.

In many cases, Member States have reported more water bodies to be classified at the quality element level using the results of monitoring than are directly monitored for the quality element. This was the case for the biological quality elements in surface water bodies (approximately two-thirds of the 24 Member States which reported on this issue), for the hydro-morphological quality elements (one third of 21 Member States) and for the general physicochemical quality elements (approximately half of 23 Member States). This may be due to reporting errors, in that the monitoring data have not been completely reported or there has been an under-reporting or misreporting of the water bodies classified by grouping.

Overall classification of ecological status

According to the one-out-all-out principle, that the status of a water body should be classified according to the biological quality element with the lowest status class and the status class should be downgraded to moderate if the worst biological quality element is good and one or more of the supporting quality elements are less than good. When combining with the supporting quality elements, an aggregated level can be used for the supporting quality elements related to the same impact (e.g. phosphorus, nitrogen, Secchi depth), based on averaging the class for single quality elements within each impact category, before applying the one-out-all-out principle.

The one-out-all-out principle is at the heart of an integrated river basin management that addresses all pressures and impacts on aquatic environment. It ensures that the negative impact of the most dominant pressure on the most sensitive quality element is not averaged out and obscured by minor impacts of less severe pressures or by less sensitive quality elements responding to the same pressure.

Only the Madeira RBD, in Portugal (out of 147), reported that the one-out-all-out principle had not been applied.

5.3.2 Conclusions

In spite of the progress done since the first RBMPs, there are several gaps in the reported monitoring programmes in terms of some water categories in a few Member States not being monitored for surveillance and/or operational purposes.

There is no clear pattern in terms of increases and decreases in the numbers of sites used for surveillance and operational monitoring for the second RBMPs compared to the first. There are examples where there have been over 50% increases in numbers, and others where there have been over 50 % decreases. This is also the case in terms of increases and decreases in the proportion of surface water bodies included in surveillance and operational monitoring between the first and second RBMPs.

The changes in monitoring sites and monitored water bodies are partially related to the re-delineation of water bodies for the second RBMPs. Monitoring programmes may have also been revised using the experience from the first RBMPs, taking into account national legislation related to the implementation of the WFD, or in response to Commission recommendations based on the first RBMPs.

Almost all the biological quality elements are not monitored at the WFD minimum recommended frequency at all of the sites at which they are monitored.

There are still significant gaps in the quality elements required to be monitored in each water category. This is particularly so for the hydro-morphological quality elements, which are not monitored at all in the Czech Republic, Ireland and Croatia, only to a limited extent in Bulgaria, Portugal and France, and show significant gaps in practically all Member States, but there are also still significant gaps in the monitoring of biological quality elements. Only 8 %, 25 % and 34 % of surface water bodies included in surveillance monitoring are monitored for all required hydro-morphological, biological and general physicochemical quality elements, respectively.

A total of 402 different RBSPs were reported to be monitored in water; 173 in sediment and 81 in biota. A significant proportion of the substances are not monitored at least at the minimum recommended frequency at all the sites where they are monitored.

EQSs were reported for 229 different RBSPs in water, 9 in biota and 36 in sediment. Of these standards, 64 % were derived in accordance with Technical Guidance n. 27. This is not the case for the Czech Republic, Finland, Croatia, Italy, Luxembourg, Latvia, Malta and Poland, and to a large extent also Spain. For Greece, no information were reported on wether or not EQSs were derived from the Technical Guide. Concerning the analytical methods, 73% of the standards had analytical methods that consistent with Article 4(1) and 24 % with Article 4(2) of the Commission Directive laying down technical specifications for chemical analysis and monitoring of water status (2009/90/EC) for the strictest standards applied. About 5 % of surface water bodies did not achieve GES/potential due to RBSPs. For Malta, however, none of the analytical methods were in line with the requirements.

Overall, around 40 % of the surface water bodies are in good or better ecological status. Lakes and coastal waters are in better status than rivers and transitional waters. The ecological status of natural water bodies is generally better than the ecological potential of heavily modified and AWBs.

The overall ecological status/potential has not improved since the first RBMPs. In fact, the results show a slight reduction in the proportion of water bodies in good or better ecological status or potential for all the water body categories. Nonetheless, around 20 % of surface water bodies have improved in ecological status/potential class since the first RBMPs, generally by one class but sometimes by 2-3 classes.

Overall, the proportion of water bodies with unknown ecological status has decreased from 16 % to 4 %, and the confidence in the classification has improved from one third of water bodies with high or medium confidence in the first RBMPs to 58 % in the second.

A total of 7 % of surface water bodies were reported to have a change in status/potential in terms of the biological quality elements between the first and second RBMPs. About a third of those changes were reported to be consistent, while the others were reported to be due to changes to assessment methods, changes to monitoring or both.

All Member States reported biological assessment methods for nutrient pollution, organic pollution and altered habitats due to morphological changes. However, Austria, The Netherlands and Romania reported chemical pollution as a significant impact but do not have a biological assessment method that is sensitive to chemical pollution.

In most Member States and for most water categories, there are significant proportions of national water bodies that are of types that do not have an equivalent common intercalibration type. It is, therefore, very important that the results of the intercalibration exercise are correctly translated to national types without an equivalent intercalibration type. If not, a comparable assessment of ecological status/potential within a Member State and across the EU may not be obtained.

The hydro-morphological quality elements are not assessed in terms of ecological status/potential in many RBDs in the Czech Republic, Denmark, Ireland and The Netherlands, while in many other cases this concerns some hydro-morphological quality elements for some water types, particularly for coastal waters. Furthermore, in more than half of RBDs the classification boundaries of these elements were not related to the class boundaries for the sensitive biological quality elements.

Oxygenation and nutrient conditions are assessed in terms of ecological status/potential in most RBDs in most water categories. The classification boundaries of these quality elements are also reported to be related to the classification of sensitive biological quality elements in most RBDs. However, there are gaps for the other general physicochemical quality elements, as they are not assessed in relation to ecological status/potential in over half of the RBDs (e.g. thermal conditions in all water categories). A large proportion (~80 %) of the standards for the general physicochemical quality elements are consistent with the good-moderate status boundary of the relevant sensitive biological quality elements.

The results of monitoring are predominantly used for the classification of the biological and general physicochemical quality elements. Expert judgement plays a significant role in the classification of the hydro-morphological quality elements and RBSPs in some Member States and water categories. Grouping is not used to a great extent, except for the biological and general physicochemical quality elements in rivers, for which around a fifth of water bodies are classified by this means.

174 of the 175 RBDs reported that the one-out-all-out principle had been applied in the second RBMPs.

5.3.3 Recommendations

- Members States should continue to strengthen the monitoring of surface waters by covering all relevant quality elements in all water categories in adequate frequencies, in order to increase the level of confidence in the assessment of water body status.
- Member States should complete the development of assessment methods for ecological status for all relevant quality elements in all water body categories, and ensure that the methods correspond to WFD requirements and are intercalibrated.
- Member States should have clear and transparent methods for the selection of RBSPs, and ensure that the corresponding EQSs meet the minimum requirements for the protection of freshwater and marine ecosystems from possible adverse effects, as well as for human health.

5.4 Monitoring, assessment and classification of chemical status in surface waters

5.4.1 Introduction

Good chemical status of surface waters means the chemical status required to meet the environmental objectives for surface waters established in Article 4(1)(a) of the WFD. It is the chemical status achieved by a body of surface water in which concentrations of priority substances do not exceed the EQSs established in Annex I of Directive 2008/105/EC (as amended). Action to achieve compliance with the EQSs may reduce the costs of treating surface waters used for drinking water production, and should reduce the risks to organisms living in these waters and other animals and humans that eat them.

Decision 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 established the initial list of 33 priority substances, selected among those identified as posing a significant risk to or via the aquatic environment at EU-level. Directive 2008/105/EC (also called the EQSs Directive) then set quality standards for these substances and eight other pollutants previously regulated by Directive 76/464/EEC. In addition to reaching good chemical status for all priority substances and the eight other pollutants, Member States are also required to assess long-term trends for some of these substances and to establish an inventory of emissions, discharges and losses of all substances identified in the Directive, for each national river basin district.

Directive 2013/39/EU (amending the EQSs Directive) identified a further twelve priority substances, set EQSs for them, and updated the EQSs for seven of the existing priority substances in line with the latest scientific and technical knowledge concerning the properties of the substances. Good status should be reached by 2021 for the seven substances with updated standards, and by 2027 for the twelve new substances.

Quality Assurance/ Quality Control Directive 2009/90/EC (QA/QC Directive) on the quality and comparability of chemical monitoring provides the minimum performance criteria to ensure the quality of the analytical results and specifies the approach to dealing with measurements lower than the level of quantification. The requirements of this Directive should be fully reflected in the second RBMPs.

Assessment of implementation and compliance with WFD requirements in 2nd cycle

Chemical monitoring sites and water bodies monitored for Priority Substances

Article 8.1 of the WFD requires Member States to establish monitoring programmes for the assessment of the status of surface water in order to provide a coherent and comprehensive overview of water status within each RBD. The results of monitoring play a key role in determining whether water bodies are in good chemical status or at risk of failing to meet their environmental objectives, what measures need to be included in the RBMP in order to reach good status, and whether the implemented measures are leading to the expected outcome. Precise and reliable monitoring results are therefore a prerequisite for sound planning of investments in the POMs.

The amount of monitoring undertaken in terms of priority substances, frequency and numbers of sites should be sufficient to obtain a reliable and robust assessment of the chemical status of all water bodies in the RBD. Insufficient monitoring leads to a low confidence in the classification of water bodies, and as a result the sometimes expensive measures required to achieve objectives may be incorrectly targeted, and objectives such as restoration of water bodies to good status may not be achieved.

Annex V of the WFD presents the objectives of the surveillance and operational monitoring programmes and the modalities for monitoring (selection of sites, substances and frequencies). Surveillance monitoring aims at validating the pressure and impact assessment, at improving the design of future monitoring programmes and at assessing long term changes in natural conditions including those resulting from widespread anthropogenic activity. Member States are also required to undertake operational monitoring to assess the status of water bodies at risk of not reaching good status, and to assess the changes in the status of such water bodies resulting from the implementation of measures. In addition, investigative monitoring can be undertaken where the reason for any exceedances is unknown or to establish the causes of water bodies failing to achieve the environmental objectives in the absence of operational monitoring. Figures 1 and 2 show the proportion of sites and the proportion of water bodies where priority substances are monitored. Both surveillance and operational monitoring are covered, and no distinction is made in these figures between sites used for trend assessment, status assessment or both. Monitoring of protected areas in not included in the numbers given below. Direct comparisons cannot be reliably made with the first RBMPs because of changes to the reporting requirements to WISE. A wide variety of changes to monitoring programmes for chemical status were reported by Member States including both increases and decreases in the numbers of monitoring sites used and water bodies monitored and a redistribution of sites between surveillance and operational monitoring programmes and between water categories.

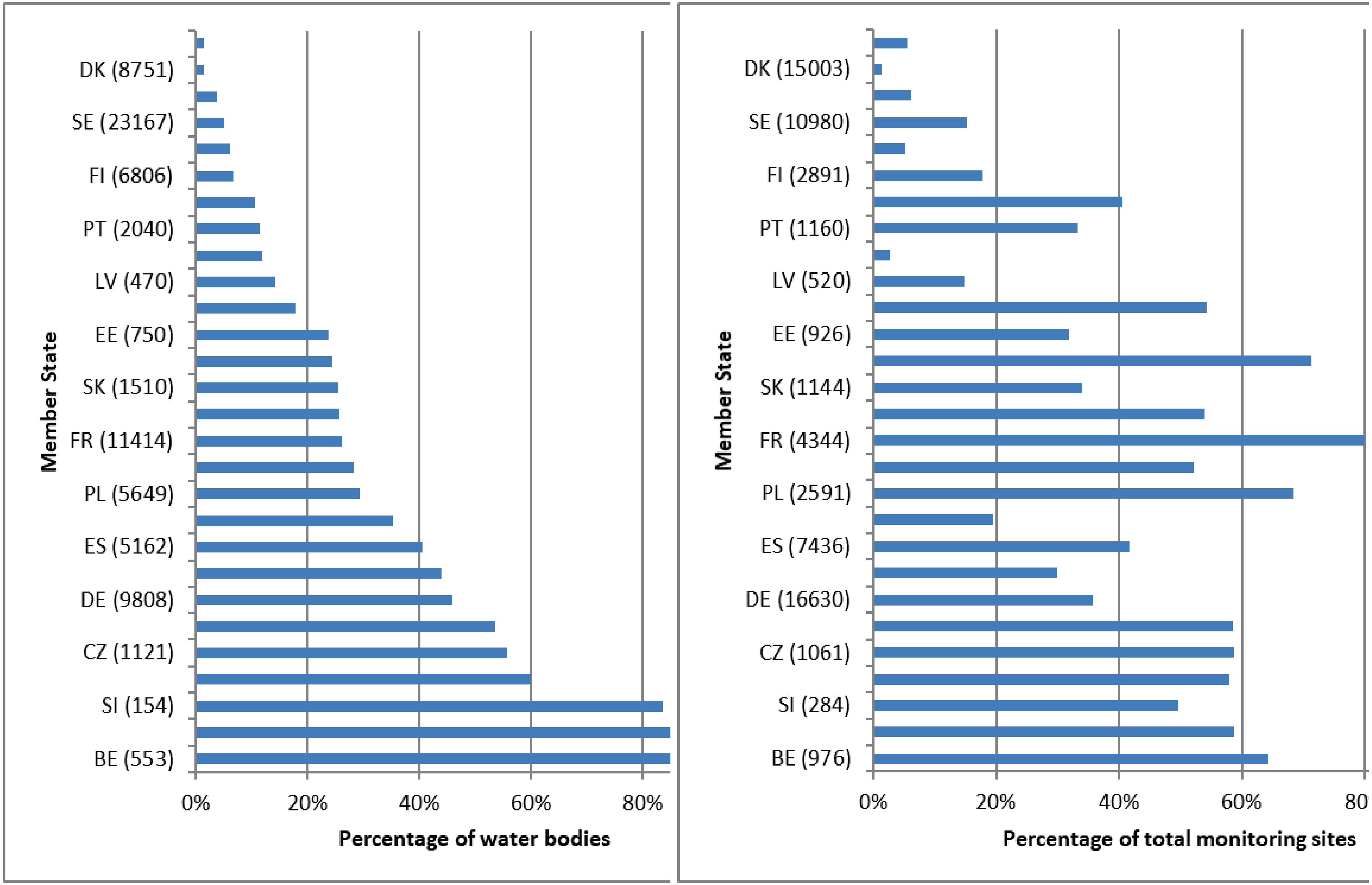
Several Member States reported extensions of monitoring programmes into previously unmonitored water categories.

Overall the extent of monitoring of Priority Substances across the EU has been very diverse, ranging from 1 to 98 % of surface water bodies being monitored for Priority Substances, with an average of about one-third. Only six Member States monitor more than 50 % of their surface water bodies for Priority Substances (Figure 1). Just under half of the Member States have chemical monitoring sites which account for greater than 50 % of their total monitoring sites with proportions ranging from 10 to 80 % of the total monitoring sites (Figure 2). Five countries report less than 10% chemical monitoring sites.

The majority of Member States monitor all of their water bodies failing to achieve good status as part of their operational monitoring programmes in at least some of their RBDs and most commonly in coastal and transitional waters.

Figure 1: Proportion of the total surface water bodies that are monitored for Priority Substances

Figure 2: Proportion of the total monitoring sites that are chemical monitoring sites



Member State
DK (8751)
SE (23167)
FI (6806)
PT (2040)
LV (470)
EE (750)
SK (1510)
FR (11414)
PL (5649)
ES (5162)
DE (9808)
CZ (1121)
SI (154)
BE (553)
0%
20%
40%
60%
80%
Percentage of water bodies
Member State
DK (15003)
SE (10980)
FI (2891)
PT (1160)
LV (520)
EE (926)
SK (1144)
FR (4344)
PL (2591)
ES (7436)
DE (16630)
CZ (1061)
SI (284)
BE (976)
0%
20%
40%
60%
80
Percentage of total monitoring sites

Source: WISE electronic reports

Monitoring of Priority Substances discharged

Annex V of the WFD states, in Section 1.3.1 (Design of surveillance monitoring), that "Surveillance monitoring shall be carried out for each monitoring site for a period of one year during the period covered by a RBMP for [inter alia]: priority list pollutants which are discharged into the river basin or sub-basin." Section 1.3.2 (Design of operational monitoring) of the Directive states that "In order to assess the magnitude of the pressure to which bodies of surface water are subject Member States shall monitor for those quality elements which are indicative of the pressures to which the body or bodies are subject. In order to assess the impact of these pressures, Member States shall monitor as relevant [inter alia]: all priority substances discharged, and other pollutants discharged in significant quantities."

Member States are therefore required to monitor all Priority Substances which are discharged into the river basin or sub-basin.

The completeness of inventories of emissions of Priority Substances is discussed in Chapter 5.2 of this report, according to which only very few Member States completed their inventories of emissions of all Priority Substances. The majority of Member States monitored all of the Priority Substances identified as discharged into their RBDs with the exception of a few Priority Substances and with some variation among RBDs within Member States. As mentioned above, it is however unclear whether all substances discharged in the RBDs have been properly identified in all cases.

Monitoring of chemical substances in water, sediment and biota, for status assessment and trend assessment.

Status assessment

EQSs for each Priority Substance in water, and biota where appropriate, are set in the EQSs Directive. According to the Directive (version in force in 2009), mercury, hexachlorobenzene and hexachlorobutadiene have to be monitored in biota for status assessment, unless Member States derived a standard for another matrix which is at least as protective as the biota standard.

All Member States monitored Priority Substances in water for status assessment. In almost all Member States, the majority of Priority Substances were monitored but with some variation among RBDs within Member States and among water categories. Some RBDs within Member States were monitored for significantly fewer Priority Substances and in some of those cases Member States indicated intentions to enhance monitoring in the second cycle for reporting in the third RBMPs. Most Member States monitored less than 30% of their water bodies with some variation between water categories. This sometimes led to some water bodies not being classified, or being classified with a low confidence in the assessment. Territorial waters were monitored in a few Member States with a coastline. Coastal and transitional water bodies tended to be monitored in a greater proportion than lakes and rivers; though many more water bodies were delineated in these latter categories.

Nearly three quarters of Member States monitored mercury, hexachlorobenzene and/or hexachlorobutadiene in biota in at least some RBDs for status assessment, even if they generally (also) monitored in water in the same and other RBDs. In a few cases, these substances were assessed in water against alternative standards rather than the "direct toxicity" water standards in the Directive. In general, the spatial extent of biota monitoring in terms of the proportion of monitoring sites was very limited, and it did not always cover all water categories.

The WFD indicates that, for the surveillance and operational monitoring of Priority Substances in water, the frequency of monitoring should be at least monthly for one year during the RBMP cycle and at least monthly every year, respectively. Monitoring in biota for status assessment should take place at least once every year according to the EQSs Directive. Member States can choose to monitor less frequently for any matrix, provided they can justify greater intervals on the basis of technical knowledge and expert judgement.

Monitoring frequencies in water at the site level varied widely within RBDs in most member States with some sites meeting the recommended minimum frequencies in the Directive and some not. The recommended minimum frequencies for surveillance monitoring were met more often than those for operational monitoring. In some cases, the reasons for reduced frequencies were justified in the RBMP. In some Member States, less frequent monitoring occurred in individual RBDs and in some of these cases Member States indicated intentions to enhance monitoring in the second cycle. Monitoring frequencies in biota were consistent with the recommended minimum frequency in the Directive for just over three quarters of Member States though not in all RBDs. In some cases, reduced frequencies were justified in the RBMP.

Trend assessment

Article 3.3 of the EQSs Directive (version in force in 2009) requires Member States to monitor 14 substances that tend to accumulate in sediment and/or biota, for the purpose of long-term trend assessment. Monitoring should take place at least once every three years, unless technical knowledge and expert judgment justify another interval.

Three-quarters of Member States reported monitoring in sediment and/or biota for trend assessment. A few Member States reported trend assessment in alternative matrices - suspended sediment or water. In most cases, the majority of the fourteen substances were monitored though not in all RBDs and not in all water categories. Generally the proportion of sites monitored appeared to be very limited. The recommended minimum frequency of monitoring was met in almost all Member States that monitored for trends. Where reduced frequencies were reported, these were justified in very few cases.

Performance of analytical methods used

For the majority of Priority Substances, the analytical methods meet the minimum performance criteria laid down in Article 4(1) of Directive 2009/90/EC, in the majority of Member States and RBDs. For the remaining substances, the analytical methods complied with the requirements laid down in Article 4(2) of Directive 2009/90/EC in all Member States and RBDs with very few exceptions.

Assessment and classification of chemical status for surface waters

Chemical status of surface water bodies by category

Figure 3 shows the comparison of chemical status of surface water bodies between the first and second RBMPs by water category.[78] At the European level, the proportion of surface water bodies at good status has remained largely the same since the first cycle. There were slight improvements in chemical status for rivers, transitional and coastal water bodies, but not for lake water bodies. These apparent changes need to be treated with some caution due to the fact that some Member States have re-delineated some of their water bodies for the second RBMPs, including splitting, aggregation, creation and deletion of surface water bodies (see further details in Chapter 5.2 on Characterisation).

The proportion of water bodies of unknown chemical status has decreased significantly from 39% to 14 % which indicates that there have been improvements in monitoring and assessment methodologies. In one country, Ireland, the proportion of waterbodies with unknown chemical status increased significantly, which may be due to changed reporting practices. The reduction of water bodies with unknown status was seen for all water body categories, but in particular transitional water bodies. The proportion of water bodies classified as failing to achieve good chemical status has increased however from 25 % to 52 % overall; this occurred for all water categories and it seems to result mainly from the increased knowledge gained during the first cycle.

Territorial waters are not a water body category under WFD. However, Article 2.1 of the WFD indicates that chemical status applies to territorial waters as well. For the second RBMP, Member States were able to report any relevant information for the part of territorial waters which extend beyond coastal waters. Territorial waters are therefore relevant to this question

[78] Changes by Member State are available in the WISE WFD Database: https://www.eea.europa.eu/themes/water/water-assessments/chemical-status-of-surface-water-bodies

for all twenty Member States with a coastline (of which seven only reported to monitor and classify territorial waters). The unknown chemical status of territorial waters has decreased from 86 % to 28 %.

Figure 3: Comparison of chemical status of surface water bodies between the first and second RBMPs by water body category

Source: WISE electronic reports; figure available online at: https://tableau.discomap.eea.europa.eu/t/Wateronline/views/WISE_SOW_SWB_Status_Compare/SWB_ChemicalStatus_Category?:embed=y&:showAppBanner=false&:showShareOptions=true&:display_count=no&:showVizHome=no

Note: The term (*) means all Member States and surface water categories. Under Article 2(1) of the WFD, territorial waters are included for the assessment and reporting of chemical status.

At the Member State level there have been some more significant changes in the chemical status between RBMPs. A few Member States have changed from having most of their surface water bodies at good chemical status to failing to achieve good status. Once again, this seemed to reflect changes in the monitoring programmes and assessment methodologies. Some other Member States have actually increased the numbers of surface water bodies with unknown status since the first cycle.

As highlighted by the EEA (2018), some variation in the chemical status among Member States is to be expected due to differences in population densities, present and past industrial activities and geography. However, such large differences are better explained by the methods used to assess chemical status. While some extrapolated failure of a standard in monitored water bodies (most commonly for mercury in biota) to all water bodies, others only reported failure where it was confirmed. A few Member States applied the revised, stricter 2013 EQSs while most countries used the 2008 standards. More details on the approaches adopted by Member States are provided in Table 3.1 of the EEA report (2018).

Priority Substances causing failure of good chemical status

Member States were expected to report exceedances for individual substances on the basis of the more stringent 2013 EQSs when they existed. The most frequently reported "top 15" priority substances found in surface water bodies are shown in Table 1. Mercury and brominated diphenylethers are responsible for failure to achieve good chemical status in the highest number of water bodies.

Table 1: Priority substances where failure to achieve good chemical status occurs in over 100 water bodies (out of a total of 111062 surface water bodies)

Priority substance	Type / use of chemical	Number of water bodies not achieving good chemical status	Number of Member States with water bodies not achieving good chemical status for the listed substance	% contributed by one Member State if that dominates (% of WBs not achieving good chemical status)
Mercury *	Metal	46002	27	50%
Brominated diphenylethers *+	Flame retardant	23331	9	99%
Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene * +	PAH	3126	17	47%
Benzo(a)pyrene *+	PAH	1632	16	65%
Fluoranthene +	PAH	1390	14	40%
Cadmium	Metal	1028	23	--
Tributyltin *	Biocide	663	15	--
Nickel+	Metal	659	24	--
Lead+	Metal	470	22	--
Benzo(b)fluor-anthene+ Benzo(k)fluor-anthene *+	PAH	462	12	41%

Isoproturon	Pesticide	200	11	45%
4-nonylphenol	Surfactant	188	10	52%
Anthracene+	PAH	123	11	59%
Hexachlorocyclohexane	Pesticide	121	13	--
DEHP	Plasticiser	102	11	--

*Note * shows where substance is an ubiquitous persistent, bioaccumulative and toxic Priority Substances (uPBT) and + denotes a more stringent 2013 Environmental Quality Standard. Source: EEA (2018).*

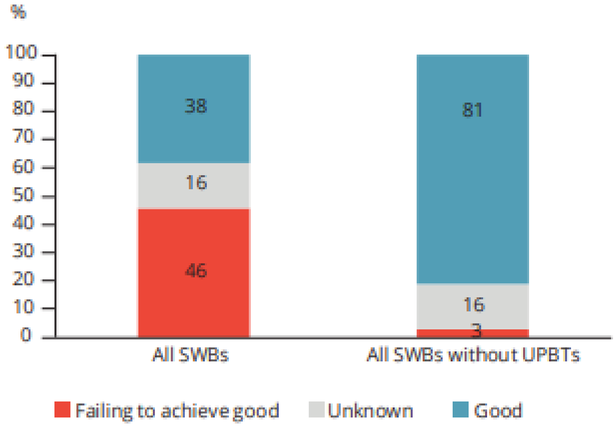
The impact of ubiquitous persistent, bioaccumulative and toxic Priority Substances on the classification of chemical status

According to Article 8(a) of the EQSs Directive, eight priority substances and groups of priority substances are behaving like ubiquitous, persistent, bioaccumulative and toxic substances. These substances are generally expected to cause widespread exceedances, and their emissions can be challenging to tackle (e.g. due to long-range atmospheric transport and deposition). In order to show the progress made in tackling other priority substances, Member States have the possibility to present the information related to chemical status separately for these substances.

The ubiquitous persistent, bioaccumulative and toxic Priority Substances (uPBTs) are also shown in Table 3 and it can be seen that all of them are in the top 10. Figure 4 displays the chemical status of surface water bodies, with and without uPBTs. There is a significant difference with only 3 % of surface water bodies failing to achieve good chemical status when uPBTs are excluded. This indicates a very significant impact of uPBTs. Some Member States are more affected by the uPBTs than others[79]. However, the true extent of the impact of uPBTs is more than likely masked by the different approaches Member States have taken to accounting for the pressures leading to impacts from these substances and to the use of extrapolation of monitoring results from monitored to unmonitored water bodies. This is commonly the case for mercury where exceedance of the environmental quality standard in biota extrapolated to similar water bodies leads to widespread occurrence of failure to meet good status.

[79] For details see WISE WFD Database: https://tableau.discomap.eea.europa.eu/t/Wateronline/views/WISE_SOW_SWB_SWPrioritySubstanceWithoutUPBT/Country?:embed=y&:showAppBanner=false&:showShareOptions=true&:display_count=no&:showVizHome=no

Figure 4: Chemical status of surface water bodies, with and without and uPBTs



Note: All SWBs, All surface water bodies.
For some surface water bodies in Poland (1 265) and Italy (265), there is no information on the priority substances causing failure and it is therefore not possible to identify whether the failure is caused by uPBTs or other priority substances.

Progress made in tackling individual substances

The EEA report (2018)[80] provides a more detailed overview of which Priority Substances are being tackled at the Member State level. Against a background of little change overall in the proportion of water bodies achieving good status and an increase in the proportion failing to achieve good status, several cases of improvements between the first and second RBMPs were reported for particular Priority Substances. For example, 943 water bodies improved in status during the first RBMP cycle due to cadmium, nickel and lead meeting their EQSs. For pesticides (isoproturon, endosulfan, chlorpyrifos, diuron, DDT, total DDT, cyclodiene, trifluralin, atrazine, alachlor), 571 water bodies improved from failing to achieve good chemical status in the first RBMP as a result of these substances meeting the relevant standards. A further 621 water bodies are still failing to achieve good chemical status in the second RBMPs due to these substances failing their standards.

Dealing with measurements lower than the limit of quantification

Article 5 of Directive 2009/90/EC on QA/QC specifies a method for dealing with measurements lower than the limit of quantification. Almost all Member States reported the use of methods consistent with these requirements.

Expected date for achievement of good chemical status

For surface water bodies failing to achieve good chemical status by 2015, Member States were requested to report the date by which good chemical status would be achieved. Member States

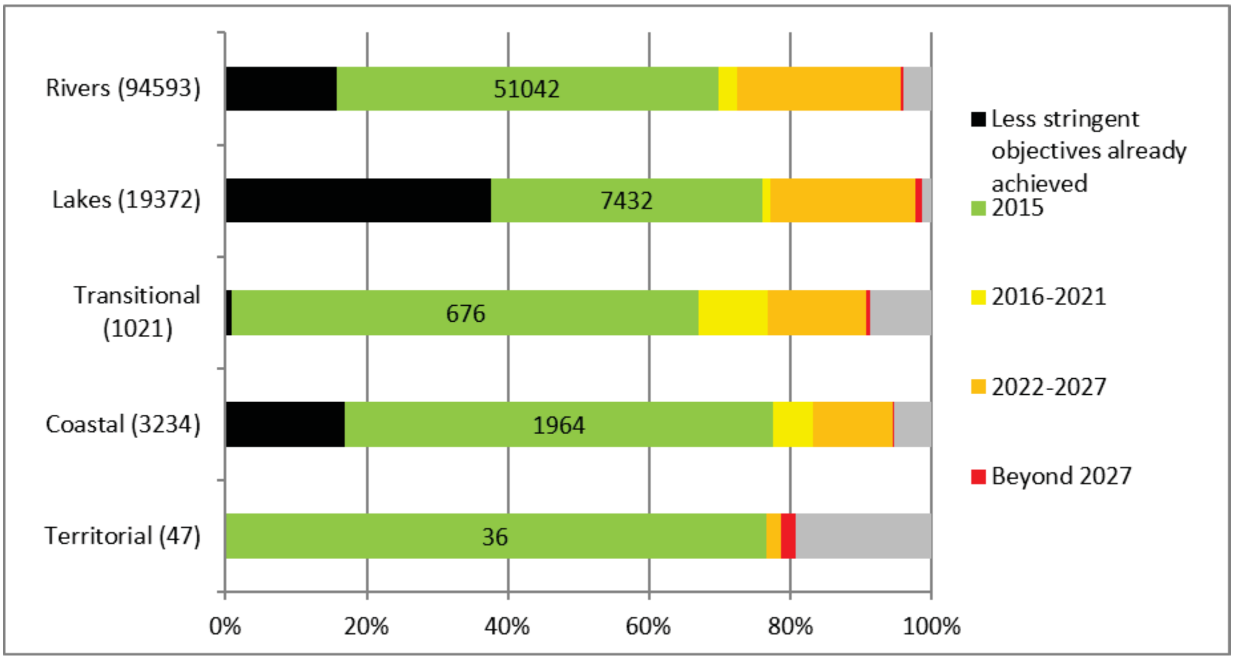
[80] EEA (2018). European Waters – Assessment of status and pressures 2018,EEA Report No 7/2018, ISSN 1977-8449.

were also asked to report water bodies achieving good status in 2015 and those where less stringent objectives (exemption under Article 4(5)) have already been achieved.

As previously mentioned, good status should be reached by 2021 for substances with revised, more stringent 2013 standards, and by 2027 for the new priority substances. Member States may also apply exemptions under WFD article 4(4) to explain the extension of deadlines, provided they can prove that the necessary conditions are fulfilled.

52% of surface water bodies have already achieved good chemical status in 2015 and 19% have achieved the less stringent objectives set by Member States under article 4(5) of the WFD. About 3 % of water bodies are expected to achieve good status by 2021 and 22 % by 2027 (Figure 5). For only less than 1 % the target will be achieved beyond 2027. For about 4 % of surface water bodies the date of achievement is unknown.

Figure 5: Expected date for achievement of good chemical status of surface water bodies by water category.



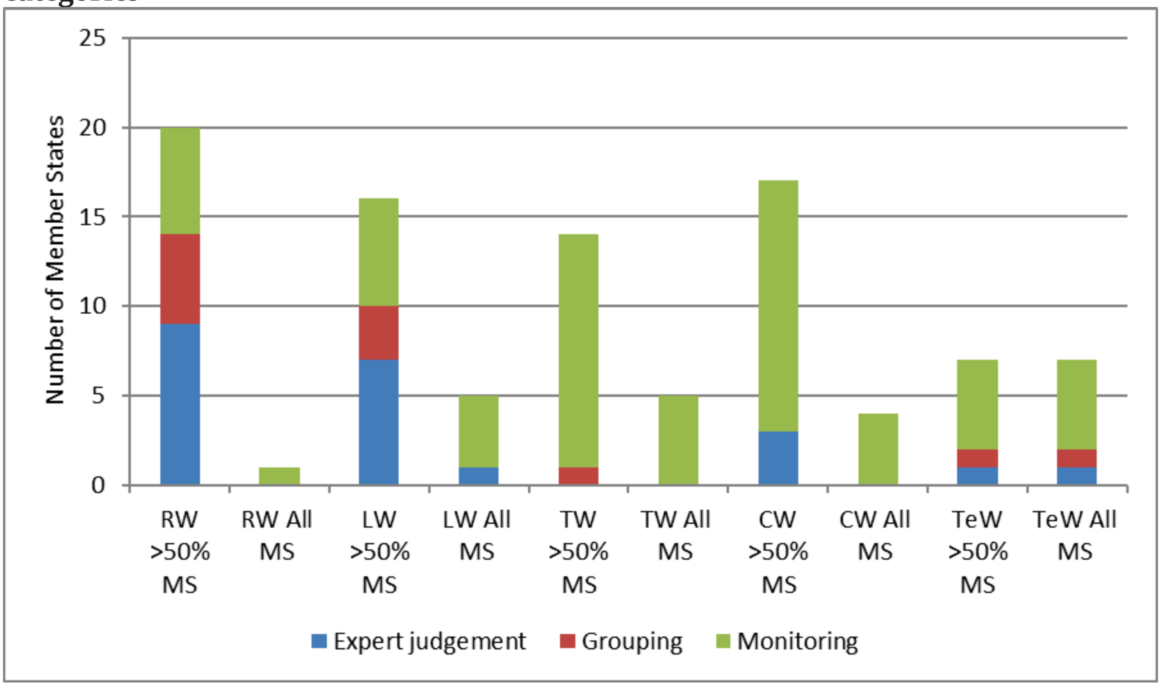
Source: WISE electronic reports

Methodologies to assess the status of non-monitored water bodies

Figure 6 shows the number of Member States where monitoring, grouping and expert judgement is used either predominantly or entirely as the means of classification for each water category relevant for surface water chemical status. 'Monitoring' indicates that there is monitoring data available for the water body and this is used as the basis for classification. ‘Grouping’ indicates that there is no monitoring data available from the water body and therefore monitoring from other similar water bodies was used as a basis for classification. Assessing water bodies by grouping without any monitoring data can increase the uncertainty but it may be justified in areas where several water bodies are of the same type and are subject to the same level of pressures and hence can be assumed to present the same chemical status. 'Expert judgement' means there is some, none or insufficiently reliable monitoring data available in this surface water body, no other similar water bodies were used and the status is mainly based on expert judgement.

Monitoring is used as the basis of classification most commonly in transitional, coastal and territorial waters (Figure 9). There are generally fewer water bodies in these water categories than in surface freshwaters. Expert judgement is used more commonly in lakes and rivers (in approximately one-third of Member States). Member States appear to have generally reported as expert judgment the extrapolation of exceedances found for mercury in monitored water bodies to all unmonitored water bodies within a Member State. This extrapolation was carried out in a few Member States. The use of grouping as the means of classification occurs least frequently but is more common in surface fresh waters than in transitional, coastal and territorial waters.

Figure 6: Means of classification of surface water chemical status in the relevant water categories



Source: WISE electronic reports

Notes to Figure: ">50% MS": Predominantly used: at least 50% of water bodies classified by this means in the Member States. "All Member States": Exclusively used: all water bodies classified by this means in the Member State.

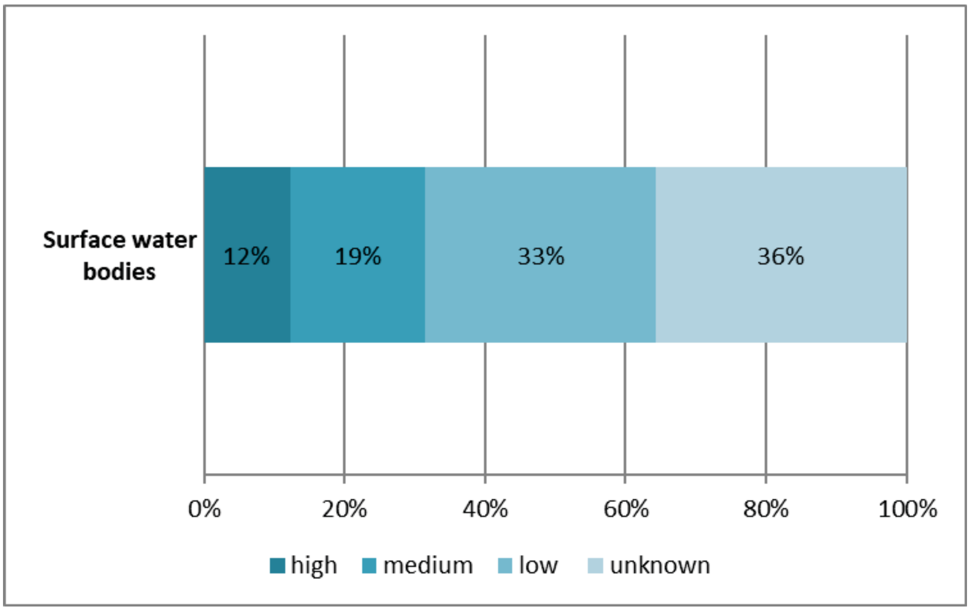
Overall, grouping techniques and expert judgement are widely used for the classification. Some RBMPs provide information on the approaches used but in some cases greater transparency would be beneficial. The grouping techniques and expert judgement also need to utilise sound monitoring results.

Confidence in classification of chemical status

The WFD stipulates that estimates of the confidence and precision attained by the monitoring system used shall be stated in the RBMP. Member States were requested to report the level of confidence according to 4 categories (low, medium, high and no information). In the first RBMPs, confidence in the chemical status assessment was not explicitly reported.

Figure 7 shows the surface water chemical status assessment confidence for the second RBMPs. At EU level, only 12 % of the chemical status classifications were assigned high confidence, 19 % of medium, 33 % of low confidence and 36 % had no information on the level of confidence. (No information on the level of confidence was generally associated with water bodies with unknown chemical status.) The range of confidence levels varies widely between the Member States. High confidence was generally associated with classifications based on reliable monitoring results and low confidence with those based on few or no monitoring results but on, for example, the extrapolation of results from monitored water bodies or expert judgment.

Figure 7: Confidence in the assessment of surface water chemical status



Source: WISE electronic reports

Use of mixing zones

Directive 2008/105/EC also allows Member States to establish mixing zones, where the EQSs Directive may be exceeded provided that the rest of the surface water body complies with those standards. These areas must be clearly identified in the RBMPs. Mixing zones were not commonly defined in the second RBMPs with only just over a quarter of Member States defining them in at least some RBDs, representing a small portion of water bodies overall.

Use of background concentrations and bioavailability for metals

Directive 2008/105/EU stipulates that Member States may, when assessing the monitoring results against the EQS, take into account the natural background concentrations for metals and their compounds and the bioavailability of metals.

In the second RBMPs, most Member States have considered natural background concentrations when assessing monitoring results against the EQS, however this was not the case in all RBDs in these Member States.

Most Member States have considered bioavailability when assessing monitoring results against the EQS, however this was not the case in all RBDs in these Member States.

Main changes in implementation and compliance since 1st cycle

Changes in surveillance and operational monitoring

A wide variety of changes to monitoring programmes for chemical status were reported by Member States including both increases and decreases in the numbers of monitoring sites used and water bodies monitored and a redistribution of sites between surveillance and operational monitoring programmes and between water categories. Several Member States reported extensions of monitoring programmes into previously unmonitored water categories.

Changes in monitoring of Priority Substances

Monitoring of Priority Substances in the first RBMPs was very diverse with few Member Sates monitoring all substances.[81] In the second RBMPs, all Member States monitored Priority Substances in water for status assessment. In almost all Member States, the majority of Priority Substances were monitored but with some variation among RBDs within Member States and among water categories.

Since the first RBMPs, biota standards have been used in the assessment of chemical status and trend monitoring was performed in sediment and biota to a greater extent. For status assessment, nearly three quarters of Member States monitored mercury, hexachlorobenzene and

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[81] See 2012 Commission Staff Working Document : http://ec.europa.eu/environment/water/water-framework/pdf/3rd_report/CWD-2012-379_EN-Vol2.pdf

hexachlorobutadiene in biota compared to just a few Member States in the first RBMPs. For trend assessment, a similar proportion of Member States reported monitoring of at least some of the 14 Priority Substances in sediment and/or biota which is a considerable improvement from the proportion using these matrices in the first RBMPs.

Changes in status

At the European level, the proportion of surface water bodies at good status has remained largely the same since the first cycle; though small increases were observed in rivers, transitional, coastal and territorial water categories. However, as a result of significant efforts invested by Member States in improving the understanding of pressures and monitoring and assessment methodologies, the number of water bodies of unknown status has decreased from 39 % to 16 %, excluding a few countries, where monitoring seems to have been failing. The number of water bodies classified as failing to achieve good chemical status has increased from 25 % to 46 % overall, which seems to be largely due to the increase in knowledge.

Confidence in the classification of chemical status was reported explicitly for the first time in the second RBMP; 15 % of classified water bodies were assigned high and 25 % medium confidence. This is related to the extent to which monitoring, grouping and expert judgement (and extrapolation) is used as the basis for classification. While the classifications of chemical status reported in the first RBMPs were based largely on limited monitoring programmes, those reported in the second RBMPs are based on improved monitoring programmes and more systematic use of grouping and expert judgement.

5.4.2 Conclusions

Overall, the percentage of water bodies that are of unknown chemical status has decreased significantly since the first RBMPs from 39 % of all surface water bodies to only 14 %. This indicates that the monitoring (spatially, substances and frequency) and status assessment methods have improved overall. A limited number of Member states have more than 60% of their water bodies in unknown status (Bulgaria, Denmark, Estonia, Ireland, Latvia, Portugal).

Against a background of little change overall in the proportion of water bodies achieving good status and an increase in the proportion failing to achieve good status (most likely due to an increase in knowledge), several cases of improvements between the first and second RBMPs were reported for particular Priority Substances.

Only 3 % of surface water bodies are failing to achieve good chemical status when ubiquitous persistent, bioaccumulative and toxic Priority Substances (uPBTs) are excluded from the assessment of chemical status (compared to 46% when all substances are considered). This indicates a significant impact of uPBTs. In particular, mercury and brominated diphenylethers are responsible for failure to achieve good chemical status in the highest number of water bodies.

A relatively high proportion of surface water bodies were reported to be failing to achieve good status for the second RBMPs – 46 % overall. However, looking at the target for the expected date of achieving good status, less than 1 % extends beyond 2027 and most water bodies are expected to achieve good chemical status by 2027, though more stringent standards and additional substances are required to be monitored for the third RBMP. For about 4 % of surface water bodies, the date of achievement is unknown.

Grouping techniques and expert judgement have been widely used to classify water bodies. Some RBMPs provide information on the approaches used but in some cases greater transparency would be beneficial. The use of these may also be at least partly linked to the reduced confidence in the assessment of status : at EU level, only 15 % of the chemical status classifications were assigned high confidence, 25 % medium, 41 % low confidence and 19 % had no information on the level of confidence. The range of confidence levels varies widely between Member States.

Although it is not expected that all water bodies be monitored, overall the extent of monitoring of Priority Substances across the EU has been very diverse, ranging from 1 to 98 % of surface water bodies being monitored for Priority Substances and an average of about one third. The majority of Member States monitor all of their water bodies failing to achieve good status as part of their operational monitoring programmes in at least some of their RBDs and most commonly in coastal and transitional waters.

For efficient monitoring programmes the information on pressures and emissions is very important. Significant efforts have been made to establish inventories of emissions (see Chapter 5.2), although few Member States reported complete inventories for all their RBDs, and it is therefore unclear whether all discharged substances have been identified. The majority of Member States monitored all of the Priority Substances identified as discharged into their RBDs with the exception of a few Priority Substances and with some variation among RBDs within Member States. For status assessment, all Member States monitored Priority Substances in water. In almost all Member States, the majority of Priority Substances were monitored but with some variation among RBDs within Member States and among water categories. Generally the spatial extent of monitoring in water was limited in terms of the proportion of water bodies monitored with some variation between water categories. Territorial waters were monitored in a few Member States with a coastline. Monitoring frequencies in water at the site level varied widely within RBDs in most member States with some sites meeting the recommended minimum frequencies in the Directive and some not.

Nearly three quarters of Member States monitored mercury, hexachlorobenzene and hexachlorobutadiene in biota for status assessment. In general, the spatial extent of monitoring in terms of the proportion of monitoring sites was very limited. Monitoring frequencies in biota were consistent with the recommended minimum frequencies in the Directive for just over three quarters of Member States though not in all RBDs. Explanations for the reduced frequencies were sometimes provided in the RBMPs.

For trend assessment, around two-thirds of Member States reported to WISE that arrangements were in place for long-term trend analysis in most, but not all, RBDs. All but two of these monitored sediment and/or biota for this reason. Most Member States monitored the majority of the 14 substances though not in all RBDs and not in all water categories. In almost all cases the spatial extent of monitoring was very limited in terms of the proportion of sites monitored. The recommended minimum frequency of monitoring was met in almost all Member States. Where reduced frequencies were reported, these were justified in very few cases.

For the majority of Priority Substances, the analytical methods meet the minimum performance criteria laid down in Article 4(1) of the QA/QC Directive, in the majority of Member States and RBDs. For the remaining substances, the analytical methods complied with the requirements laid down in Article 4(2) in all Member States and RBDs with very few exceptions.

Article 5 of the QA/QC Directive specifies a method for dealing with measurements lower than the limit of quantification. Almost all Member States reported the use of methods consistent with these requirements.

Member States did not often use the option of deriving mixing zones in the second RBMPs with only just over a quarter of Member States defining them in at least some RBDs, in a small portion of water bodies overall.

Most Member States have used the possibility offered by the Directive to consider natural background concentrations and bioavailability when assessing monitoring results against the EQS. However this was not the case in all RBDs in these Member States (in some RBDs because metals were not causing exceedances).

5.4.3 Recommendations

- Member States should continue improving the confidence in the assessment of status for all water categories (including territorial waters), and further reduce the proportion in unknown status. In particular, monitoring should be performed in a way that provides sufficient temporal resolution and spatial coverage to classify all water bodies (in combination if necessary with robust grouping /extrapolation methods). All discharged Priority Substances should be monitored, and all Priority Substances should be considered in the assessment of status, in the relevant matrix. If reduced frequencies or a different matrix/EQS are used, they should be explained, as required by the Directives.

- Trend monitoring in sediment and/or biota should be performed or further improved to ensure that all the relevant substances specified in Directive 2008/105/EC are monitored in a way that provides sufficient temporal resolution and spatial coverage and fully reflects the concern that these substances may be accumulating in the environment.

5.5 Monitoring, assessment and classification of quantitative status in groundwater

5.5.1 Introduction

Monitoring

Article 8 of the WFD requires the establishment of programmes for the monitoring of groundwater quantitative status. The directive sets out the requirements for these programmes in Annex V 2.2 and Annex II 2.3.

WFD groundwater monitoring is primarily focussed on the groundwater body as a management unit, but it also supports the overall management of the RBD. The principal purpose of WFD quantitative monitoring is to facilitate quantitative status assessment to determine whether the relevant Article 4 environmental objectives for groundwater bodies are met. Moreover, the monitoring results must be used:

- to supplement and validate the Article 5 characterisation and risk assessment procedure with respect to risks of failing to achieve good groundwater quantitative status,
- to demonstrate compliance with the objectives for drinking water protected area and other protected area objectives,
- to assist in designing the programmes of measures necessary to achieve the environmental objectives and in evaluating their effectiveness, and
- to estimate the direction and rate of flow in groundwater bodies that cross Member State boundaries.

The groundwater quantitative monitoring network shall include sufficient representative monitoring points and monitoring shall be carried out with a sufficient frequency of observations. Such monitoring design is particularly necessary to estimate the balance between groundwater abstraction and recharge in each groundwater body or group of bodies, taking into account short and long-term variations in recharge. It is also necessary so that the impacts of anthropogenically induced level changes or of alterations of groundwater flow on groundwater associated aquatic and dependent terrestrial ecosystems as well as on saline or other intrusion can be assessed.

Although the WFD identifies groundwater level as the metric for determining quantitative status, in practice the requirements of status assessment and the specific characteristics of groundwater bodies mean that additional supporting information will be required to assess quantitative status. Common Implementation Strategy Guidance document No. 15 recommends considering spring flows, flow characteristics and/or stage levels of surface water courses during drought periods or stage levels in significant groundwater dependent wetlands and lakes for the purposes of quantitative groundwater status assessment, too. Moreover, to adequately assess the quantitative status also information on abstractions, recharge, ecological flow needs of ecosystems and changes of intrusion parameters would be needed.

Classification

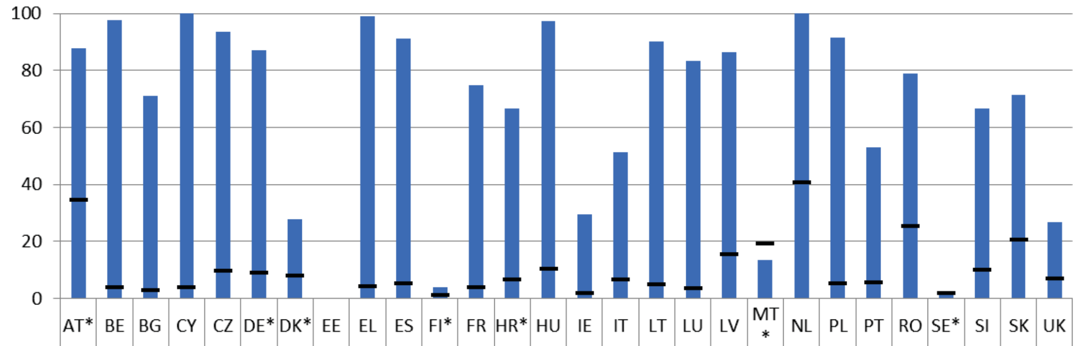
The definition of groundwater quantitative status is set out in Annex V 2.1 of the WFD and discussed in Common Implementation Strategy Guidance document No. 18. Good quantitative status is met when the available groundwater resource is not exceeded by the long term annual average rate of abstraction, when the groundwater levels are not subject to such anthropogenic alterations which would result in failure to achieve the environmental objectives for associated surface waters or any significant diminution of their status or any significant damage to groundwater dependent terrestrial ecosystems. Moreover, in good quantitative status anthropogenic flow alterations or level changes do not cause any saline or other intrusion.

Assessment of implementation and compliance with WFD requirements in 2nd cycle

Monitoring of quantitative status in groundwater

The coverage of groundwater bodies by quantitative monitoring is in most of the Member States generally high, but with a significant number of groundwater bodies without quantitative monitoring in specific Member States (see figure 1). In total 5020 of the 14533 groundwater bodies are subject to quantitative monitoring. Twelve Member States (Austria, Belgium, Cyprus, Czech Republic, Germany, Spain, Hungary, Luxembourg, Latvia, Netherlands, Poland, Lithuania) monitor more than 80% of their groundwater bodies, and of these, two monitor all their groundwater bodies (Cyprus, the Netherlands).

Figure 1: Percentage of groundwater bodies with quantitative monitoring (bars) and average number of monitoring sites per monitored groundwater.



	AT*	BE	BG	CY	CZ	DE*	DK*	EE	EL	ES	FI*	FR	HR*	HU	IE	IT	LT	LU	LV	MT*	NL	PL	PT	RO	SE*	SI	SK	UK
% of GWB	88	98	71	100	94	87	28	0	99	91	4	75	67	97	30	51	90	83	86	13	100	92	53	79	2	67	72	27
sites/GWB	34,	3,7	2,7	3,9	9,6	8,9	7,7		4,1	5,2	1,1	3,6	6,5	10,	1,7	6,6	4,7	3,4	15,	19,	40,	5,1	5,4	25,	1,8	9,7	20,	6,9

Source: WISE reporting 2016

*Note: * grouping has been applied, at least partially, in Austria, Croatia, Denmark, Germany, Finland, Malta, Spain and Sweden. Austria confirmed that there is surveillance monitoring for groundwater, but the reported information is shown in this figure.*

Consistency with the quantitative monitoring requirement of the WFD needs to be assessed in a differentiated way because the WFD allows grouping groundwater bodies - inter alia for the purpose of monitoring - and therefore not each groundwater body which is subject to such grouping is in need of a separate monitoring network. Some Member States reported that groundwater bodies had been grouped for the purpose of monitoring (see figure 1) (Austria, Croatia, Denmark, Germany, Finland, Malta, Spain and Sweden) but for the majority of Member States with unmonitored groundwater bodies there is no such information about grouping and hence there is a clear gap and inconsistency with the monitoring requirements of the WFD. Even in cases where grouping has been reported, this often does not allow determining whether grouping covers all groundwater bodies without monitoring or only a subset.

In average on the EU level, each monitored groundwater body is monitored in 9.2 monitoring sites. Figure 1 shows the number of monitoring sites per monitored groundwater body in each Member State. The number of sites varies between 1.1 sites in Finland up to 40.7 sites in the Netherlands. However, in Ireland there are no reported data for one RBD with 61 groundwater bodies. Of course, the number of monitoring sites per groundwater body is highly influenced by its size and is not an adequate measure of comparison. In addition to that, the density of sites is influenced by the variability of characteristics and pressures within groundwater bodies and the intensity and type of groundwater use, leading to significant variations even within Member

States. Furthermore, as mentioned previously, it should be considered that some Member States group their groundwater bodies for monitoring purposes and therefore did not establish monitoring sites in each groundwater body.

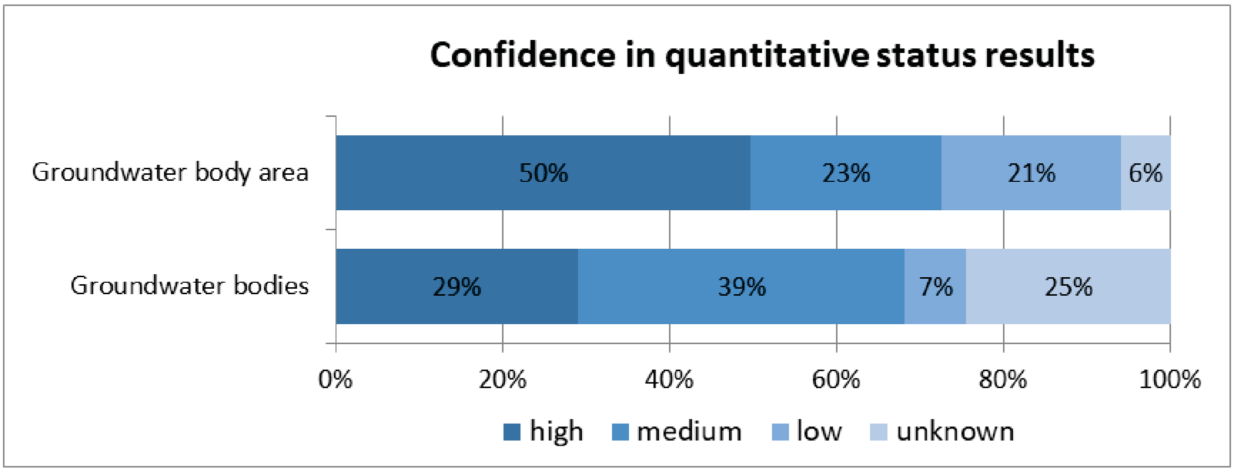
Assessment and classification of quantitative status for groundwater

About 92% of groundwater bodies in the EU (1 13351 of the 14480 are in good quantitative status Around 5% (793 groundwater bodies) are failing good status and % (385 groundwater bodies) have unknown status. Considering the area of groundwater bodies, about 89% (4.0 million km²) of the total area of groundwater bodies (4.4 million km²) is in good quantitative status, around 9 % of the total area has failed to achieve good quantitative status, while around 1 % of the groundwater body area (about 59 000 km²) has unknown status.[82]

Member States that have reported all groundwater bodies in good quantitative status are Austria, Luxembourg, Latvia, Lithuania, The Netherlands, Romania and Slovenia. In Ireland, 99.8% of groundwater bodies are achieving good quantitative status, and only one groundwater body is failing. The main reason for failing good quantitative status is attributed to the 'water balance / lowering of water table'. Around 61% of the groundwater body area failing good quantitative status (634 groundwater bodies in the other 20 Member States) is affected by this reason. Further reasons for failing good status are the diminution of associated surface water bodies (22% of the failing groundwater body area; 205 groundwater bodies in Germany, Spain, Finland, France, Italy, UK), damage to groundwater dependent terrestrial ecosystems (17% of the groundwater body area in poor status; 101 groundwater bodies in Bulgaria, Germany, France, Hungary, Poland, UK, Ireland, Spain) and saline or other intrusions (8% of the groundwater body area in poor status; 10571 groundwater bodies in Belgium, Bulgaria, Cyprus, Germany, Spain, Greece, Finland, France, Croatia, Italy, Poland, UK).

The overall confidence in the assessment of groundwater quantitative status is relatively high, with high confidence being reported for 53% of the groundwater body area and medium confidence for about 24%. Low confidence in status assessment was reported for 23% of the area and unknown confidence or no information for about 6% (about 276 000 km²). As it can be seen in Figure 4, there is quite a difference when comparing the level of confidence for groundwater bodies or for the related groundwater body area. widely between the Member States.

[82] The total area of GWBs in Europe is 4.34 million km². While this figure might seem extremely large (the whole EU surface is about 4,3 km²), it is correct as the different layers of delineated and reported groundwater bodies have been considered for calculating the total.



As stated above, approximately10% of the total groundwater body area is not achieving good quantitative status. Looking at the expected date of finally achieving good quantitative status, only about 31% of the groundwater body area which is currently at poor status is expected to achieve good status at the end of the second cycle planning period in 2021. About 39% is expected to achieve good status by 2027. For 11% the target will only be achieved beyond 2027. For about 5% of the groundwater body area which is currently at poor status, the date of achievement is either unknown and for 8% less stringent objectives have already been achieved.

Table 1 Outlook on the area of groundwater bodies failing to achieve good quantitative status in future RBMPs

Groundwater quantitative status Expected achievement of good status	**Total groundwater body area**		**Groundwater body area failing good status**
	in million km²	in %	
Good status 2015	4.14	90 %	
Less stringent objectives already achieved	0.03	1 %	7%
2016--2021	0.18	4 %	24%
2022--2027	0.18	4 %	43%
Beyond 2027	0.04	1 %	19%
Unknown	0.03	1 %	3%

Source: EEA SoW 2016. The table shows preliminary results based on the WISE reporting of data from 25 Member States (EU28 except Greece, Ireland and Lithuania).

Groundwater bodies at risk: About 12% of the total groundwater body area is assigned at risk of failing good quantitative status objectives at the end of the second cycle planning period in the year 2021. This percentage is slightly higher than the area currently failing good status

(10%). About 88% of the total groundwater body area is not at risk and supposed to achieve good status at the end of the second cycle planning period.

The main reason for risk is linked with water balance (931 groundwater bodies) followed by adverse effects to groundwater dependent terrestrial ecosystems (306 groundwater bodies), associated aquatic ecosystems (236) and saline or other intrusion (154). For 1 011 groundwater bodies uses or functions of groundwater are affected and for 449 groundwater bodies associated aquatic and groundwater dependent terrestrial ecosystems.

Brief summary of methodology

The assessment of groundwater quantitative status needs to consider the degree of direct/indirect groundwater abstractions and of anthropogenically induced alterations of groundwater levels and flow directions in comparison with the available groundwater resource. The evaluation of consistency for the 'water balance' of a groundwater body as a whole is based on an assessment of whether the available groundwater resource is not exceeded by the long-term annual average rate of abstraction. Furthermore, it needs to be checked whether the environmental objectives of associated surface water bodies and groundwater dependent terrestrial ecosystems are met and whether there is no saline or other intrusion.

Elements considered: All Member States reported on the considered elements in the quantitative status assessment. Water balance was considered by all Member States and for most of the RBDs. Further elements like diminution of the status of associated surface water bodies and damage to groundwater body dependent terrestrial ecosystems were reported to be considered by many of the Member States[83], even if no such ecosystem is related to any groundwater quantitative risk. The remaining Member States did not consider the ecosystems in status assessment but there is no risk related. Saline and other intrusions have been frequently taken into consideration in status assessment as well as the flow rate of GWBs discharging through sources.

The needs of groundwater dependent terrestrial ecosystems have been taken into account in status assessment by the majority of Member States (but not Czech Republic, Denmark, France, Latvia, Romania, Sweden and Slovakia), and the majority of the RBDs (e.g. not in all RBDs in Italy, Greece, Lithuania and Spain). 18 Member States reported its consideration in 93 RBDs (60% of all 157 RBDs), even in 6 RBDs where no such ecosystems exist. But in 34 RBDs (23%) of 11 Member States the needs have not been taken into account although such

[83] Austria, Belgium, Bulgaria, Cyprus, Germany, Estonia, Spain, Finland, Croatia, Hungary, Ireland, Italy, Lithuania, Malta, Netherlands, Poland, Portugal, Slovenia, UK

ecosystems exist. In 25 RBDs of 9 Member States, no groundwater dependent terrestrial ecosystems exist and thus, their needs have not been considered.

For 119 RBDs (75%) in most Member States, the term 'available groundwater resource' has been applied in accordance with the definition laid down in WFD Article 2(27)[84]. For 25 RBDs of 7 Member States, this was considered partly (Spain, Italy, Latvia, Romania, Sweden, Slovakia, Lithuania) and for the remaining 24 RBD, this definition was not applied (Czech Republic, Denmark, France, Luxembourg).

In assessing water balance, 112126 (7080%) RBDs (7922 groundwater bodies in the majority of Member States previously mentioned) reported having compared the annual average groundwater abstractions against the available groundwater resource for every groundwater body and in 11 (8%) RBDs (853 groundwater bodies) of 5 Member States the comparison for a subset of groundwater bodies has been calculated (Spain, Italy, Romania, Sweden, Slovakia). For 30 (21%) RBDs in 7 Member States (5 123 groundwater bodies), the failure of achieving good status was established by considering sustained long-term decline in water levels caused by long-term groundwater abstraction, based on reliable information on groundwater levels across the groundwater body.

Table 2 Assessment of water balance within the assessment of groundwater quantitative status

Method	**Member States**	**River Basin Districts**	**Groundwater bodies**
Comparison of the annual average groundwater abstractions against the available groundwater resource in the groundwater body **for every** groundwater body	19	126 (80%)	7922
Comparison of the annual average groundwater abstractions against the available groundwater resource in the groundwater body **for a subset** of groundwater bodies	5	11 (8%)	853
Consideration of the sustained long-term decline in water levels caused by long-term groundwater abstraction, based on reliable information on groundwater levels across the groundwater body	7	30 (21%)	5 123
No consideration of water balance in status assessment	1	1	90

[84] Austria, in some RBDs of Belgium, Bulgaria, Cyprus, Germany, Estonia, Finland, Croatia, UK, Hungary, Malta, Netherlands, Poland, Portugal, Slovenia and UK

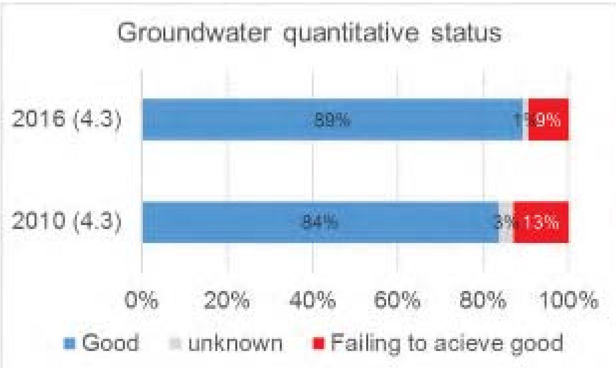
Note: Some Member States applied different approaches for different RBDs.

Main changes in implementation and compliance since 1st cycle

In most of the Member States, groundwater quantitative monitoring improved since the first RBMPs[85]. In many Member States, the coverage of groundwater bodies by quantitative monitoring increased (including Belgium, Czech Republic, Germany, Denmark, France, Hungary, Ireland, Greece, Italy, Poland, Portugal, Sweden, Slovenia) and in six Member States the coverage more or less remained the same, commonly at high level (Austria, Cyprus, Croatia, Lithuania, Malta, Netherlands). Some Member States reduced the percentage of groundwater bodies with quantitative monitoring but they did not report reasons for that (Bulgaria, Estonia –with reporting data gaps-, Finland, Romania). In two Member States the reduction could be a result of the re-delineation of groundwater bodies (Bulgaria, Romania). In Spain the number of monitored groundwater bodies remained the same as the number of groundwater bodies decreased significantly in Eastern Cantabrian and increased significantly in Guadalquivir.

Overall, the quantitative status of groundwater bodies in the EU improved. The groundwater body area achieving good quantitative status increased by 5% from 84% to 90% of the total groundwater body area and the area failing good status decreased from 13% to 10%. Also the knowledge on groundwater quantitative status has substantially increased as the area at unknown status decreased from 3% to around 1 % of the total groundwater body area, located in four Member States. In parallel to the knowledge, also the level of confidence in the status results increased. Now around 70 % of quantitative status results have been reported of high or medium confidence.

Figure 2: Groundwater quantitative status by area in the first and second RBMPs



[85] Austria, Belgium, Cyprus, Czech Republic, Germany, Denmark, Spain, France, Hungary, Ireland, Italy, Luxembourg, Latvia, Poland, Portugal, Sweden, Slovenia, Slovakia, UK

Note: The numbers in parenthesis show total area (in million km2) of groundwater bodies. Source: EEA SoW 2018. Data from 25 Member States (except Greece, Ireland and Lithuania)

Very often, changes in the status results were reported as a result of the re-delineation of groundwater bodies and the improvement of the status assessment methodologies, which is also reflected in the increased level of confidence in the status assessment. To a lesser extent, changes of the pressure situation and the effectiveness of measures were mentioned as reasons for changes in status results.

Changes in elements considered in status assessment:

The consideration of the water balance in quantitative status assessment increased significantly. Compared to the first RBMPs, where only half of the Plans reported about this consideration, now almost 80% of the second RBMPs reported having considered the balance between recharge and abstraction for every groundwater body (80%) or for a subset of groundwater bodies (8%). Only 1 of 157 RBMPs did not consider water balance in the status assessment.

Also the consideration of ecosystems in the quantitative status assessment increased significantly. In the first RBMPs, their consideration was quite limited, but in the 2nd cycle, most Member States reported having considered the ecosystems in status assessment, even if no such ecosystem is related to any groundwater quantitative risk. The remaining Member States did not consider ecosystems in quantitative status assessment (Czech Republic, Denmark, France, Latvia, Romania, Sweden and Slovakia).

5.5.2 Conclusions

Overall, groundwater quantitative monitoring improved since the first cycle RBMPs with increasing coverage of groundwater bodies. Most Member States increased the coverage of groundwater bodies by quantitative monitoring or at least kept the coverage at high level (decreases were observed in Bulgaria, Estonia, Finland, Romania). Nevertheless, a significant number of groundwater bodies is still without quantitative monitoring sites in specific Member States and the partially reported grouping of groundwater bodies for monitoring purposes does not fully explain the absence of monitoring. Therefore, there is still inconsistency with the WFD requirement on groundwater quantitative monitoring.

The groundwater quantitative status situation improved with 88% of the groundwater bodies representing 90% of the total groundwater body area being at good status. Most of the changes in status are owing to the partially significant re-delineations of groundwater bodies and the improvements of the status assessment methodologies.

In parallel to the improvement of status also knowledge improved which is expressed in the decreased share of groundwater bodies at unknown status (7% of groundwater bodies representing 1% of the area) and the increased confidence in the status results which is high or medium for about 31% respectively 44% of the groundwater bodies.

Water balance is almost fully considered in status assessment and also associated surface water bodies and groundwater dependent terrestrial ecosystems are fully considered in almost all Member States where such ecosystems exist and where they are related to groundwater quantitative risk.This is a significant improvement since the previous RBMP.

5.5.3 Recommendations

- While there have been important improvements, many Member States need to continue improving quantitative monitoring programmes, and work toward completing quantitative status assessment for all groundwater bodies.

- In some Member States additional efforts are required for harmonisation of status assessment methodologies (across regions and RBDs).

- Grouping methodologies for monitoring purposes are not always clear and should be better described in RBMPs.

5.6 Monitoring, assessment and classification of chemical status in groundwater

5.6.1 Introduction

In this area, the requirements of the WFD are complemented by those of the Groundwater Directive (GW). The two Directives work in conjunction and, in addition, together with other EU legislation, such as the Drinking Water Directive and the Nitrates Directive.[86]

Monitoring

Article 8 of the WFD requires the establishment of programmes for the monitoring of groundwater chemical status. The directive sets out the requirements for these programmes in Annex V 2.4 and Annex II 2.3.

WFD groundwater chemical monitoring is primarily focused on the groundwater body as a management unit, but it also supports the overall management of the RBD. The principal purpose of WFD chemical monitoring is to facilitate chemical status assessment to determine

[86] The analysis in this chapter also responds to the requirement of Article 11 of the Groundwater Directive.

whether the relevant Article 4 environmental objectives for groundwater bodies are met. Moreover, the monitoring results must be used to supplement and validate the Article 5 characterisation and risk assessment procedure with respect to risks of failing to achieve good groundwater chemical status, to demonstrate compliance with the objectives for drinking water protected area (DWPA) and other protected area objectives, to provide information on natural and anthropogenically induced long-term trends in pollutants concentrations and to assist in designing the programmes of measures and in evaluating their effectiveness.

Monitoring of groundwater chemical status consists of surveillance and operational monitoring, as defined in WFD Annex V 2.4. The Directive specifies that surveillance monitoring shall be carried out for groundwater bodies at risk or which cross a boundary between Member States. However, to adequately supplement and validate the Annex II risk assessment procedure, additional surveillance monitoring is also needed for groundwater bodies, or groups of bodies, not identified as being at risk (see CIS Technical Report 3 on Groundwater monitoring[87]). Surveillance monitoring must include the core parameters defined in Annex V (oxygen content, pH value, conductivity, nitrate and ammonium), and the selection of additional parameters to be monitored should enable the detection of all potential impacts of all pressures on groundwater bodies, and of all long-term natural and anthropogenically induced changes in pollutants concentrations (trends). If entire groundwater bodies or certain parameters indicating impacts of anthropogenic pressures are not included in surveillance monitoring, then this omission could lead to the non-detection of significant pressures, the incorrect classification of water status and inappropriate targeting of measures. This is particularly important where the pressures and impacts assessment may not have been adequate enough to identify all potential pressures and impacts in the RBD, including perhaps because of a lack of information or of methods or because of unexpected anthropogenic activities within the RBD.

Operational monitoring is to be performed in the periods between surveillance monitoring. In contrast to surveillance monitoring, operational monitoring is highly focused on assessing the specific identified risks to the achievement of the directive's objectives. It is needed to establish the status for all groundwater bodies identified at risk, and to establish the presence of any significant long-term anthropogenically induced upward trend in the concentration of any pollutant.

Classification

[87] https://circabc.europa.eu/sd/a/729b38fe-4141-48e8-b808-04c3ecc91975/Groundwater%20monitoring%20Report.pdf

The definition of groundwater chemical status is set out in Annex V 2.3 of the WFD. The procedure of assessing status is further specified in Article 4 and Annex III of the Groundwater Directive 2006/118/EC (GWD). Good chemical status is met when the chemical composition of the groundwater body does not indicate saline or other intrusion, does not exceed relevant standards, does not result in failure to achieve the environmental objectives for associated surface waters or any significant diminution of their status or any significant damage to groundwater dependent terrestrial ecosystems and does not impair the ability of a groundwater body to support human uses such as drinking water abstraction. For groundwater bodies identified as Drinking Water Protected Areas, the requirements of WFD Article 7 must be met as well, in order for a groundwater body to be in good chemical status.

Regarding the provision of not exceeding relevant standards, the GWD provides EU-wide groundwater quality standards for nitrates and pesticides (individual and total) and requests Member States to establish further national groundwater quality standards (referred to as 'threshold values') for all substances causing risk of failing to meet good chemical status objectives at the most appropriate level (e.g. Member State, RBD, groundwater body). The establishment of threshold values shall consider the indicative minimum list of substances given in Annex II part B of the GWD[88], the natural occurrence and variability of substances in groundwater (natural background levels), the needs of the receptors of the groundwater (including where groundwater is or is planned to be used as drinking water), pollutant pathways and interactions with different environmental compartments such as associated aquatic ecosystems or dependent terrestrial ecosystems.

Assessment of implementation and compliance with WFD requirements in 2nd cycle

Monitoring of chemical status in groundwater

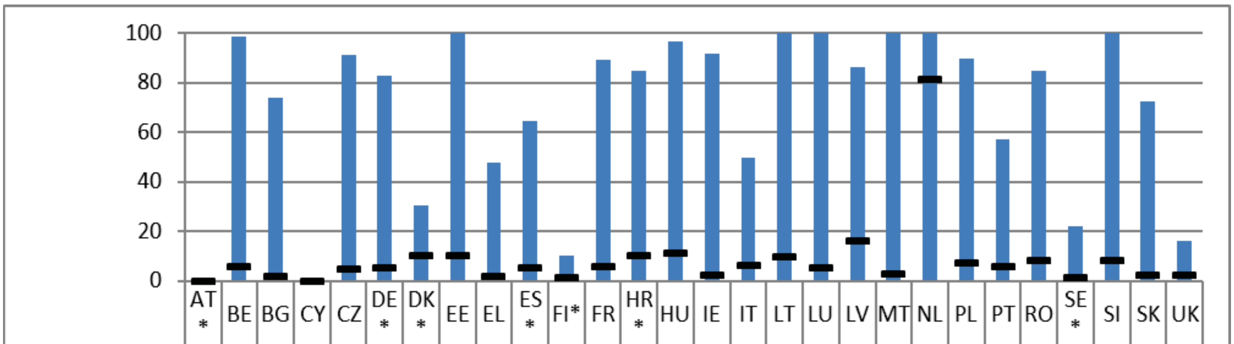
Surveillance monitoring

The coverage of groundwater bodies by surveillance monitoring is in many Member States high, but a significant number of groundwater bodies is not covered by such monitoring in specific Member States (see figure 1). In total 5 067 of the 14554 groundwater bodies are subject to surveillance monitoring and 8 326 are not. Sixteen Member States monitor more than 80% of their groundwater bodies, whereby 6 Member States (Croatia, Estonia, Luxembourg, Malta, the Netherlands and Slovenia) cover all their groundwater bodies. Coverage is very low in Finland, Sweden, Ireland and Denmark while two Member States reduced the coverage (the

[88] Arsenic, Cadmium, Lead, Mercury, Ammonium, Chloride, Sulphate, Nitrites, Phosphorus (total)/Phosphates, Trichloroethylene, Tetrachloroethylene, Conductivity.

United Kingdom and Spain). As mentioned, Finland and Sweden host more than half (7 084) of the total 13 376 groundwater bodies in the EU.

Figure 1: Percentage of groundwater bodies with surveillance monitoring (bars) and average number of surveillance monitoring sites per monitored groundwater.



	AT *	BE	BG	CY	CZ	DE *	DK *	EE	EL	ES *	FI*	FR	HR *	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE *	SI	SK	UK
% of GWB	0	99	74	0	91	83	30	100	48	64	10	89	85	97	92	50	100	100	86	100	100	90	57	85	22	100	73	16
sites/GWB	0,0	5,9	1,9	0,0	4,8	5,4	10,	10,	1,9	5,0	1,1	5,9	10,	11,	2,1	6,4	9,8	5,2	16,	2,8	81,	7,3	5,9	8,4	1,5	8,4	2,4	2,1

Source: WISE reporting 2016.

*Note: * grouping has been applied, at least partially, in Austria, Croatia, Denmark, Finland, Germany, Spain and Sweden.*

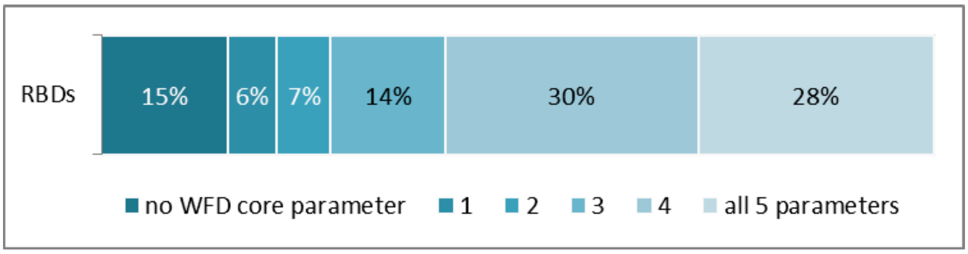
As with quantitative monitoring, consistency with the chemical monitoring requirement of the WFD needs to be assessed in a differentiated way because the WFD allows grouping of groundwater bodies, *inter alia* for the purpose of monitoring. Therefore, not each groundwater body which is subject to such grouping is in need of a separate monitoring network. Almost one third of the Member States reported that groundwater bodies had been grouped for the purpose of monitoring but for the majority of Member States with unmonitored groundwater bodies, there is no information reported on grouping and hence there is a clear gap and potential inconsistency with the requirements of the WFD. Even in cases where grouping has been reported, this often does not allow determining whether grouping covers all groundwater bodies without monitoring or only a subset.

According to WISE, the surveillance monitoring of the core parameters defined in Annex V of the WFD (oxygen content, pH value, conductivity, nitrate and ammonium) reported is rather poor. All parameters are monitored in 17 Member States[89] and, in 42 RBDs, at least 4 parameters were considered. No WFD core parameter was monitored in 21 RBDs located in eight Member States. The core parameters most often considered were nitrate (115 RBDs) and

[89] Austria, Bulgaria, Cyprus, Denmark, Germany, Estonia, Croatia, Hungary, Latvia, Malta, the Netherlands, Poland, Portugal, Romania, Sweden, Slovenia and Slovakia.

electrical conductivity (101 RBDs), while the least considered were ammonium and dissolved oxygen (71 RBDs)[90].

Figure 2: Percentage of RBDs where a number of WFD core parameters were monitored.



Source: WISE reporting 2016.

Groundwater bodies at risk of failing environmental objectives

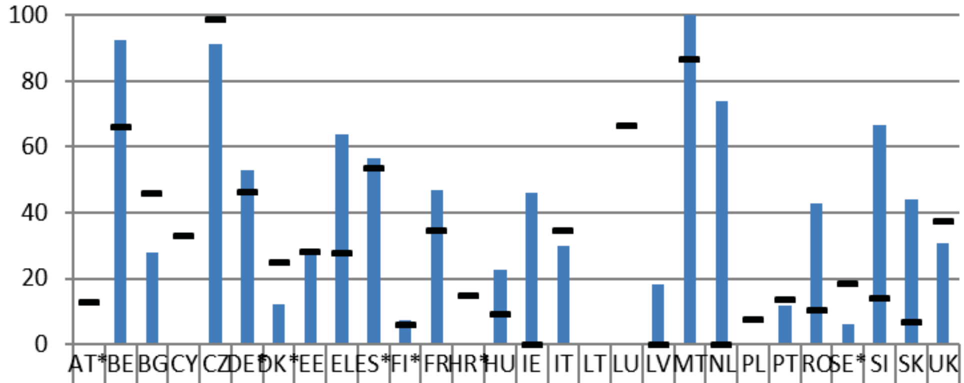
In total 3 330 (23%) groundwater bodies representing about 30% of the total groundwater body area are assessed as being at risk of failing good chemical status objectives. This is slightly higher than the area of 48% which is covered by the 2 431 groundwater bodies currently failing to achieve good chemical status objectives (see Figure 4). For 1 431 groundwater bodies the risk is due to nitrate, which is by far the most frequent reason causing risk. The second most frequent reasons causing risk are pesticides followed by chloride, sulphate, lead, ammonium, nickel and arsenic. These substances are causing risk in at least 10 Member States.

Operational monitoring

All groundwater bodies at risk should be subject to operational monitoring for those substances which are causing the risk. Overall, 3 330 groundwater bodies are at risk and 2 922 are covered by operational monitoring. About half of the Member States implemented operational monitoring in at least the same number of groundwater bodies at risk, whereas 12 Member States monitor fewer groundwater bodies than those being at risk. As mentioned for surveillance monitoring, only seven Member States reported on grouping of groundwater bodies for monitoring purposes. For the majority of the groundwater bodies without operational monitoring, there is no such explanation and hence there is a gap and inconsistency with the requirements of the WFD.

[90] Several Member States consequently clarified that while core parameters are monitored they have not been reported.

Figure 3: Percentage of groundwater bodies with operational monitoring (bars) and percentage of groundwater bodies at chemical risk.



	AT*	BE	BG	CY	CZ	DE*	DK*	EE	EL	ES*	FI*	FR	HR*	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE*	SI	SK	UK
% of monitored GWB	0	93	28	0	91	53	12	28	64	56	7	47	0	23	46	30		0	18	10	74	0	12	43	6	67	44	31
% GWB at risk	13	66	46	33	99	46	25	28	28	54	6	35	15	9	0	35		67	0	87	0	8	14	10	19	14	7	38

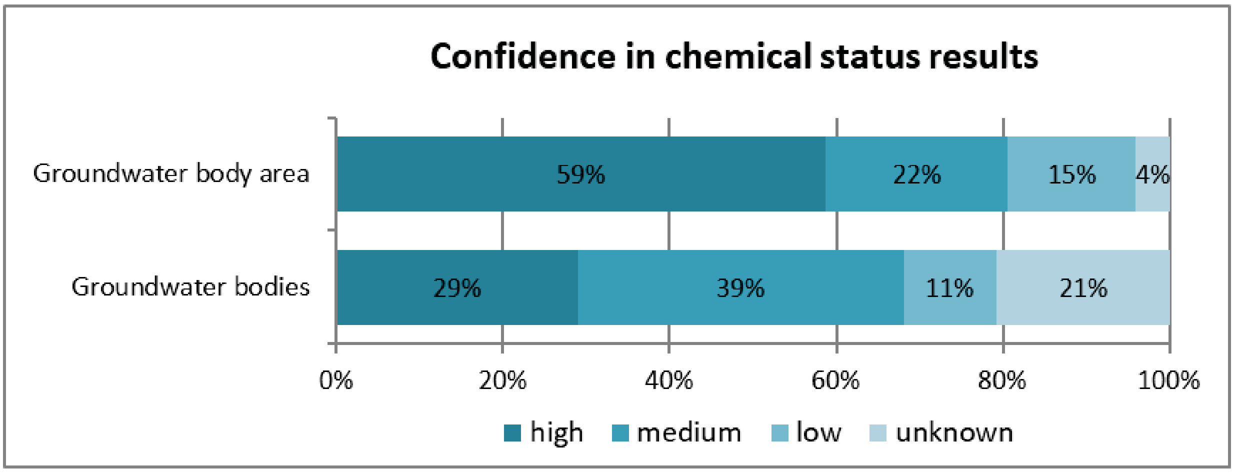
Source: WISE reporting 2016.

On average, each monitored groundwater body is monitored by 8.3 surveillance monitoring sites (ranging from 1.1 to 81.6 sites) and by 5,2 operational monitoring sites (ranging from 1.1 to 14.5 sites). The number of monitoring sites per groundwater body is highly influenced by its size and is not an adequate measure of comparison. In addition to that, the density of sites is influenced by the variability of characteristics and pressures within groundwater bodies and the intensity and type of groundwater use. Furthermore, it should be considered that some Member States group their groundwater bodies for monitoring purposes and therefore did not establish monitoring networks in each groundwater body. As operational monitoring is to be implemented for groundwater bodies at risk, comparisons at the Member State or RBD level are not meaningful.

Confidence and precision of monitoring results

The Member States had to indicate the confidence in the status results which is very much dependant on the level of monitoring and the availability of sufficient and representative monitoring data, the applied status assessment methods and whether all environmental objectives had been considered or only some of them. The overall confidence in the assessment of groundwater chemical status is relatively high, with high confidence being reported for 59% of the groundwater body area (3 667 groundwater bodies) and medium confidence for about 22% (5 292 groundwater bodies). Low confidence in status assessment was reported for 16% of the area (1 403 groundwater bodies) and unknown confidence or no information for about 4% (3 014 groundwater bodies). As it can be seen in Figure 4 there is quite a difference when comparing the level of confidence for groundwater bodies or for the related groundwater body area. The range of confidence levels varies widely between Member States.

Figure 4: Confidence in the results of the groundwater chemical status assessment.



Source: WISE reporting 2016.

Assessment and classification of chemical status for groundwater

In total 11 875 (82%) groundwater bodies representing 75% (3.4 million km²) of the total groundwater body area in the EU (total area being about 4.6 million km²) is at good chemical status; 2 170 (15%) groundwater bodies covering 24% of the total groundwater body area are failing to reach good chemical status (see Figure 4). For 489 (4%) groundwater bodies representing about 1% of the groundwater body area (about 41 000 km²) the chemical status is unknown. At the Member State level, the proportion varies widely from only 3% of the groundwater body area reaching good chemical status, up to 100%, where all groundwater bodies are at good status.

In total, about 160 different synthetic and naturally occurring substances cause poor chemical status in EU Member States. One third of these substances are pesticides. Indicators like turbidity, pH, or water temperature were also reported. The main pollutant causing poor chemical status in 24 Member States is nitrate, which affects 1 278 (9%) groundwater bodies representing 18% of the total groundwater body area. The group of pesticides is the second most reported reason but the number of groundwater bodies and the groundwater body area affected cannot be given precisely, as for some RBDs 'pesticides' as such were reported, while for others each individual active substance was reported. Further frequently reported substances are ammonium, sulphate and chloride, nickel, arsenic and electrical conductivity which were reported by at least 10 Member States.

The main reason for failing good status is attributed to 'general water quality', which is linked to an exceedance of groundwater quality standards or threshold values. In 28 Member States in total 1456 groundwater bodies representing about 18% of the total groundwater body area (74% of the area in poor status) are affected by this reason. This requirement considers significant impairment of human uses and significant environmental risk from pollutants across the whole groundwater body. The second most frequent reason for failing good status is an impairment of the objectives for drinking water protected areas, reported from 12 Member States for 375 groundwater bodies representing about 7% of the total groundwater body area. Diminution of associated surface water bodies (226 groundwater bodies, 3% in terms of area), damage to groundwater dependent terrestrial ecosystems (100 groundwater bodies, 2% in terms of area) and saline or other intrusions (189 groundwater bodies, 1% in terms of area) are less significant.

Expected achievement of good status: Only about 7% of the groundwater body area which is at poor status by the year 2015 is expected to achieve good status at the end of the second planning cycle in 2021. About 67% is expected to achieve good status by 2027. For 15%, the target will only be achieved after 2027. For about 12% of the groundwater body area which is currently at poor status the date of achievement is either unknown or less stringent objectives have already been achieved. This long timeframe needed for the achievement of good status reflects the specific properties of many groundwater bodies in reacting very slowly to changes in anthropogenic pressures at the surface. Once measures are implemented it can take many years or even decades until their effects show in groundwater.

Table 1. Outlook for the groundwater bodies (and the represented area) failing to achieve good chemical status in future RBMPs

Groundwater chemical status, expected achievement date	**Groundwater bodies**		**Groundwater body area**		**Groundwater body area failing good status**
	Number	in %	in million km^2	in %	
Good status 2015	12247	84 %	3,4	75 %	
Less stringent objectives already achieved	97	1 %	0.07	2 %	7 %
2016--2021	347	2 %	0.11	2 %	8 %
2022--2027	1 343	9 %	0.73	16 %	68 %
Beyond 2027	378	3 %	0.16	4 %	12 %
Unknown	122	1 %	0.06	1 %	5 %

Source: Preliminary results based on WISE reporting 2016, including data from 25 Member States (EU28 except Greece, Ireland and Lithuania).

Methodology for status assessment

Groundwater chemical status assessment needs to consider a number of quality objectives, depending on the identified risk. The evaluation of consistency for the ‘general water quality’ of a groundwater body as a whole is based on a comparison of monitoring data with quality standards and threshold values. Member States established different national approaches for the extent of acceptable exceedance of such values. Below the defined extent of acceptable exceedance, the groundwater body is still in good status. Approaches include the number of monitoring sites (10 Member States) and the affected (weighted) area (12 Member States). No Member State calculated the affected groundwater body by volume. Expert judgment or ‘other methods’ were also reported by 5 Member States without further specifying the underlying criteria. Some Member States applied different methods in their RBDs and in some RBDs this calculation was not necessary as no monitoring site exceeded any quality standard or threshold value.

Associated surface water bodies and groundwater dependent terrestrial ecosystems need to be considered when posing a risk of not achieving good chemical status in the groundwater body. In total 3 204 groundwater bodies of 22 Member States are linked with associated aquatic ecosystems. Diminution of the status of associated surface water bodies was reported to be considered by 21 Member States, even if no such ecosystem is related to any groundwater chemical risk. Some Member States did not consider the ecosystems in status assessment but there is also no risk related and, for a few Member States, where risk is evident, consideration of surface waters in chemical status assessment is missing.

In total 3 370 groundwater bodies of 24 Member States are linked with groundwater dependent terrestrial ecosystems. Damage to groundwater body dependent terrestrial ecosystems was reported to be considered by 15 Member States, even if no such ecosystem is related to any groundwater chemical risk. Several Member States did not consider these ecosystems in status assessment but there is also no risk related and, for a few Member States, where risk is evident, consideration of groundwater dependent terrestrial ecosystems in chemical status assessment is missing.

Methodology for threshold value establishment

The establishment of groundwater threshold values needs to consider all substances posing risk, all substances listed in Annex II of the Groundwater Directive, the natural chemical composition of groundwater (natural background level) and the needs of the relevant receptors of the groundwater (e.g. human use, ecosystems).

In total, about 170 substances/indicators were reported as posing risk and many of these are pesticide substances. Up to nine Member States did not establish groundwater threshold values for all these substances causing risk within their territory. This is often true for pesticide substances, but for these substances, the Groundwater Directive foresees a general quality standard of 0.1µg/l. For all other substances where there is neither a EU-wide quality standard (nitrate and pesticides) nor a nationally set threshold value, then the Member State is not able to assess the status of a groundwater body at risk in a consistent way.

Most Member States (22) considered natural background levels when establishing threshold values, while five considered elevated natural substances concentrations at a later stage during status assessment. Four Member States considered natural background levels in a different way or they did not report details about the consideration of background levels in the establishment of threshold values. In seven Member States, different approaches were applied for their different RBDs.

Trends assessment

Twenty-four Member States reported that trend assessment has been performed for each RBD and methodologies are available, three Member States performed trend assessment at least partially and Greece did not perform a trend assessment. Additional trend assessments (required by the Article 5.5 GWD to assess the impact of existing plumes of pollution) were reported by three Member States for all of their RBDs and by 5 Member States for a subset. Significant and sustained upward trends were identified for 58 pollutants. For nitrate, significant upward trends were detected in 19 Member States for 260 groundwater bodies representing about 6% of the total groundwater body area. Other substances with frequent upward trends are chloride, sulphate and pesticides.

Twenty-four Member States reported that a methodology for trend reversal assessment is available for at least a subset of their RBDs, four Member States did not report on trend reversal. Trend reversals were reported for 68 pollutants by 10 Member States, mainly for nitrates (375 groundwater bodies), ammonium (310), sulphates (291) and chlorides (284).

Main changes in implementation and compliance since 1st cycle

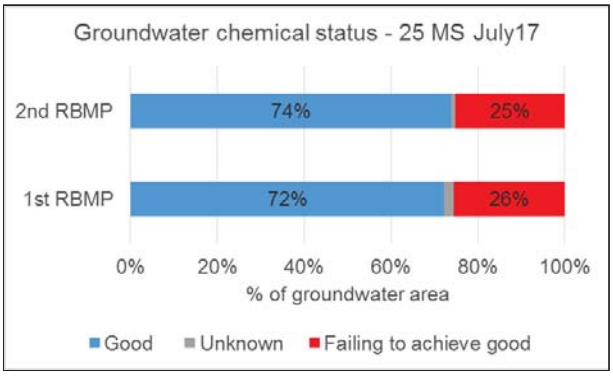
Nineteen Member States reported that they had re-delineated a more or less significant number of their groundwater bodies. In total about 19% of the groundwater bodies which were reported in the second RBMPs are new and 81% remained unchanged. Several Member States reported the improvement of the chemical status assessment methods, the development of trend assessment methods, changed threshold values and the increased confidence in the assessment results by the increased availability of monitoring data.

Changes in surveillance and operational monitoring: Overall, efforts in surveillance monitoring were reduced. Four Member States kept there 100% coverage of groundwater bodies and more than ten Member States increased the percentage of monitored groundwater bodies but two Member States reduced their monitoring efforts. Grouping of groundwater bodies is applied in about one third of the Member States. However, in the majority of Member States with incomplete coverage of surveillance monitoring, grouping is not applied and consistency with the WFD requirement on full coverage of groundwater bodies by surveillance monitoring is not described.

Operational monitoring was reduced in some Member States (e.g. Denmark, Slovakia, Romania, the United Kingdom), two Member States (Poland, Luxembourg) kept the monitoring at the same level as in the first cycle, while more than ten Member States increased their monitoring efforts. Changes in operational monitoring between reporting cycles need to be seen in close relationship with the groundwater bodies being identified at risk of failing good chemical status. Overall, in half of the Member States, the number of groundwater bodies at risk is higher than the number of groundwater bodies subject to operational monitoring while only two Member States (Belgium and Malta) have full coverage of the groundwater bodies.

The improvement of groundwater chemical status is very minor since the first cycle RBMPs. The number of groundwater bodies achieving good status increased by 1% from 80% to 81% which corresponds to an increase from 72% to 74% in terms of the represented total groundwater body area. Half of this increase is due to the fact that the area at unknown status has more than halved. This slight increase in good status and the reported expected achievement of good status for most of the groundwater bodies by 2027 points to the long time-lag between the implementation of measures and their effectiveness in groundwater; hence, the importance of correctly classifying groundwater bodies status and timely targeting the appropriate measures.

Figure 5: Groundwater chemical status of groundwater bodies reported in first and second RBMPs in terms of groundwater area



Note: *Proportion of groundwater area in good and failing to achieve good chemical status. Total groundwater area (EU25) is 4.3 million km².*
Source: *Preliminary results based on WISE reporting 2016, including data from 25 Member States (EU28 except Greece, Ireland and Lithuania).*
Source of figure: EEA SoW report 2018

Note: The total area of GWBs in Europe is 4.34 million km². While this figure might seem extremely large (the whole EU surface is about 4,3 km²), it is correct as the different layers of delineated and reported groundwater bodies have been considered for calculating the total.

For many Member States and groundwater bodies the direct comparison between the first and the second RBMPs might be difficult due to changes in assessment methodologies, increased consideration of ecosystems (which was quite low in the first plans), changed threshold values and the re-delineation of groundwater bodies. Overall, the confidence in the status results has increased.

Compared to the first cycle RBMPs the consideration of groundwater associated aquatic and groundwater dependent terrestrial ecosystems increased dramatically. Almost all Member States reported the existence of such ecosystems and only few Member States did not consider them in status assessment although risk is related to them.

Compared to the first cycle RBMPs, where available time series were often too short, trend assessment is now commonly applied. In the second RBMPs, even trend reversal assessment is widely applied, which usually requires longer time series than trend assessment.

5.6.2 Conclusions

Most groundwater bodies have been assessed, and for only very few the chemical status is unknown. Overall, the confidence in the status results is relatively high.

Due to the reported re-delineation of a significant number of groundwater bodies, improvements of the status assessment methods and changed threshold values, comparisons between both reporting cycles need to be made carefully.

Overall, groundwater chemical monitoring did not improve since the first cycle RBMPs. In contrary, two Member States reduced the coverage of groundwater bodies by surveillance monitoring. A significant number of groundwater bodies is still without chemical monitoring sites and the partially reported grouping of groundwater bodies for monitoring purposes does not fully justify the absence of monitoring. Therefore, there is still an inconsistency with the WFD requirement on groundwater chemical monitoring. Following the clarification from the Member States, the monitoring of the WFD core parameters is partly implemented for the United Kingdom, Italy, Belgium, France, while it is complete for about seventeen Member

States. One Member State i.e. Finland has very limited monitoring of the WFD core parameters.

Not all groundwater bodies which were identified at risk of failing good chemical status are subject to operational monitoring and also not all substances causing risk are fully covered. As with surveillance monitoring the partially reported grouping of groundwater bodies cannot completely justify the absence of operational monitoring at in total 669 groundwater bodies at risk. Therefore, there is evidence of inconsistency with the WFD requirement on groundwater chemical monitoring.

About 74% of the total groundwater body area is at good groundwater chemical status. The overall chemical status of groundwater bodies improved only very little since the first cycle. Also the reported expected achievement of good status for most of the groundwater bodies by 2027 or beyond 2027 demonstrates the long time-lag between the implementation of measures and their effectiveness in groundwater.

The consideration of groundwater associated aquatic and groundwater dependent terrestrial ecosystems improved significantly. In almost all Member States such ecosystems were identified and commonly considered in status assessment if risk was related to them.

Still, not all Member States (e.g. Spain) have established threshold values for all substances/indicators posing a risk of failing good status.

Trend assessment is now commonly applied in all Member States, in few cases only covering a subset of RBDs.

5.6.3 Recommendations

- Operational monitoring must be ensured for all groundwater bodies identified at risk.
- Monitoring of core parameters must be reported by Member States.
- Grouping methodologies for monitoring and status assessment is not always clear, and thus the absence of monitoring sites cannot be justified.
- Member States should set threshold values for all substances/indicators posing a risk of failing good status, and should clearly describe how natural background levels have been considered in their establishment.
- Some Member States still need to develop and apply trend reversal methodologies.

5.7 Designation of HMWBs and AWBs and definition of GEP

5.7.1 Introduction

Designation of HMWBs and AWBs

The WFD aims to bring all water bodies to GES by 2015. Measures have to be identified and implemented for impaired water bodies to improve their conditions. Not all water bodies, however, can be brought to a GES which refers to only slight changes compared to natural undisturbed conditions, since important water uses would otherwise be significantly affected. Many water bodies have been heavily modified in their physical structure to serve various uses including navigation, flood protection, hydropower, or agriculture. In many cases, it is not viable nor desirable from a socio-economic perspective to abandon such uses and to remove the physical modifications which affect the water bodies. Member States can, thus, designate such water bodies as HMWBs or AWBs whose environmental objective is GEP instead of GES, according to WFD Article 4(3).

Some of the key aspects which should be considered in the designation of HMWB are recalled below:

- HMWB should be water bodies that have undergone significant hydro-morphological alterations such that the water body is substantially changed in character (WFD Article 2(9)). In general, these hydro-morphological alterations should be long-term and non-reversible, and impact both morphological and hydrological characteristics.

- The designation process needs to include a clear understanding of the expected failure of good status due to hydro-morphological changes. Therefore, the proper assessment of ecological status is a prerequisite for HMWB designation. If GES is achievable, designation as HMWB is not justified.

- Restoration measures to achieve GES need to be identified (changes to the hydro-morphological characteristics of the water body which would be necessary for achieving GES). For HMWB to be designated, these restoration measures should have significant adverse effects on: (i) the wider environment, (ii) navigation, including port facilities, or recreation, (iii) activities for the purpose of which the water is stored, such as drinking water supply, power generation or irrigation, (iv) water regulation, flood protection, land drainage, (v) other equally important sustainable human development activities (WFD Article 4(3)(a)). The reasons and criteria for judgements on significance should be made clear.

- The beneficial objectives served by the modified characteristics of the water body cannot, for reasons of technical feasibility or disproportionate costs, reasonably be achieved by other means, which are a significantly better environmental option (WFD Article 4(3)(b)).

- HMWB and AWB are a specific water body category with their own classification scheme and objective, namely GEP. While GES requires the implementation of restoration measures to reach the environmental objectives, reaching GEP requires the implementation of mitigation measures so as to improve the overall environmental condition of the water bodies.

- HMWB and AWB are not a type of exemption. Exemptions under WFD Articles 4(4), 4(5), 4(6) and 4(7) may also apply to HMWB and AWB, as they apply to natural water bodies.

- HMWB designation refers to existing modifications. Any new modification with potential significant effect on the ecological status of the water body needs to be handled as a possible exemption through WFD Article 4(7) if the conditions are met. Therefore, designation of HMWB in view of future modifications is not in line with the WFD.

- The methodology and specific criteria for HMWB designation (application of all relevant steps according to CIS HMWB guidance number 4[91]) should be clearly explained in the RBMPs.

In addition, according to WFD Article 4(3), the designations of HMWB and AWB and the reasons for them shall be specifically mentioned in the RBMPs and reviewed every six years for each new WFD planning cycle.

The WFD takes a very similar approach to AWBs and HMWBs. AWB must have been created by the same specified uses listed in Article 4(3)(a). The CIS Guidance document no. 4 interprets an AWB "as a surface water body which has been created in a location where no water body existed before and which has not been created by the direct physical alteration or movement or realignment of an existing water body". As in the case of HMWB, the environmental objective of AWB is GEP.

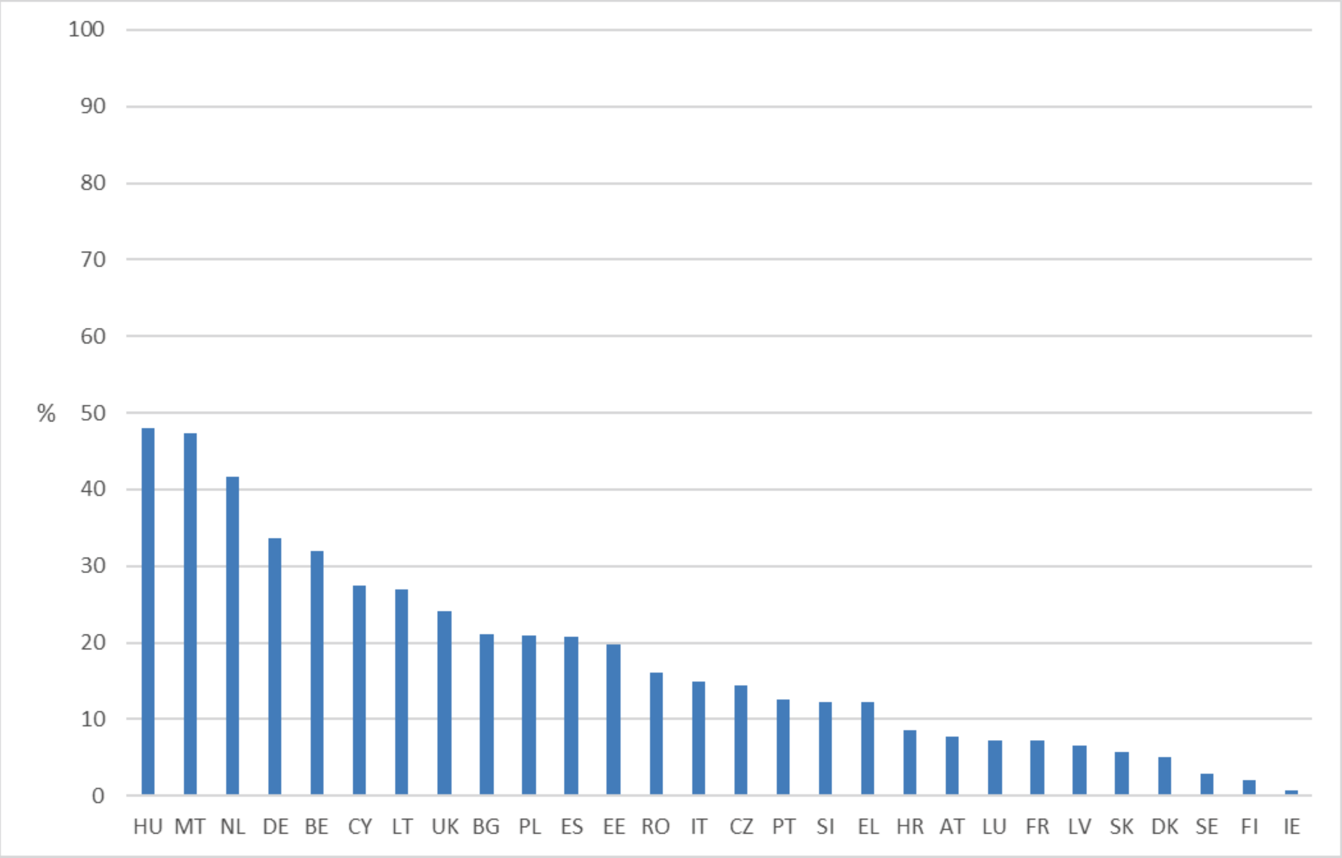
[91] CIS Guidance Document no.4. Identification and Designation of Heavily Modified and Artificial Water Bodies. Available online: https://circabc.europa.eu/sd/a/f9b057f4-4a91-46a3-b69a-e23b4cada8ef/Guidance%20No%204%20-%20heavily%20modified%20water%20bodies%20-%20HMWB%20(WG%202.2).pdf

According to the assessment of the first RBMPs, the designation of HMWB is one of the key elements of the WFD. In the first RBMPs, HMWB were designated to a significant extent in Member States (approximately 12% of surface water bodies with an additional 4% designated as AWB), reflecting the amount of modifications that took place historically in Europe.

Assessment of implementation and compliance with WFD requirements in 2nd cycle

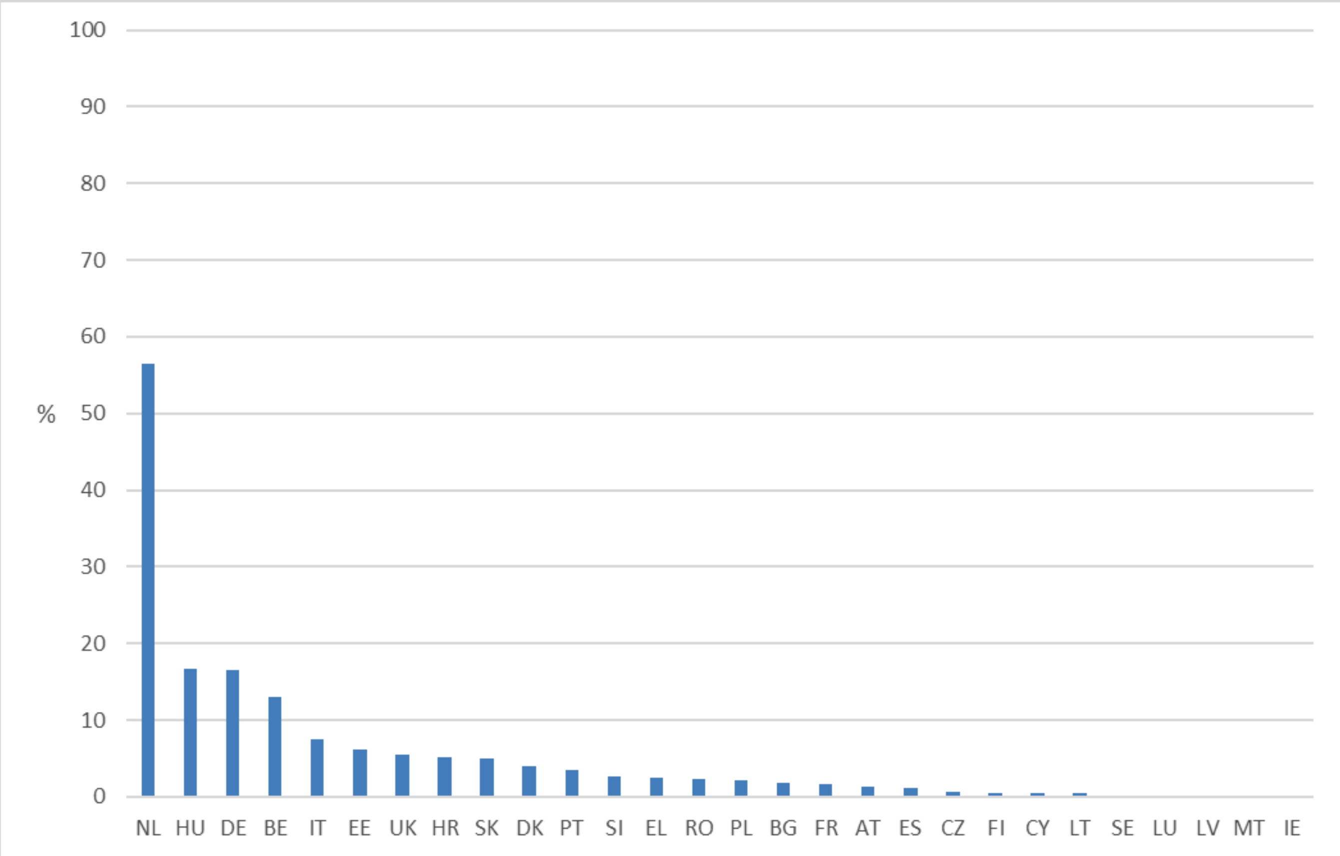
In the second RBMPs, approximately 13% of European surface water bodies are designated as HMWB and 4% as AWB. The extent of designation varies across Member States, with some States designating more than 30% of their water bodies as heavily modified (such as Hungary, Malta, Germany, and the Netherlands), while other States designate less than 5% of their water bodies as heavily modified (such as Finland and Sweden) and even less than 1% (such as Ireland). The extent of designation of AWB is high in the Netherlands (more than 50% of surface water bodies), but in most Member States with some exceptions is relatively low between 0% and 10%.

Figure 1 Designated HMWBs in the EU Member States



Source: WISE reporting 2016

Figure 2 Designated AWBs in the EU Member States



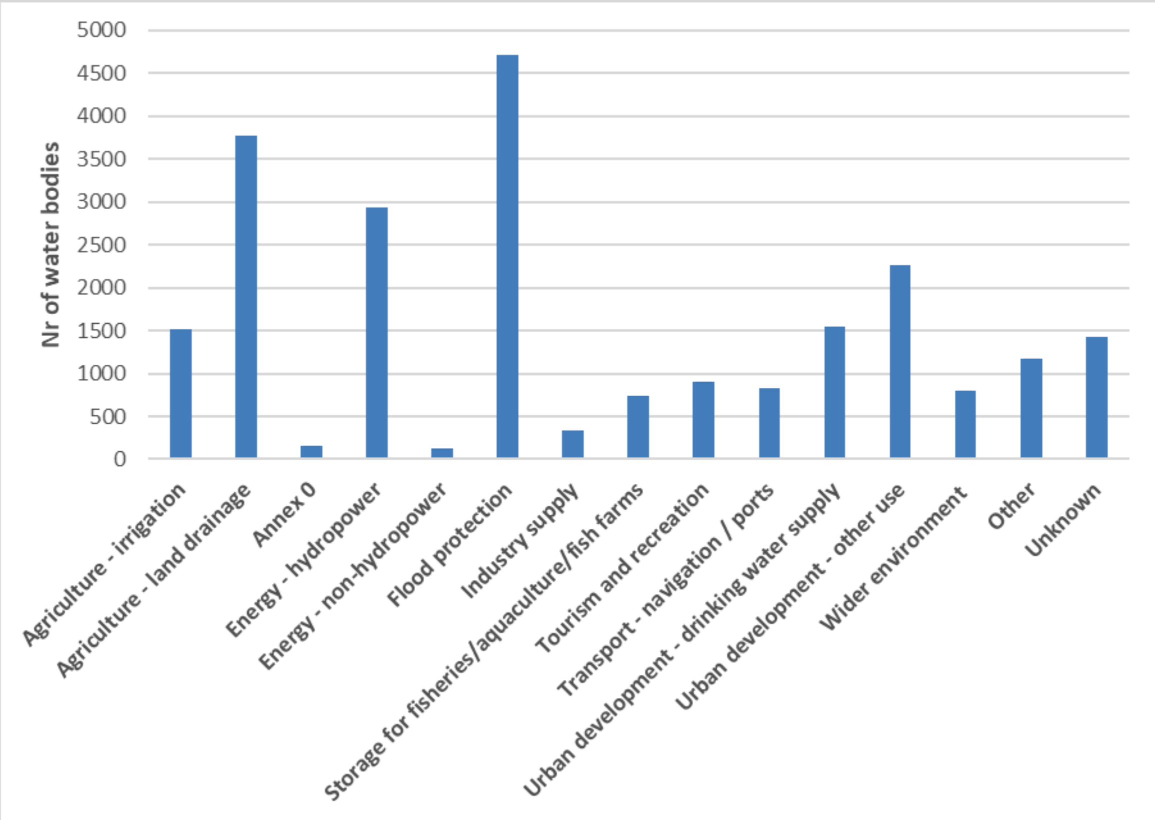
Source: WISE reporting 2016

Main activities and physical alterations due to which HMWB are designated

Flood protection, land drainage for agriculture and hydropower are the human activities (water uses) due to which the highest number of water bodies is designated as HMWB across the EU, followed by urban development (urban use other than drinking water supply) and storage for drinking water and irrigation[92]. For a relatively high number of HMWB, the water activity for which they are designated is either unknown or has been reported as "other" (i.e. not further specifying the water use categories in the WISE reporting).

[92] The pre-defined list of water uses for HMWB in WISE is: Agriculture - land drainage; Agriculture - irrigation; Energy - hydropower; Energy – non-hydropower; Storage for fisheries/aquaculture/fish farms; Flood protection; Industry supply; Tourism and recreation; Transport - navigation / ports; Urban development - drinking water supply; Urban development - other use; Wider environment - nature protection and other ecological uses; Other; Unknown.

Figure 3 Activities for which water bodies are being designated as HMWBs

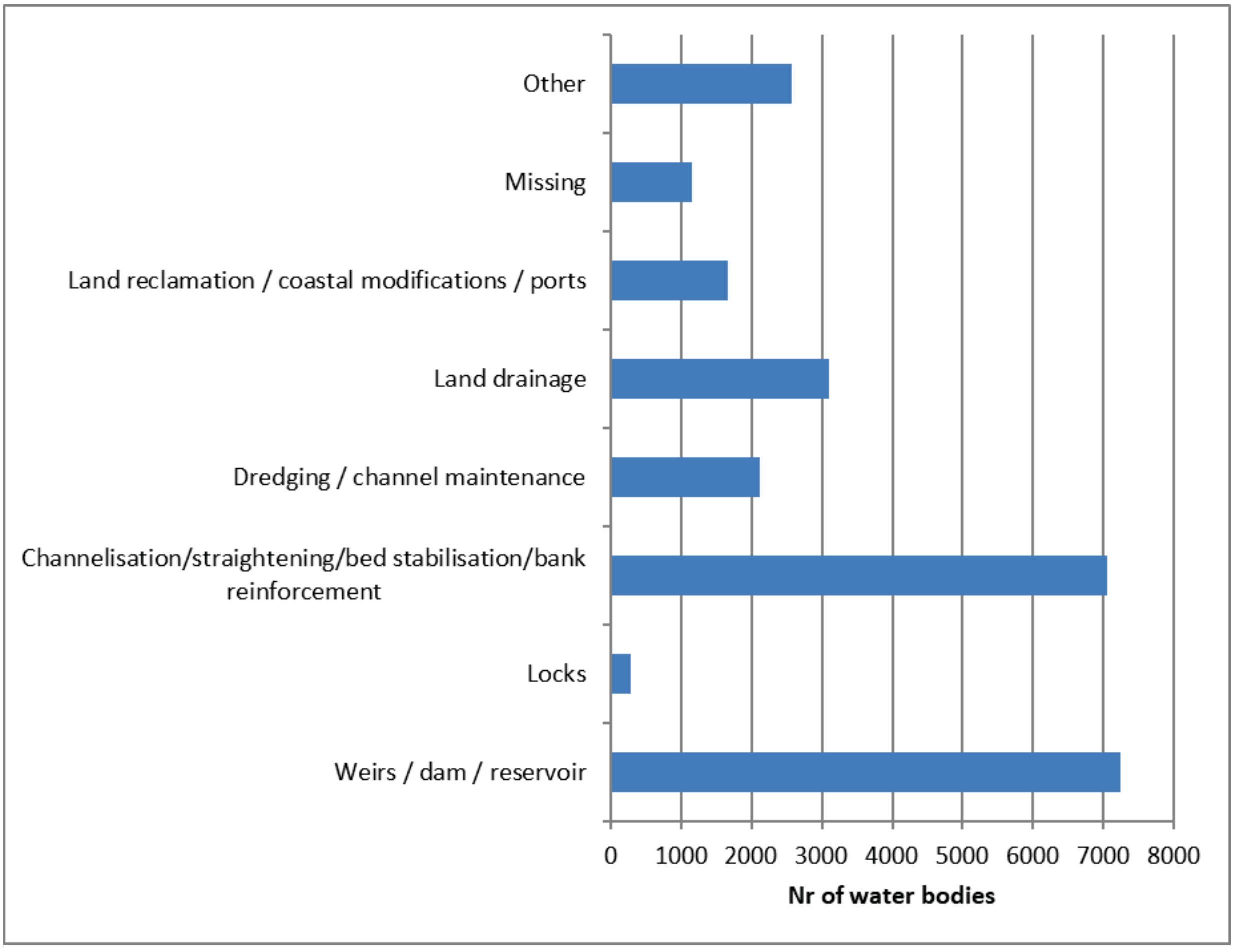


Source: WISE reporting 2016

Weirs/dams/reservoirs and channelisation/straightening/bed stabilisation/bank reinforcements are the main physical alterations affecting the highest number of designated HMWB in the EU. Dredging/channel maintenance, land drainage and land reclamation/coastal modifications/ports are physical alterations which affect a substantial number of HMWB in certain countries only.[93]

[93] The pre-defined list of physical alterations of HMWB in WISE is: Locks; Weirs / dam / reservoir; Channelisation / straightening / bed stabilisation / bank reinforcement; Dredging / channel maintenance; Land reclamation / coastal modifications / ports; Land drainage; Other

Figure 4 Types of physical modifications considered in the designation of HMWBs



Source: WISE reporting 2016.

Methodologies for designating HMWBs

A methodology for designating HMWB is described for the RBMPs of all Member States, with few exceptions, where a consistent description of the method is until now missing (such as in Denmark, Sweden and Slovakia). Nevertheless, the degree to which the reported methodologies of the Member States cover the main aspects of HMWB designation varies. The RBMPs of Member States with a relevant recommendation by the European Commission for the first RBMPs concerning their designation methodologies were assessed in more detail concerning these aspects.

Most Member State methodologies address the definition of "substantial changes in character" in order to consider a water body for designation as HMWB and report relevant criteria. Some approaches refer to simple presence of certain structures, e.g. presence of dams, dykes or ports, while other approaches are more "quantified' and connect criteria to specific thresholds, e.g. % of river water body impacted, for defining substantial changes in character.

The designation tests concerning the assessment of significant adverse effects of restoration measures on the use or wider environment (Article 4(3)(a)) and the assessment of other means to deliver the beneficial objectives of the modifications (Article 4(3)(b)) are less adequately covered in the reported Member State methodologies. Relevant descriptions of how to do such assessments were only found in about two thirds of the Member States assessed in detail, while for one third, no relevant information is provided in the methodologies for designating HMWB. Only few Member States provide information on specific criteria used to assess significant adverse effects of restoration measures, such as Austria, and the criteria reported are mainly of qualitative nature, similar to the first RBMPs.

Furthermore, for the majority of Member States, no information was found reported in the second RBMPs on the details of the outcome of the designation tests of significant adverse effects and "other means" for individual water bodies (e.g. in Czech Republic, Germany and Hungary). The information provided is in most cases of general nature, applicable to the national or regional level. Only few Member States provide information on specific criteria used to assess significant adverse effects of restoration measures on the use or wider environment. The criteria reported are mainly of qualitative nature, instead of quantified ones. This situation is similar to the first RBMPs.

Main changes in implementation and compliance since 1st cycle

The EU average share of surface water bodies designated as HMWB and AWB is similar between the second and first RBMPs (ca. 12-13% and 4% respectively). Some differences are noted only in individual Member States, while for the majority of countries, the extent of designated HMWB and AWB has remained the same. In some countries, the share of designated HMWB has increased, while in others, the share of designated HMWB decreased since the first cycle.

Most countries clearly report that they have reviewed the designation of HMWB and AWB for the second planning cycle; this involves an assessment of whether existing HMWB and AWB still fulfil the relevant criteria, and whether water bodies formerly not designated should be designated as HMWB or AWB for the new cycle.

The degree to which the reasons for changes in the extent of designations are explained varies in the second RBMPs between Member States. In the RBMPs of some Member States, no explanations of the changes are provided, even though it is stated that designations have been reviewed. Other Member States provide explanations, even though these may not be detailed at individual water body level.

The main reasons for changes in the extent of designating HMWB and AWB since the first RBMPs, as reported by Member States, are:

- Improved data available from new investigations and monitoring in hydro-morphological and biological terms
- Updated analysis of hydro-morphological pressures and updated assessment of status
- Redelineation of water bodies (for example, changes in the number of HMWB due to the merging of water bodies)
- Further knowledge acquired on the feasibility of restoration actions or other means which may have become available to provide equivalent benefits to those of the physical modifications of the HMWB
- Finalisation of designations of water bodies that were only provisionally identified as HMWB or AWB in the first RBMPs
- Designations of new HMWB as a result of new developments that have been permitted since the first RBMPs
- De-designations of HMWB into natural water bodies, because of new assessments indicating that the water bodies may achieve GES
- Changes in the methodology for designating HMWB (for example, further uses considered in the designation may have led to an increase of HMWB)

For several countries, the methodologies for designating HMWB and AWB are the same as those used for the first RBMPs. However, for certain countries, updates in the methodologies used are explicitly reported, while in other countries, new methods or guidelines for designation have been published since the first cycle.

In some countries, assessments to complete the designation of HMWB and AWB are still ongoing and further changes to the extent of designation may take place during the second cycle.

Definition of GEP for HMWB and AWB

Within the WFD implementation, the status of HMWB and AWB needs to be assessed in terms of achieving at least GEP as this is defined in Annex V of the Directive. A water body shows a GEP when there are slight changes in the values of the relevant biological quality elements as compared to the values found at Maximum Ecological Potential (MEP). The MEP is considered as the reference conditions for HMWB and AWB, and is intended to describe the best approximation to a natural aquatic ecosystem that could be achieved given the hydro-morphological characteristics that cannot be changed without significant adverse effects on the specified use or the wider environment.

The definition of ecological potential for HMWB and AWB has been a subject of long discussions between Member States and the Commission in the context of the CIS. Defining ecological potential is a challenging and complex subject in the WFD implementation, which needs to be defined on the basis of a sound methodological approach in order to set appropriate environmental objectives for the numerous HMWBs and AWBs in Europe.

An Appendix to CIS Guidance document number 4 is currently in preparation to provide more detailed guidelines on the establishment of GEP and MEP for HM and AW bodies.

Until the second RBMPs, the following two approaches had been put forward and discussed on EU level for the definition of GEP.

- **Reference-based approach** (based on the CIS Guidance Document number 4): This approach is based on biological quality elements as illustrated in CIS Guidance number 4[94]. The MEP for HMWB relates to the values of biological quality elements after all mitigation measures have been implemented that do not have a significant adverse effect on the use. GEP is defined as only slight changes from those values at MEP. GEP represents a state in which the ecological potential of a water body is falling only slightly short of the maximum it could achieve without significant adverse effects on the wider environment or on the relevant water use or uses. An assessment of disproportionate costs of the mitigation measures should not be considered (as these are considered when applying exemptions).
- **Mitigation measures approach** (alternative Prague approach): The alternative Prague approach[95] takes a different route and bases the definition of GEP on the identification of mitigation measures. Starting from all measures that do not have a significant adverse effect on the water use, those measures are excluded that, in combination, are predicted to deliver only slight ecological improvement. GEP is then defined as the biological

[94] CIS Guidance Document no.4. Identification and Designation of Heavily Modified and Artificial Water Bodies. Available online: https://circabc.europa.eu/sd/a/f9b057f4-4a91-46a3-b69a-e23b4cada8ef/Guidance%20No%204%20-%20heavily%20modified%20water%20bodies%20-%20HMWB%20(WG%202.2).pdf

[95] See Annex II of Common Implementation Strategy for the Water Framework Directive 2006: Good Practice in managing the ecological impacts of hydropower schemes; Flood protection works; and works designed to facilitate navigation under the Water Framework Directive. 30 November 2006.

values that are expected from implementing the remaining identified mitigation measures. As in the first approach, an assessment of disproportionate costs of the mitigation measures should not be considered. A key difference to the first approach is that the GEP is derived directly from the mitigation measures, and not indirectly from the specification and prediction of biological quality elements at MEP.

Assessment of implementation and compliance with WFD requirements in 2nd cycle

According to the WISE reporting, GEP has been defined in almost all Member States. In some Member States though, it has only been defined for some but not all RBDs with designated HMWB or AWB. In a few Member States, GEP is reported as not defined yet in the second RBMPs. In one case, there are currently projects ongoing to develop a GEP methodology. In another, a national methodology for GEP has not yet been published.

In the second RBMPs, about one third of the Member States define GEP on the basis of the reference-based approach and one third of the Member States on the basis of the mitigation measures approach. In several Member States, either a hybrid approach combining elements of the two methods in all their RBDs is used or they use different approaches across the regions or RBDs on their territory. In one country, the approach used is not specified as one of the approaches listed in WISE; different criteria to assess ecological potential were used, which do not correspond to any of these approaches.

Most methodologies of Member States for defining GEP are established at national level. In terms of the water categories addressed, most reported methodologies describe the definition of GEP for rivers, less methodologies refer to lakes and coastal waters while the category less often addressed by the reported methodologies are transitional waters. In a few Member States, the methods for GEP establishment treat reservoirs separately from lakes and rivers.

With regards to the level at which GEP has been defined, more than half of the Member States report to have defined GEP at the water body level (a few of these countries have done so for part of their RBDs). Several Member States have defined GEP for groups of HMWB and AWB of the same use/physical modification (a few of these countries have used this approach for part of their RBDs). A few Member States report to have used another approach (for all or some of their RBDs).

GEP definition in terms of biology

GEP is reported as defined in terms of biology in most Member States, which have defined GEP in the second RBMPs. In some Member States, GEP is reported as not defined in terms of biology, but also in the case of a few other countries, no clear information could be found in their RBMPs on how actual values for biological quality elements (BQEs) are estimated for GEP.

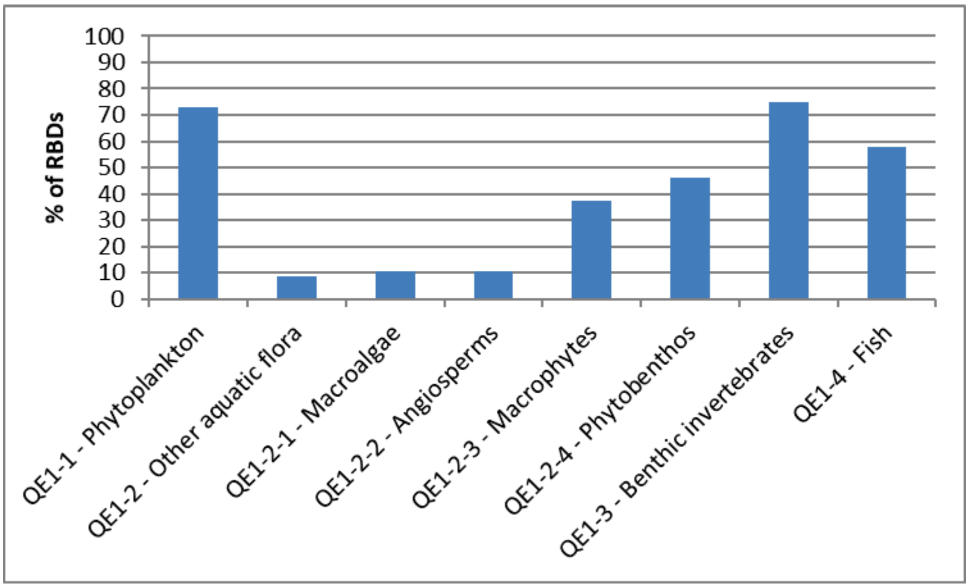
The BQEs for which biological values have been derived for MEP and GEP in the majority of RBDs are phytoplankton, benthic invertebrates and fish (respectively in 73%, 75% and 58% of the RBDs in which GEP is defined in biological terms). Biological values for phytobenthos and macrophytes for MEP and GEP have been derived in less RBDs (respectively in 46% and 38% of the RBDs).

Most Member States report that the establishment of values of BQEs for GEP is based on assessment methods which are similar to those used for GES of natural water bodies, but often using lower thresholds to distinguish between classes of “good” and “moderate”. A comparison between GEP and GES has been carried out in half of the Member States, which have defined GEP. In another few Member States, such a comparison was done in some but not all of their RBDs where GEP is defined, while no such comparison was done in several Member States.

It is also noted that, according to WISE, for the second RBMPs, almost all Member States (with few exceptions) report to have one or more biological quality element assessment methods in place, which are sensitive to hydrological and/or morphological changes. Such methods have been reported for various BQEs in the different water categories (rivers, lakes, coastal and transitional waters).

Estimations of BQE values can be based on available data and monitoring, combined with expert judgement. Some countries report that biological values have only been derived in case monitoring data are available; in cases of lack of biological data, ecological potential is defined mainly in hydro-morphological terms.

Figure 5 BQEs for which biological values have been derived for MEP and GEP



Source: WISE reporting 2016. Note: The total number of RBDs in which GEP is reported as defined in biological terms is 104.

Table 1: Key elements of GEP definition in the second RBMPs of the Member States

Member State	**Approach for GEP definition**	**GEP reported as defined in terms of biology**	**Level at which GEP is defined**
Austria (AT)	Hybrid approach	Yes	At water body level
Belgium (BE)	Mitigation measures approach in four RBDs in Walloon Reference-based approach in one RBD (Brussels region) Hybrid approach in two RBDs in Flanders	Yes	For groups of HMWB/AWB in four RBDs in Walloon At water body level in Brussels region and Flanders
Bulgaria (BG)	Reference-based approach	Yes	At water body level
Cyprus (CY)	Mitigation measures approach	No	At water body level
Czech Rep (CZ)	Reference-based approach	Yes	Another approach
Germany (DE)	Reference-based approach in three RBDs Hybrid approach in seven	Yes	For groups of HMWB/AWB in eight RBDs

Member State	Approach for GEP definition	GEP reported as defined in terms of biology	Level at which GEP is defined
	RBDs		At water body level in two RBDs
Denmark (DK)	Reference-based approach	Yes (in three RBDs; for one RBD, GEP is not defined)	At water body level
Estonia (EE)	Reference-based approach	Yes	For groups of HMWB/AWB
Greece (EL)	GEP not defined	GEP not defined	Not applicable
Spain (ES)	Reference-based approach in 18 out of 22 RBDs Hybrid approach in four RBDs	Partially (in 20 of 22 RBDs)	At water body level in twelve RBDs, for groups of HMWB/AWB in six RBDs
Finland (FI)	Mitigation measures approach	No	At water body level
France (FR)	Hybrid approach	Yes (in 11 RBDs; for two RBDs with designated HMWB/AWB, GEP is not defined)	At water body level
Croatia (HR)	GEP not defined		
Hungary (HU)	Mitigation measures approach	No	At water body level
Ireland (IE)	Mitigation measures approach	Yes	At water body level
Italy (IT)	GEP not defined		
Lithuania (LV)	Mitigation measures approach	Yes	For groups of HMWB/AWB
Luxembourg (LU)	Reference-based approach	Yes	At water body level

Member State	Approach for GEP definition	GEP reported as defined in terms of biology	Level at which GEP is defined
Latvia (LV)	Not specified	Yes	Another approach
Malta (MT)	Mitigation measures approach	Yes (only for coastal water bodies)	At water body level
The Netherlands (NL)	Hybrid approach	Yes	At water body level
Poland (PL)	Reference-based approach	Yes	For groups of HMWB/AWB in four RBDs Another approach in five RBDs In practice, depends on water category (rivers: for groups of HMWB/AWB; lakes: at national level; transitional and coastal waters: at water body level)
Portugal (PT)	Hybrid approach	Yes (in eight RBDs; for two RBDs, GEP is not defined)	Defined for groups of HMWB/AWB
Romania (RO)	Hybrid approach	Yes	Another approach
Sweden (SE)	Mitigation measures approach	No	At water body level
Slovenia (SI)	Reference-based approach	Yes	At water body level
Slovakia (SK)	Reference-based approach	Yes	For groups of HMWB/AWB
United Kingdom (UK)	Mitigation measures approach in England, Wales and Scotland Hybrid approach in	No	At water body level

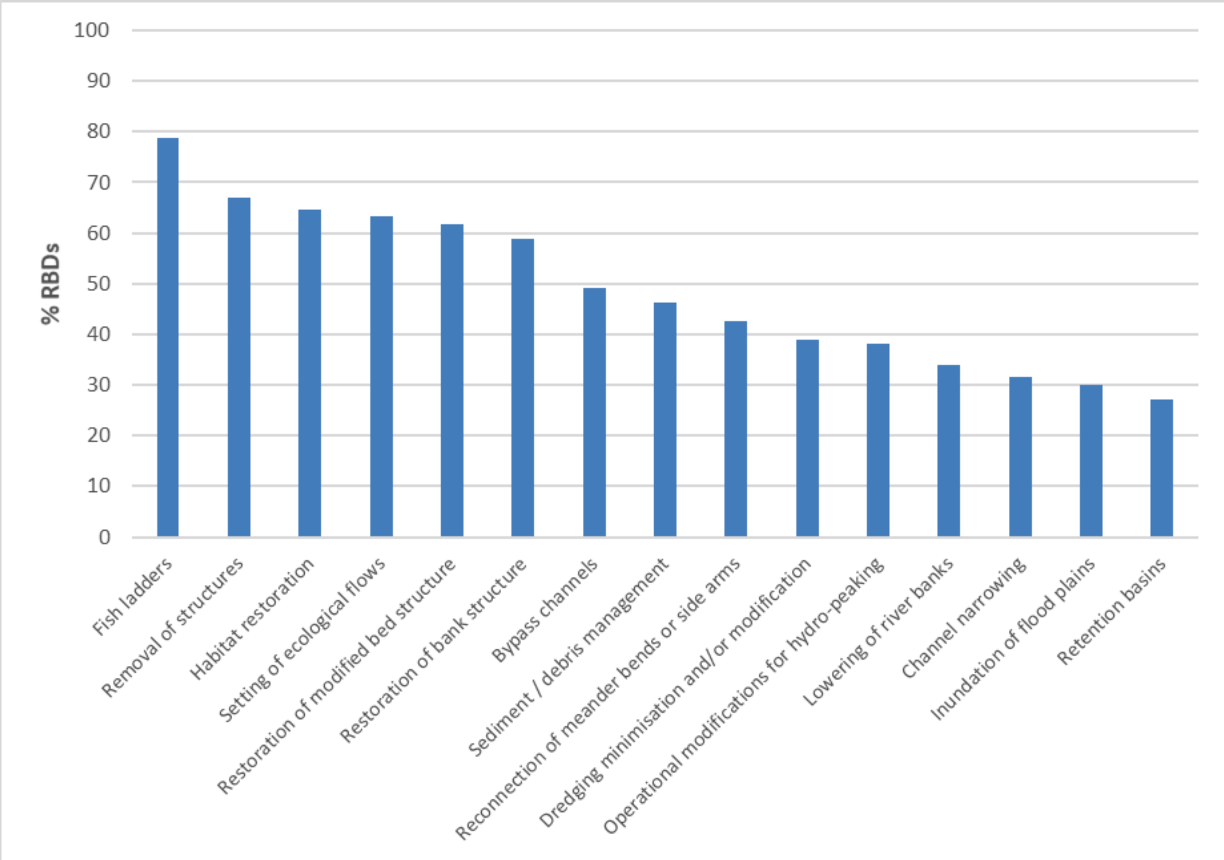
Member State	Approach for GEP definition	GEP reported as defined in terms of biology	Level at which GEP is defined
	Northern Ireland		

Source: WISE reporting 2016 and additional information from the published RBMPs.

Mitigation measures for defining GEP

Mitigation measures for defining GEP are reported in almost all Member States, where GEP has been defined. Measures related to longitudinal continuity and fauna migration, habitat restoration and setting of ecological flows are the most commonly reported mitigation measures (Figure 6). No mitigation measures for defining GEP were reported for a few. Mitigation measures used to define GEP need to be linked to specific ecological improvements in order to set the environmental objective of HMWB and AWB in a way which is consistent with the WFD. In the majority of the first RBMPs, there was no explanation of the expected ecological improvements, while, on some RBMPs, there was some general information on ecological improvements but the ecological benefits of individual measures remained unclear. This has not been significantly improved in the second RBMPs, as descriptions of the ecological changes that the mitigation measures are designed to achieve were found in the plans of only less than a third of Member States (descriptions being mainly qualitative). In the RBMPs of more than half of the Member States, no such descriptions have been given, indicating a significant gap in this respect.

Figure 6 Mitigation measures for defining GEP



Source: WISE reporting 2016; Note: Percentage calculated with reference to the total number of RBDs (130) which reported mitigation measures for defining GEP and MEP.

Main changes in implementation and compliance since 1st cycle

In the first RBMPs, GEP was not defined at all or only in a very limited way in more than a third of Member States. Overall, progress is noted in this respect, as in the second RBMPs, GEP is reported as defined (or partly defined) in almost all Member States. Although there are still gaps in the methods of many Member States and specific CIS guidance on the process for establishing GEP is in development, several methodological improvements have been reported. Methodological improvements for the establishment of GEP in the second RBMPs are reported by a number of countries, and in some countries, new national methods have been developed since the first cycle.

One of the key improvements reported by Member States in the methodological developments of GEP definition since the first RBMPs is the inclusion of more biological quality elements in the assessment. In the first RBMPs, due to the lack of data and well-developed assessment methods, it was possible to only include few BQEs in the assessment of ecological potential.

Since the first cycle, the assessment methods for various BQEs have been reviewed and improved, therefore, the number of BQEs to assess the classification of ecological status and potential in different water categories has increased.

Nevertheless, the level of information provided on the ecological changes that the mitigation measures for defining GEP are designed to achieve remains limited, indicating a lack of progress in this respect since the first RBMPs. In addition, in one Member State although GEP was not defined, some elements of method for the classification corresponding to the Prague approach were reported for the second cycle.

5.7.2 Conclusions

For the majority of countries, the extent of designated HMWB and AWB has remained similar to the first RBMPs, while some differences (increase or decrease of the number of designated HMWB and AWB) are noted only in individual Member States. In the RBMPs of some Member States, no explanations of the changes are provided, even though it is stated that designations have been reviewed. Other Member States provide explanations, even though these may not be detailed at individual water body level.

A methodology for designating HMWB is described for the RBMPs of all Member States, with few exceptions. Nevertheless, the degree to which the reported methodologies of the Member States cover the main aspects of HMWB designation varies. Most Member State methodologies address the definition of “substantial changes in character” in order to consider a water body for designation as HMWB and report relevant criteria. However, descriptions of how to assess significant adverse effects of restoration measures on the use or wider environment and how to assess other means which are better environmental options were only found in about two thirds of the Member States assessed in detail.

For the majority of Member States, no information was found reported in the second RBMPs on the details of the outcome of the designation tests of significant adverse effects and “other means” for individual water bodies. The information provided is in most cases of general nature, applicable to the national or regional level. Only few Member States provide information on specific criteria used to assess significant adverse effects of restoration measures on the use or wider environment and the criteria reported are mainly of qualitative nature, similar to the first RBMPs.

In the first RBMPs, GEP was not defined at all or only in a very limited way in more than a third of Member States. In the second RBMPs, GEP is reported as defined (or partly defined) almost all Member States (reported as undefined only in very few Member States).

Methodological improvements for the establishment of GEP in the second RBMPs are reported by a number of countries, while in some countries, new national methods have been developed since the first cycle. One of the key improvements reported by Member States since the first RBMPs is the inclusion of more biological quality elements in the definition of GEP.

GEP is reported as defined in terms of biology in the majority of Member States, with only one fifth of countries reporting not to have done so in the second RBMPs. The BQEs for which biological values have been derived for MEP and GEP in the majority of RBDs are phytoplankton, benthic invertebrates and fish. Most Member States report that the establishment of values of BQEs for GEP is based on assessment methods which are similar to those used for GES of natural water bodies, but often using lower thresholds to distinguish between classes of “good” and “moderate”.

Mitigation measures for defining GEP are reported in most Member States, where GEP has been defined. Nevertheless, the level of information provided on the ecological changes that the mitigation measures for defining GEP are designed to achieve remains very limited, indicating little progress in this respect since the first RBMPs.

5.7.3 Recommendations

- Member States should continue the efforts to further improve the methodologies for the designation of HMWBs. Clear criteria of how to assess significant adverse effects of restoration measures on the use or wider environment and how to assess other means which are a significantly better environmental option should be developed. Generic and qualitative descriptions should be improved towards more transparent and traceable quantitative approaches.

- Member States should further improve the definition of GEP by including more biological quality elements. The objective of GEP needs to be clearly distinguishable from the application of exemptions.

5.8 Environmental Objectives and Exemptions

5.8.1 Introduction

The WFD defines environmental objectives in Article 4 and sets the aim for long-term sustainable water management. Article 4(1) defines the WFD general objectives to be achieved in all surface and groundwater bodies, i.e. good status or potential (for HM and AW bodies) by 2015, and introduces the principle of preventing any further deterioration of status. A number of exemptions to the general objectives are possible to be applied if specific conditions are met. Article 4(4) allows for an extension of the deadline for achieving good status beyond 2015, Article 4(5) allows for the achievement of less stringent objectives, Article 4(6) allows a temporary deterioration in the status of water bodies as a result of circumstances of natural cause or *force majeure,* and Article 4(7) sets out conditions in which deterioration of status or failure to achieve certain of the WFD objectives may be permitted for new modifications to the physical characteristics of surface water bodies, alterations to the level of groundwater, or deterioration from high to good status as a result of new sustainable human development activities. Furthermore, Articles 4(8) and 4(9) introduce two principles applicable to all exemptions and designation of heavily modified water bodies: the exemptions applied for one water body must not permanently exclude or compromise the achievement of the environmental objectives in other water bodies, and when exemptions are applied, at least the same level of protection provided for by existing EU law must be achieved.

The WFD provides the general and legally binding framework on exemptions. Guidance was elaborated to facilitate a better common understanding on the practical application. Further clarifications can be obtained in the CIS Guidance Document No. 20 on exemptions[96]. Since the publication of the second RBMPs, three further supporting documents have been elaborated and published, aiming to help and further clarify the application of exemptions. These include the CIS Guidance Document No. 36 further clarifying aspects of Article 4(7)[97], the technical document clarifying the application of WFD Article 4(4) time extensions in the 2021 RBMPs and practical considerations regarding the 2027 deadline[98] and the technical document on natural conditions in relation to WFD exemptions[99].

[96] CIS Guidance Document No. 20: Guidance on exemptions to the environmental objectives https://circabc.europa.eu/sd/a/2a3ec00a-d0e6-405f-bf66-60e212555db1/Guidance_documentN%C2%B020_Mars09.pdf

[97] Guidance Document No. 36: Exemptions to the Environmental Objectives according to Article 4(7) https://circabc.europa.eu/sd/a/e0352ec3-9f3b-4d91-bdbb-939185be3e89/CIS_Guidance_Article_4_7_FINAL.PDF

[98] Technical document on Clarification on the application of WFD Article 4(4) time extensions in the 2021 RBMPs and practical considerations regarding the 2027 deadline

Assessment of implementation and compliance with WFD requirements in the 2nd cycle

According to the EEA State of Water Report (2018), in 2015, around 40 % of surface water bodies were in high or good GES/potential and 38 % of surface water bodies were in good chemical status. Concerning groundwater, 74 % of EU groundwater bodies (by area) achieved good chemical status by 2015, while around 90 % of groundwater bodies were in good quantitative status.

A comparison of the first with the second RBMPs shows that for groundwater some improvement of the status (mainly quantitative) has been achieved between the first and the second cycle. For surface waters, the assessment of the second RBMPs shows that there has been progress in the status of single quality elements and single pollutants. For example, the status of some biological quality elements has improved from the first to the second cycle, whereas overall status is determined by the quality element(s) in the lowest status class hence not necessarily leading to an improvement of the overall status[100].

It should be noted that several changes between the first and the second cycle are outlined in many RBMPs, such as changes in water body delineation, changes in the methodologies applied, changes in the quality elements considered in the status assessments as well as changes in the legal requirements related to priority substances (for priority substances, see chapter 6.4). Further, new assessment methods for different quality elements have been developed and intercalibrated since the first RBMPs, allowing a better assessment of the status of waters. This has resulted in a marked reduction of water bodies with unknown status, a clearly improved confidence in status assessments in the second RBMPs, as well as a better understanding of the ecological, chemical and quantitative status, the pressures causing failure to achieve good status and the needed measures.

Due to these developments – and changes to water body delineation - many Member States have flagged that a direct comparison of the status between the first and second cycle is not fully possible. Further details on the assessment of status of surface water and groundwater are given in chapters 6.3, 6.4, 6.5 and 6.6 .

Expected good status in 2015, 2021, 2027 and beyond

https://circabc.europa.eu/w/browse/f6393a2a-87ba-4cb1-86e8-ff3178a1ac1f

[99] Technical document on Natural Conditions in relation to WFD Exemptions https://circabc.europa.eu/sd/a/cea9ffbb-2cf0-4c08-b421-b085893352a0/WD2017-2-2%20-%20Natural%20Conditions%20-%20Main%20document.pdf

[100] EEA (2018): European waters - Assessment of status and pressures 2018

In the second RBMPs, Member States have also indicated whether it is expected that water bodies will achieve good (or better) status by the end of 2015. This may differ from the most recently assessed status of the water body, due to the fact that the assessment of status will most likely be based on monitoring data from the period 2010-2014 and measures implementation was still ongoing. Therefore, the monitored status communicated in the second RBMPs may not necessarily reflect the expected status in the year 2015. In addition, for water bodies failing to achieve good status (in 2015), Member States have indicated in their reporting the year (2021, 2027 or beyond 2027) by when they are expected to achieve the WFD objectives.

The table below summarises this information on EU level, while separate tables are provided further below with more detailed information for ecological, chemical and quantitative status at Member State level.

Table 1: Status (ecological, chemical and quantitative) expected to be good (or better) in 2015 and the proportion expected to be in good status in 2021 and 2027. All surface water bodies (by count) and groundwater bodies (weighted by area).

	Ecological status/potential of surface water bodies	**Chemical status of surface water bodies**	**Chemical status of groundwater bodies**	**Quantitative status of groundwater bodies**
Expected to achieve good (or better) by end of 2015	44%	52%	74%	90%
Less stringent objectives already achieved	1%	19%	2%	1%
Expected to achieve good (or better) by end of 2021	21%	3%	3%	4%
Expected to achieve good (or better) by end of 2027	31%	22%	17%	4%
Expected to achieve good (or better) by beyond 2027	1%	1%	4%	1%
Unknown when objectives will be achieved	2%	3%	1%	1%

Source: WISE electronic reports.

Note: The percentages above have been calculated on the basis of the total number of water bodies, including water bodies with unknown current status.

Overall, the following observations can be made:

- 44 % of all surface water bodies were expected to be in high or GES or potential in 2015. The percentage of water bodies in high/good status or potential is expected to increase to 65 % and 96 % in 2021 and 2027, respectively.
- For chemical status, 52 % of surface water bodies were expected to be in good status in 2015; this is expected to increase to 55 % and 77 % in 2021 and 2027, respectively. For 21 % of surface water bodies (mainly corresponding to one Member State), the less stringent objectives set have been already achieved.
- 74 % of the area of groundwater bodies was expected to be in good chemical status in 2015; this is expected to increase to 77% and 94% in 2021 and 2027, respectively.
- 90 % of the area of groundwater bodies was expected to be in good quantitative status already in 2015; this is expected to increase to 94% and 98 % in 2021 and 2027, respectively.
- Only a few Member States reported that good status will be achieved after 2027 for a significant share of their water bodies or it is unknown when objectives will be achieved.
- Although the number of water bodies in unknown status has substantially been reduced since the first RBMPs, it is noted that in a few Member States, the share of surface water bodies in unknown ecological status or potential is still significant. In the case of chemical status of surface water bodies, there is still a high share of water bodies in unknown status in approximately a quarter of the Member States. In these cases, further clarification and information may be needed on how it is possible to indicate expected good status in 2015 for water bodies currently in unknown status.

It should be noted that information is often limited to judge whether the estimations on the timelines by several Member Status on reaching good status are realistic or not.

Table 2: Ecological status/potential of surface water bodies expected to be good (or better) in 2015 and the proportion expected to be in good status/potential in 2021 and 2027 at Member State level (count of water bodies).

MS	Expected to achieve good (or better) by end of 2015	Less stringent objectives already achieved	2016--2021	2022—2027	Beyond 2027	Unknown when objectives will be achieved
AT	47%			53%		
BE	27%		13%	1%		59%
BG	59%		20%	18%	2%	
CY	59%		13%	28%		
CZ	21%		5%	57%	17%	
DE	8%		11%	81%		
DK	51%		21%	28%		
EE	63%		17%	19%		
EL	64%		7%		29%	
ES	58%	2%	16%	21%	1%	1%
FI	81%		9%	10%		
FR	46%		20%	33%		
HR	46%		1%	1%		52%
HU	8%		7%	33%	51%	
IE	70%		5%	25%		
IT	45%	4%	22%	21%	1%	7%
LT						
LU	3%		34%	64%		
LV	21%		69%	10%		
MT	63%		11%			26%
NL	0%		12%	68%	20%	
PL	36%		47%	17%		
PT	53%		22%	22%		3%
RO	68%	1%	18%	13%		
SE	38%		40%	21%		
SI	62%			38%		
SK	70%			30%		
UK	38%	11%	8%	39%	3%	

Source: WISE electronic reports.

Note: The percentages above have been calculated on the basis of the total number of water bodies, including water bodies with unknown current status.

Table 3: Chemical status of surface water bodies expected to be good (or better) in 2015 and the proportion expected to be in good status in 2021 and 2027 at Member State level (count of water bodies).

MS	Expected to achieve good (or better) by end of 2015	Less stringent objectives already achieved	2016--2021	2022--2027	Beyond 2027	Unknown when objectives will be achieved
AT				100%		
BE	2%			1%		97%
BG	95%		1%	3%	1%	
CY	97%		1%	2%		
CZ	61%		1%	13%	24%	
DE				100%		
DK	99%		1%			
EE	98%			2%		
EL	71%		18%	11%		
ES	92%		3%	5%		
FI	50%			50%		
FR	82%		1%	17%		
HR	93%		1%	1%		5%
HU	46%			54%		
IE	99%		1%			
IT	76%		8%	7%		8%
LT						
LU				100%		
LV	95%			5%		
MT	53%					47%
NL	39%		9%	18%	34%	
PL	96%		1%	3%		
PT	26%		52%	16%		6%
RO	98%		1%	1%		
SE		98%	1%	1%		
SI	1%			99%		
SK	98%			2%		
UK	97%		1%	2%		

Source: WISE electronic reports.

Note: The percentages above have been calculated on the basis of the total number of water bodies, including water bodies with unknown current status.

Table 4: Chemical status of groundwater bodies expected to be good (or better) in 2015 and the proportion expected to be in good status in 2021 and 2027 at Member State level (by area).

MS	Expected to achieve good (or better) by end of 2015	Less stringent objectives already achieved	2016--2021	2022--2027	Beyond 2027	Unknown when objectives will be achieved
AT	98%			1%		
BE	37%		1%			62%
BG	55%			39%	6%	
CY	88%	8%			4%	
CZ	37%		2%	17%	44%	
DE	62%		2%	20%	16%	
DK	80%			20%		
EE	95%					5%
EL	85%			6%	11%	
ES	68%	1%	6%	15%	9%	
FI	95%		2%	3%		
FR	75%		2%	23%		
HR	98%					2%
HU	83%			13%	4%	
IE	91%	<1%		8%		
IT	61%	8%	3%	26%		2%
LT						
LU	21%		29%			50%
LV	100%					
MT	3%	3%	28%	67%		
NL	31%		67%	2%		
PL	92%		3%	4%		
PT	97%		2%	1%		
RO	87%			13%		
SE	94%		3%	3%		
SI	94%			6%		
SK	83%			17%		

MS	Expected to achieve good (or better) by end of 2015	Less stringent objectives already achieved	2016--2021	2022--2027	Beyond 2027	Unknown when objectives will be achieved
UK	53%	19%	3%	21%	4%	

Source: WISE electronic reports. Note: The percentages above have been calculated on the basis of the total number of water bodies, including water bodies with unknown current status.

Table 5: Quantitative status of groundwater bodies expected to be good (or better) in 2015 and the proportion expected to be in good status in 2021 and 2027 at Member State level (by area).

MS	Expected to achieve good (or better) by end of 2015	Less stringent objectives already achieved	2016--2021	2022--2027	Beyond 2027	Unknown when objectives will be achieved
AT	100%					
BE	71%					29%
BG	99%			1%		
CY	43%	8%			50%	
CZ	95%		4%		2%	
DE	96%		1%	1%	2%	
DK	98%			2%		
EE	94%					6%
EL	84%			5%	11%	
ES	79%		3%	13%	4%	
FI	100%					
FR	90%		7%	3%		
HR	99%					1%
HU	75%	4%	2%	16%	3%	
IE	100%		(<1%)			
IT	81%		6%	10%		2%

MS	Expected to achieve good (or better) by end of 2015	Less stringent objectives already achieved	2016--2021	2022--2027	Beyond 2027	Unknown when objectives will be achieved
LT						
LU	100%					
LV	100%					
MT	20%		80%			
NL	24%		76%			
PL	95%		5%			
PT	98%		1%	1%		
RO	100%					
SE	94%		6%			
SI	100%					
SK	97%			3%		
UK	84%	9%	3%	4%		

Source: WISE electronic reports.

Note: The percentages above have been calculated on the basis of the total number of water bodies, including water bodies with unknown current status.

Application and justification of exemptions

The number of exemptions applied in the different Member States varies. An accountable factor is *inter alia* the fact that Member States have different starting points for achieving good status/potential because of the different levels of pressures and impacts as well as different degrees of progress regarding the implementation of measures.

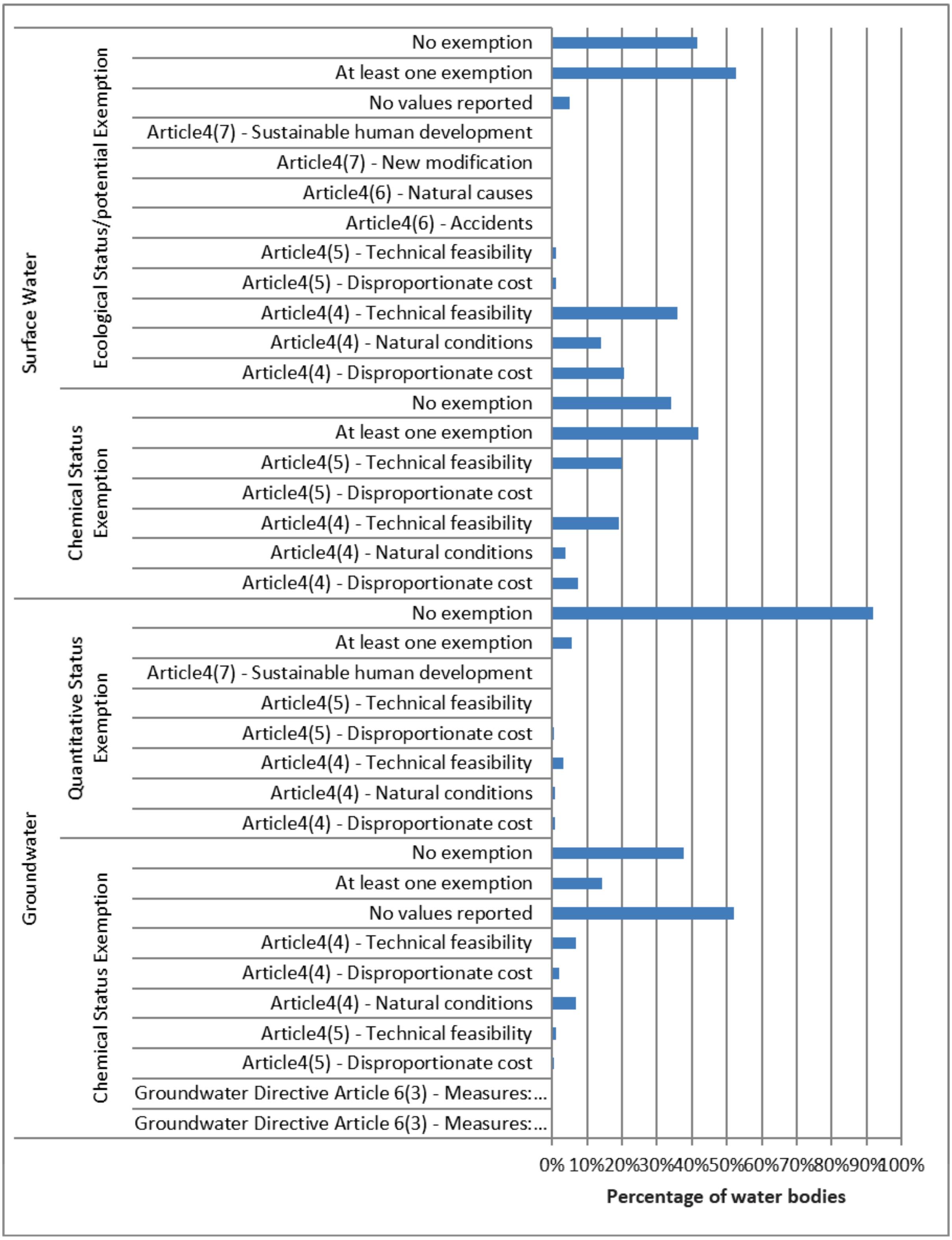
The following two figures provide an overall picture on the type of exemptions applied at EU level to surface and groundwater bodies.

The main reported type and justification for exemptions to GES/potential of surface water bodies are Article 4(4) time-extensions based on technical feasibility. In relation to chemical status of surface water bodies, the main type of exemptions are Article 4(5) exemptions justified by technical feasibility and leading to less stringent objectives.

For groundwater, technical feasibility is the main reason for Article 4(4) time-extensions to the achievement of good quantitative status. Natural conditions and technical feasibility are the main justifications for Article 4(4) time-extensions to the achievement of good chemical groundwater status.

The following sections describe the reasons behind the different exemptions applied in more detail.

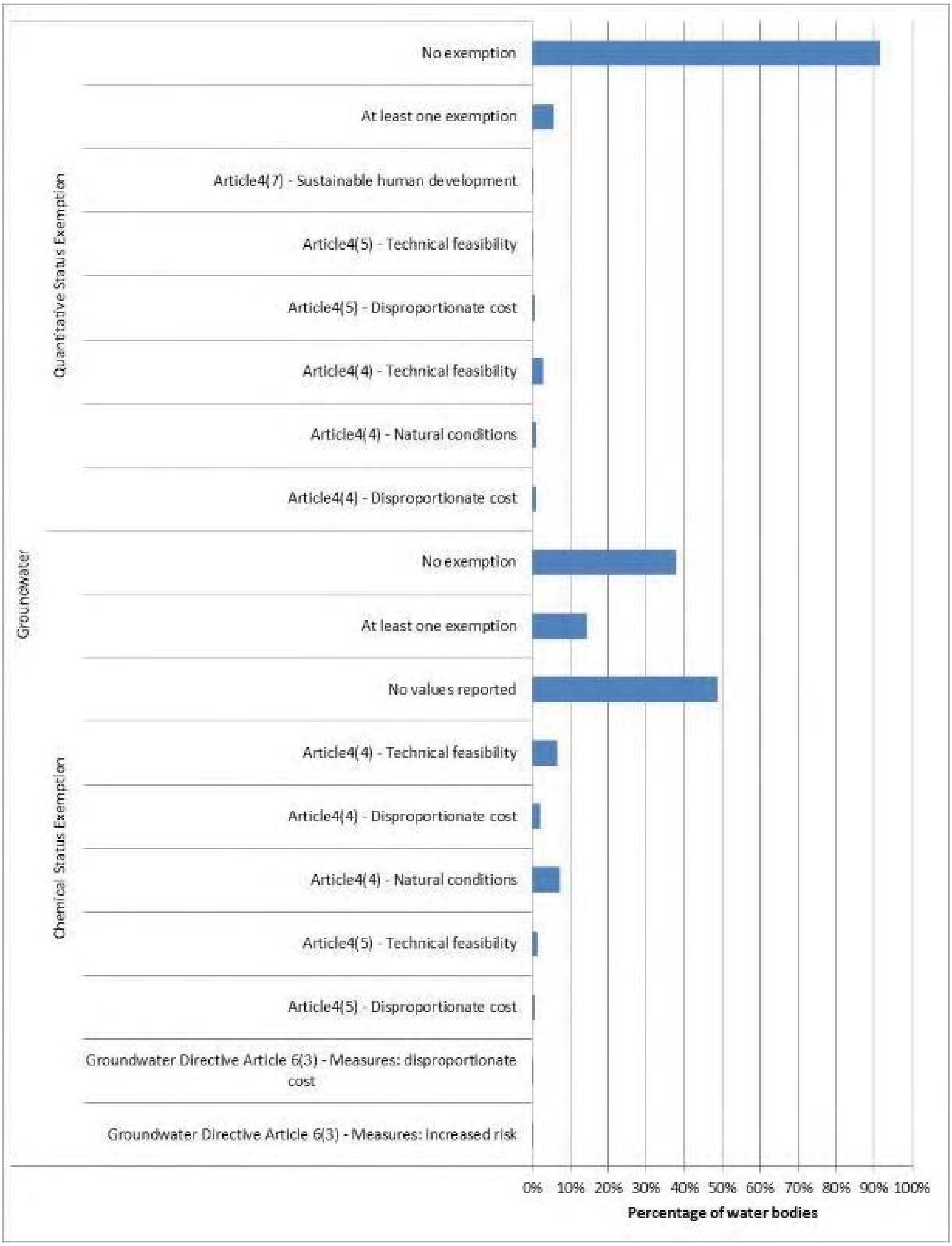
Figure 9: Type of exemptions applied to surface water bodies and groundwater bodies in the 2nd RBMPs.



Source: WISE electronic reports.

Note: Ecological status exemptions are reported at the water body level. Chemical status exemptions for surface waters are reported for each Priority Substances that is causing failure of good chemical status.

Figure 10: Type of exemptions applied to groundwater bodies in the second RBMPs.



Source: WISE electronic reports.

Note: Groundwater quantitative status exemptions are reported at the water body level. Chemical exemptions for groundwater are reported at the level of each pollutant causing failure of good chemical status. (Table not including Greece, Lithuania, Ireland and Spain Canary Islands)

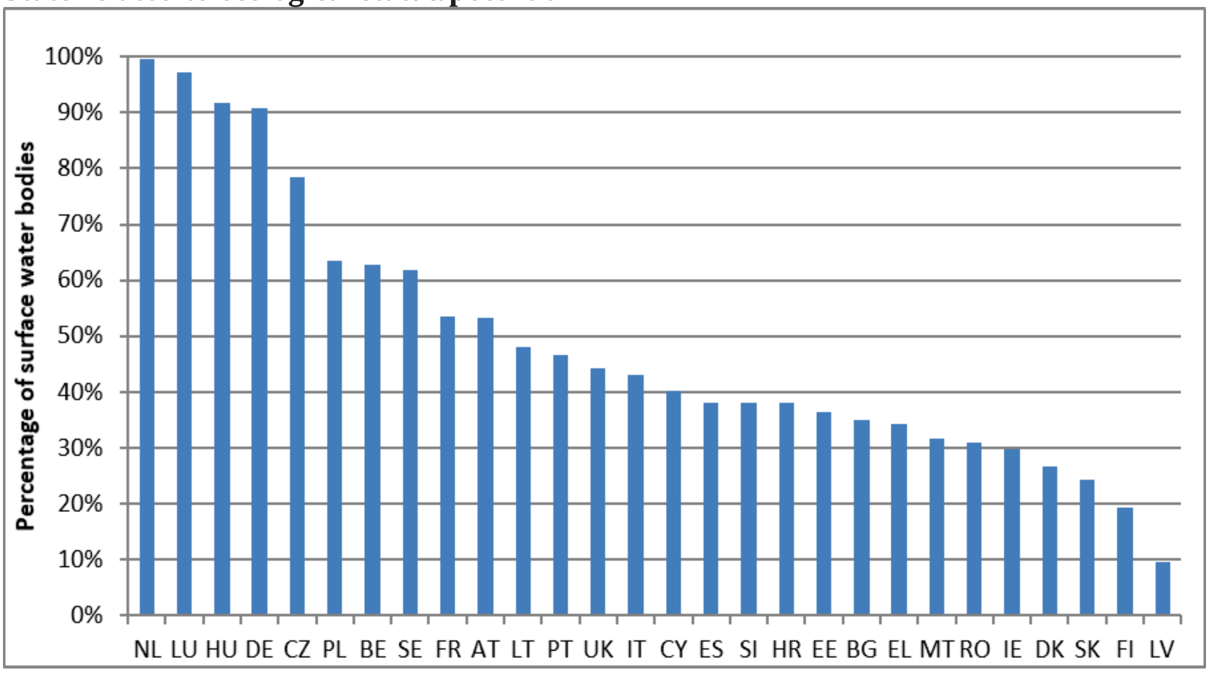
Use of exemptions under Article 4(4) – Time extensions

Exemptions according to WFD Article 4(4) are applied in all Member States in the second RBMPs. For surface water bodies, technical feasibility, natural conditions and disproportionate costs are used as justifications for applying this type of exemption. The main pressures reported causing the application of exemptions under Article 4(4) in surface water bodies are hydro-morphological pressures, atmospheric deposition, diffuse source pollution, point source pollution and water abstractions.

The figures below set out the application of Article 4(4) per Member State for ecological and chemical status of surface water bodies. For more than one third of the Member States, Article 4(4) exemptions to the achievement of GES/potential are applied for more than 50 % of their water bodies.

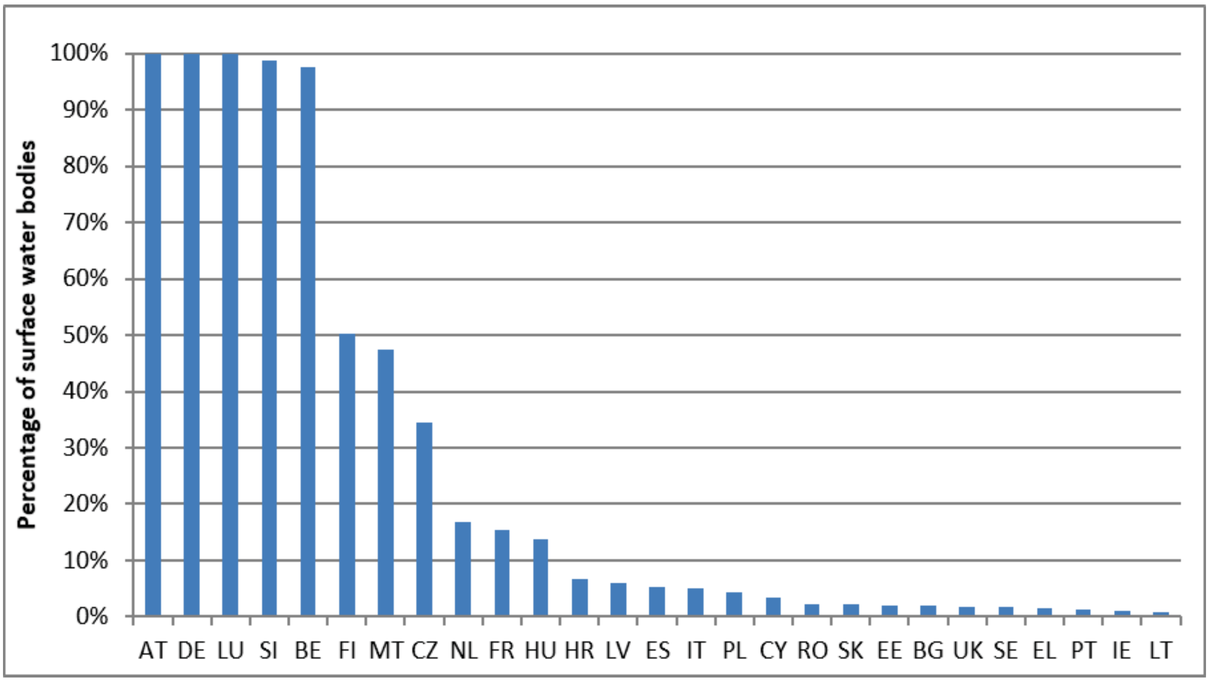
For approximately one-fifth of the Member States, Article 4(4) exemptions to the achievement of good chemical status are applied for almost 100 % of their surface water bodies. For most of these Member States, the main reasons that all or almost all surface waters are exempted from the achievement of good chemical status by 2015 are ubiquitous substances. Technical feasibility reasons have also been reported in one Member State for all its RBDs.

Figure 11: Percentage of surface water bodies with Article 4(4) exemptions per Member State related to ecological status/potential



Source: WISE electronic reports.

Figure 12: Percentage of surface water bodies with Article 4(4) exemptions per Member State related to chemical status



Source: WISE electronic reports.

For groundwater bodies, mainly natural conditions and technical feasibility are used as justifications for Article 4(4) exemptions, with technical feasibility reported more frequently than natural conditions. Disproportionate costs play a less important role. The main pressures related to exemptions for chemical status are diffuse and point sources of pollution, while for groundwater quantitative status the main pressures are from water abstractions.

In general, the justification of Article 4(4) exemptions has improved compared to the first RBMPs. Exemptions are justified at water body level which was not always the case in the first cycle. In addition, the details provided behind each justification have improved in most Member States and more detailed relevant studies have been reported.

Use of exemptions under Article 4(5) - Less stringent objectives

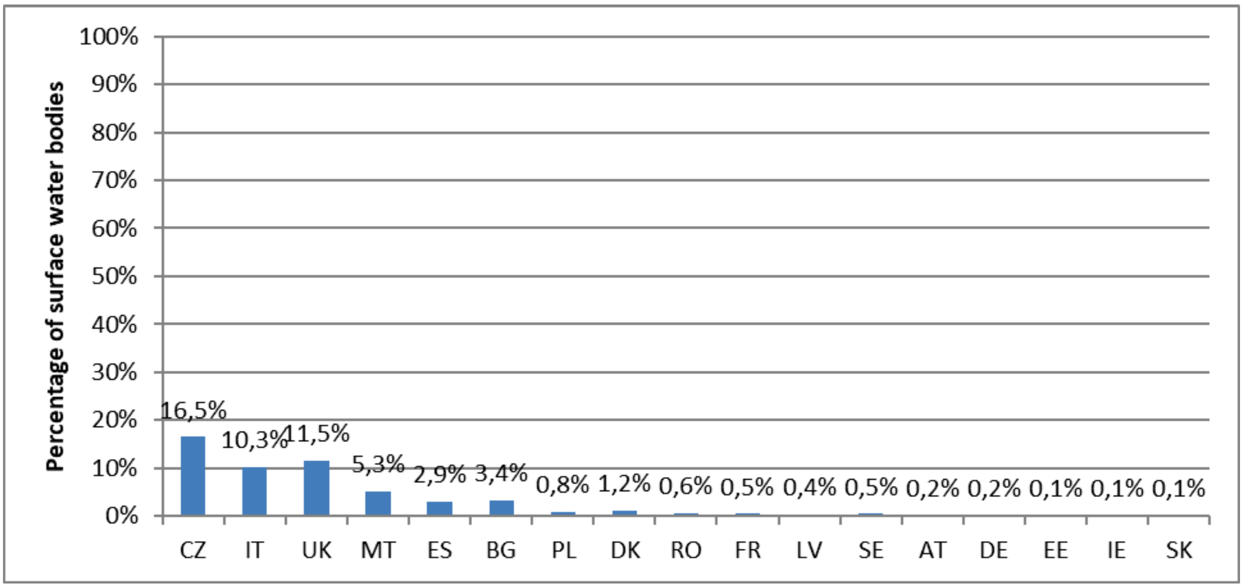
In the first RBMPs, exemptions under Article 4(5) were rarely used for surface water bodies, comprising less than 5% of all exemptions applied.[101] The main pressures behind Article 4(5) exemptions were diffuse and point pollution.

The figures 5 and 6 below show the application of Article 4(5) exemptions per Member State in the second RBMPs for ecological and chemical status of surface water bodies. In the

[101] See European Commission Staff Working Document (2012): European Overview (2/2) Report from the Commission to the European Parliament and the Council on the implementation of the water Framework Directive

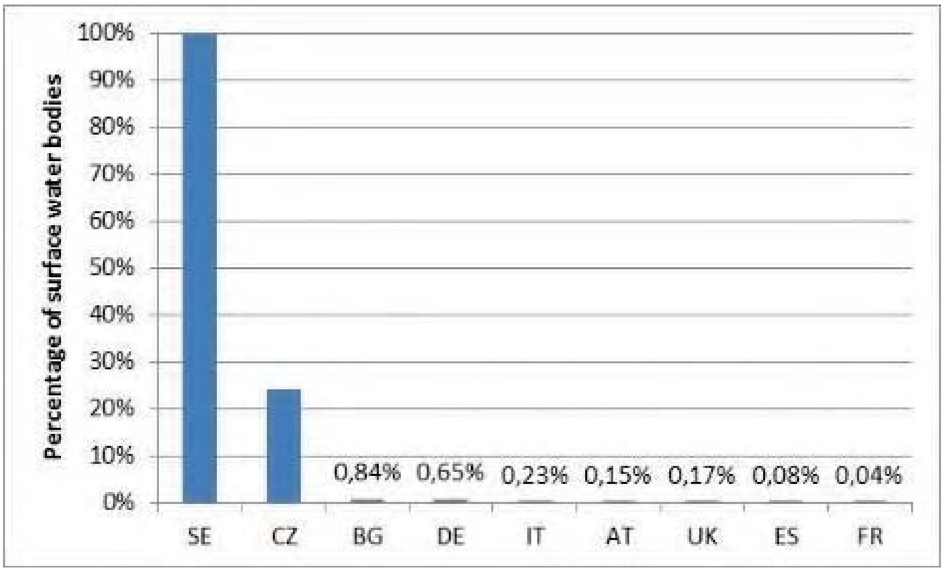
second RBMPs, Article 4(5) exemptions for ecological status of surface waters were applied in two-thirds of the Member States, and mainly due to technical feasibility and disproportionate costs.

Article 4(5) exemptions for chemical status of surface water were applied in one third of the Member States, but mainly in Sweden and Czech Republic (see Figure 6 below). Sweden has used Article 4(5) in a general way as in the first cycle and has reported less stringent objectives under Article 4(5) for about 23.000 water bodies due to pollution by mercury. The most frequent justification for this type of exemption is technical feasibility which was used for approximately one fifth of the total surface water bodies. **Figure 5: Percentage of surface water bodies with Article 4(5) exemptions per Member State related to ecological status/potential**



Source: WISE electronic reports.

Figure 6: Percentage of surface water bodies with Article 4(5) exemptions per Member State related to chemical status



Source: WISE electronic reports.

Use of exemptions under Article 4(6)

Article 4(6) provides the possibility for an exemption for temporary deterioration of the status of water bodies in certain circumstances, which are exceptional or could not reasonably have been foreseen. Such circumstances include natural causes or force majeure, in particular extreme floods and prolonged droughts, or the result of circumstances due to accidents which could not reasonably have been foreseen. The reason for invoking an exemption under Article 4(6) is that an extreme event may affect the status of a water body considerably and during a significant period of time, so that temporary deterioration may be inevitable (see also chapter 6.16 on droughts and water scarcity).

In the second RBMPs, the application of exemptions under Article 4(6) has been reported in the Netherlands, Portugal, Hungary and Spain. The reasons for the application of such exemptions are linked to extreme floods (Netherlands), prolonged droughts (Netherlands, Portugal, Spain[102]) and accidents (Netherlands, Hungary, Spain).

Use of exemptions under Article 4(7)

Under Article 4(7) exemptions can be applied due to new modifications to the physical characteristics of surface water bodies or alterations to the level of bodies of groundwater which might lead to deterioration / non-achievement of good status / potential, or for a new sustainable human development activity which might lead to deterioration of surface water bodies from high status to good status. Non-exhaustive examples which may cause such modifications or alterations include new hydropower plants, flood protection schemes, navigation projects or groundwater abstractions.

Member States will not be in breach of the Directive if a new modification/alteration/new sustainable human development activity leads to deterioration or compromising the achievement of good status/potential at water body level, and the conditions as outlined under Article 4(7) (a) to (d)[103] are met. The authorisation or licensing process plays a key role in

[102] It should be noted that this exemption is only included in a Spanish RBMP but has not been reported in the WISE reporting system.

[103] a) All practicable steps are taken to mitigate the adverse impact on the status of the body of water;
b) The reasons for those modifications or alterations are specifically set out and explained in the river basin management plan required under Article 13 and the objectives are reviewed every six years;
c) The reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in paragraph 1 are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development, and
d) The beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

performing the related assessments and justifying the conditions as outlined under Article 4(7).

Since the first RBMPs, important clarifications have been provided[104] on the way in which compliance with the Directive's environmental objectives should be interpreted in the assessment of new developments and lately new guidance[105] has been elaborated in the frame of the CIS for the WFD.

In accordance with WFD Article 4(7) and Annex VII A.5, A.7 and B1, which refer to Article 4(7) exemptions and the need to report them in the RBMP, more than a third of the Member States have reported Article 4(7) in the second RBMPs. Article 4(7) has been applied for specific projects in about one-fourth of the total RBDs (40 out of 175 RBDs).

Exemptions under Article 4(7) have most commonly been applied in RBDs due to impoundments for drinking water followed by flood protection schemes and hydropower plants (see Figure 7).

According to the information reported to WISE, Article 4(7) has been applied in the following Member States: Austria (3 RBDs), Bulgaria (3 RBDs), Germany (2 RBDs), Spain (14 RBDs), Greece (8 RBDs), France (2 RBDs), the Netherlands (1 RBDs), Poland (3 RBDs), Portugal (3 RBDs), Romania (1 RBD) and the UK (2 RBDs).

The RBMPs or background documents provide descriptions on how the steps of the assessment required under Article 4(7) have been applied. It should be noted that in several other RBDs, projects that may cause deterioration/non-achievement of good status/potential and thus require to meet the conditions as outlined in Article 4(7) are being planned.

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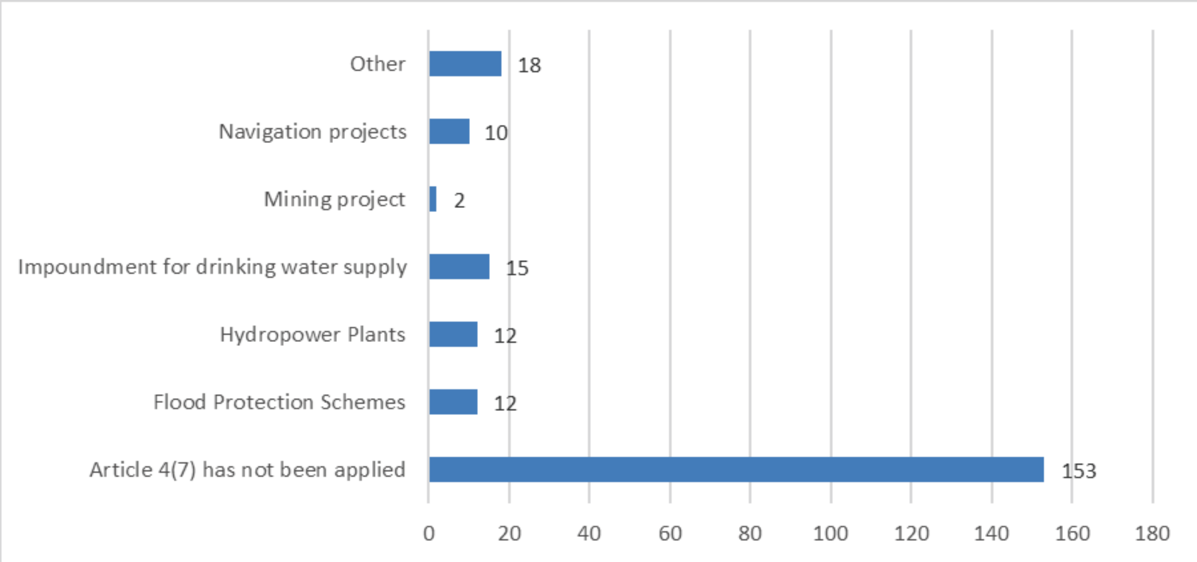
[104] Case C-461/13 Bund für Umwelt und Naturschutz Deutschland e.V. versus Bundesrepublik Deutschland: http://curia.europa.eu/juris/document/document.jsf;jsessionid=9ea7d0f130d6146e624bf57c46808158f287aced950b.e34KaxiLc3eQc40LaxqMbN4Pax8Le0?text=&docid=165446&pageIndex=0&doclang=EN&mode=lst&dir=&occ=first&part=1&cid=11661

[105] CIS Guidance Document No. 36 - Exemptions to the Environmental Objectives according to Article 4(7): https://circabc.europa.eu/sd/a/e0352ec3-9f3b-4d91-bdbb-939185be3e89/CIS_Guidance_Article_4_7_FINAL.PDF

Figure 7: Number of RBDs with projects causing Article 4(7) exemptions.



Source: WISE electronic reports.

Note: Some projects causing an Article 4(7) exemption may be multi-purpose, e.g. a proposed hydropower plant may also serve as a flood protection scheme or as impoundment for water supply. For this reason, the same project causing an Article 4(7) exemption in one RBD may be captured in more than one bar in the figure above.

An assessment of the methodologies behind the application of Article 4(7) shows that some progress has been made in the second cycle. Member States have developed more detailed approaches and improved methodologies to assess a project's effect on the status of a water body and justifications are provided in more detail. The assessment of cumulative effects though remains a challenge. Information on how to determine overriding public interest is limited, and it is not clear to which extent public consultations have taken place.

Main changes in implementation and compliance since 1st cycle

Since the first RBMPs, there have been improvements in the approaches and methodologies used for the application of exemptions for surface and groundwater bodies. While in the first cycle, not all Member States have justified the application of exemptions on water body level, this has significantly improved providing now more detailed information on the justifications for exemptions. Most progress has been made in the justifications related to disproportionate costs.

Generally, more detailed studies have been elaborated, although the information provided does not always clearly distinguish between the criteria applied for justifications under Article 4(4) and Article 4(5). Overall, justifications for exemptions are still often provided in a generic way.

As in the first cycle, fewer Member States are applying Article 4(5) exemptions compared to Article 4(4) exemptions, but overall the use of Article 4(5) exemptions has increased. Sweden is the Member State that applies Article 4(5) most frequently due to mercury pollution.

A comparison of the first and the second RBMPs shows that for groundwater, improvements in the status (mainly in quantitative status) has been achieved between the first and the second cycle. For surface waters, the situation is less clear and changes to the application of exemptions are difficult to track due to changes related to the assessment of status between the first and second RBMPs. In several Member States, the methodology for status assessment has improved, for example through increasing the number of quality elements considered. Although this has improved the understanding of status, the improved knowledge has in some cases led to a change in water body status despite the implementation of measures. Changes in the number of delineated water bodies, i.e. an increase or decrease in the number of water bodies, also makes it difficult to assess whether the use of exemptions has increased or decreased in an RBD.

In relation to Article 4(6), the number of RBDs applying this type of exemption has increased from five to fourteen between the first and second RBMPs.

Reported exemptions under Article 4(7), which were applied in the first RBMPs in 12 RBDs, have increased in the second RBMPs, now being applied in 40 RBDs. Based on the assessment of the RBMPs, it can be concluded that more projects are in the pipeline and more cases of Article 4(7) application may occur in the future. From the assessment of the methodologies behind the application of Article 4(7), it appears that some progress has been made in terms of methodologies to assess the impacts on the status of a water body.

5.8.2 Conclusions

In the second RBMPs, the status of groundwater across Europe is generally better than that of surface waters. In addition, for groundwater, some improvement in the status (mainly in terms of quantitative status) has been achieved between the first and the second cycle. For surface waters, the situation is less clear and changes to the application of exemptions are more difficult to track e.g. due to improvements related to the assessment of status between the first and second RBMPs. Improvements in monitoring and classification methods have led to a better understanding of water body status, but have also changed the baseline for comparing status assessments between the first and second cycle.

Exemptions under Article 4(4) are still applied to a significant extent in almost all Member States. In general, exemptions under this Article are more often applied to surface water than to groundwater for which good status is already achieved to a greater extent. For surface waters, technical feasibility, natural conditions and disproportionate costs are used as justifications for exemptions under Article 4(4). For groundwater bodies, mainly natural conditions and technical feasibility are used to justify these exemptions, with technical feasibility used more often than natural conditions.

Article 4(5) exemptions have been applied more often in the second than in the first RBMPs in several Member States.

The justification provided in the second RBMPs for exemptions under Article 4(4) and 4(5) are more detailed and more consistently reported on water body level compared to the first cycle. However, justifications are still often provided in a generic way and the criteria applied, distinguishing between Article 4(4) and 4(5), are not always clear.

The application of Article 4(7) has increased in the second RBMPs. Based on the assessment of the RBMPs, it can be concluded that more projects are in the pipeline and more cases of Article 4(7) application may occur in the future. The assessment of the methodologies behind the application of Article 4(7) provided evidence that some progress has been made in terms of methodologies to assess impacts on the status of water bodies. The assessment of cumulative effects though remains a challenge. Information on how to determine overriding public interest is limited and it is not clear to which extent public consultations have taken place. Further improvements in relation to the application of Article 4(7) may be expected due to clarifications provided on the way in which compliance with the Directive's environmental objectives should be interpreted in the assessment of new developments and new guidance which was elaborated in the frame of the CIS.

5.8.3 Recommendations

- A significant number of exemptions from the WFD objectives is still applied in the second RBMPs. Member States should raise the level of ambition for the implementation of the necessary measures to subsequently reduce the amount of exemptions and to ensure a timely achievement of the WFD objectives.

- Transparency in relation to the justifications for the use of exemptions should be further improved in the RBMPs, including clear criteria for the decision. In case of extending deadlines or lowering objectives, the necessary remaining measures and timeline for implementation should be clearly indicated.

- Member States should include in the RBMPs an inventory of projects under development to ensure that the RBMPs present a complete overview of all current and planned developments, including particularly new hydropower, navigation, flood protection, drainage and water abstraction projects.

- Member States should ensure a thorough assessment of the expected effects of projects under development on water body status/potential at quality element level RBMPs. For the application of exemptions Member States are encouraged to implement the policy recommendations and the best practice guidance that has been elaborated under the CIS.

5.9 Programme of measures – general & measures related to other significant pressures

5.9.1 Introduction

The WFD requires that, within each RBD, a POMs is established to address the significant issues identified and to allow the achievement of the objectives established under Article 4. The Directive further specifies that the POMs shall include as a minimum 'basic measures' and where necessary to achieve objectives 'supplementary measures'.

Basic measures as a minimum must comprise:

- Measures required in order to implement existent Community water legislation and other environmental legislation (set out in Article 10 and in Part A of Annex VI – detailed below).
- Measures to implement Article 9 (cost recovery).
- Measures to promote efficient and sustainable water use.
- Measures to protect drinking water quality and reduce level of treatment required.
- Measures to control abstraction from surface and groundwater.
- Measures to control recharging of groundwater.
- Measures to control point source discharges.
- Measures to prevent or control inputs of diffuse pollutants.
- Measures to address any other significant impacts on status, in particular the hydro-morphological condition.
- Measures to eliminate or reduce pollution by priority substances.
- Measures to prevent accidental pollution.

The legislation referred to in Article 10 and listed in Part A of Annex VI are:

(i) The Bathing Water Directive (76/160/EEC).

(ii) The Birds Directive (79/409/EEC).

(iii) The Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC).

(iv) The Major Accidents (Seveso) Directive (96/82/EC).

(v) The Environmental Impact Assessment Directive (85/337/EEC).

(vi) The Sewage Sludge Directive (86/278/EEC).

(vii) The Urban Waste-water Treatment Directive (91/271/EEC).

(viii) The Plant Protection Products Directive (91/414/EEC).

(ix) The Nitrates Directive (91/676/EEC).

(x) The Habitats Directive (92/43/EEC).

(xi) The Integrated Pollution Prevention Control Directive (96/61/EC).

Supplementary measures are those measures designed and implemented in addition to the basic measures, where it is necessary to achieve the environmental objectives of the WFD as established in Article 4 and Annex V. Supplementary measures can include additional legislative powers, fiscal measures, research, educational campaigns that go beyond the basic measures and are deemed necessary for the achievement of objectives.

According to Article 11(5), additional measures may be necessary when a water body is unlikely to achieve the objectives under Article 4, after the adoption of the measures under the first RBMP.

Measures should be targeted in terms of their type and extent to ensure that pressures are addressed and that this will deliver improvements towards achieving good status or potential in the individual water bodies. The measures should be designed based on the assessment of the actual status of the water body, supplemented with the information from the analysis of pressures and impacts affecting the water body.

Each step of the planning process of the WFD is, therefore, necessary to ensure the correct measures are implemented in the appropriate location. The planning process started with the transposition of the Directive into national law and the administrative arrangements, and was followed by the characterisation of the RBD (including the pressure and impact analysis, the economic analysis, the delineation of water bodies and the establishment of the typology and reference conditions for surface water bodies: the basis for the ecological status assessment). The status assessment based on sufficient (parameters, frequency, etc.) and updated monitoring results is a fundamental element of the planning process. Finally, the environmental objectives are set and the POMs to achieve those objectives established. The first POMs should have become operational by December 2012 at the latest. There is also a need to monitor the effects and effectiveness of the measures in the improvement of the water status and (as stated in Article 11.5) where monitoring or other data indicate that the objectives set are unlikely to be achieved. The cause of the possible failure should be investigated, relevant permits and authorisations should be reviewed, monitoring programmes reviewed and adjusted and amended or additional measures devised to ensure achievement of objectives. Article 11.8 requires the POMs to be reviewed and updated by 2015, with measures being made operational three years later.

This chapter covers general issues concerning the POMs such as implementation of the first POMs, the application of KTMs to achieve objectives, the use of basic and supplementary measures, targeting of measures including the assessment of the gap to good status, and finally measures to address other significant pressures. The following chapters in this report cover specific measures targeted abstractions and water scarcity, to pollution from agriculture and other sources, to hydro-morphological pressures and water pricing policies.

Reported progress with the implementation of the first POMs

In their second RBMPs, Member States were asked to report on the status of implementation of the first POMs; a summary of this information is shown in Table 1. It should be noted that the reporting to WISE was not always consistent with the reporting in the RBMPs. All planned measures have been completed in only a few RBDs of few Member States, whilst in the vast majority (86 %) of RBDs, only some measures have been completed. Member States reported that a lack of finance and unexpected planning delays were the main obstacles to the implementation of the POMs, with a lack of mechanism for implementing measures (e.g. national regulations not yet adopted) and governance issues affecting the implementation of measures in at least 50 % of RBDs. Some Member States reported other obstacles such as a change of the delineation of water bodies and classification systems, measures that proved to be irrelevant, lack of membership, difficulties due to land ownership, land availability, staff resources and an acceptance of the measures, acquisition of real estate, complex approval procedures and coordination with participants and staff shortages, the need to prioritise measures under the conditions of limited time and financing and a lack of research on the effect of the measures, land acquisition and a reduction in the national budget due to the economic crisis, and the legal regime of the land and tendering process for the award of contracts ("the contestation of the auctions for works").

Table 1 Status of the implementation of the first POMs

Status of implementation of first PoM	Number of RBDs	Percentage of RBDs
All planned measures started	15	9%
Some planned measures started	2	1%
Some measures completed	142	81%
All measures completed	15	9%
No measures started	0	0%

Source: WISE electronic reports.

Table 2 Number of obstacles to the implementation of measures identified in the first PoM

Obstacle	Number of RBDs	Percentage of RBDs
Governance	92	53%
Delays	122	70%
Lack of finance	140	80%
Lack of mechanism	111	63%
Lack of measures	37	21%
Planned measures not cost effective	29	11%
Extreme events	14	8%

Source: WISE electronic reports.

About one-quarter of the Member States provided no information on the costs of the first POMs. At EU level, a total investment of at least 101,000 million was reported for the first POMs. 111 RBDs (67 %) reported having received a contribution from EU funds for the first POMs, which implies that EU funds were a significant source of funding for measures in the first cycle for some RBDs.

Assessment of implementation and compliance with WFD requirements in 2nd cycle

Overview of the application of KTMs to achieve WFD objectives

The concept of KTMs was developed in 2012 to simplify reporting. This approach was the consequence of the large differences in the level of detail reported in 2010. Some Member States reported 10-20 measures whilst others reported hundreds or even thousands. 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, but also because the KTMs are not completely independent silos. There is certain degree of overlap in the description of KTMs to ensure that the Member States can more easily find the way to report their PoMs. KTMs are expected to deliver the bulk of the improvements through reduction in pressures required to achieve WFD environmental objectives. A KTM may be one national measure, but it would typically comprise more than one national measure. The KTM should be fully implemented and made operational within the RBMP planning period to address specific pressures or chemical substances and to achieve the environmental objectives.

Figures 1 and 2 show the number of RBDs where significant pressures causing groundwater bodies and surface water bodies to fail to be of good status are addressed by operational KTMs. 91 RBDs have measures in place to address failures caused by diffuse pollution from agriculture in groundwater and 123 RBDs have measures in place to address the same pressure causing failures of surface water bodies. 128 RBDs have operational measures in place to address point source pollution from urban waste water treatment plants. Only very few Member States reported operational measures in place to address all the significant pressures identified as causing failures of objectives. Approximately half of the Member States reported that the majority of the significant pressures were being addressed by operational measures in all RBDs with only one or two pressures not reported as being addressed. Figure 3 shows the number of RBDs which have reported each KTM as operational to address at least one significant pressure. KTM2 - Reduce nutrient pollution from agriculture is reported as operational in the most RBDs to address significant pressures in groundwater, whilst KTM1 - Construction or upgrades of wastewater treatment plants is reported as operational to address at least one significant pressure in surface water bodies in the most RBDs.

Member States were asked to report the national basic and supplementary measures mapped against the KTMs[106] (see Tables 3 and 4 and Figures 4 and 5 below). A total of 14 106 basic measures were reported. No single KTM was reported to have been applied in basic measures by all the 28 Member States that reported information. Following observations can be made on selected KTM:

- The majority of Member States (86%) reported a total of 5 817 basic measures mapped against KTM1 - Construction or upgrades of wastewater treatment plants.

[106] For each pre-defined or new KTM, Member States were asked to report the unique code of each national or RBD specific measure incorporated into the KTM.

- The majority of Member States have also applied a total of 619 basic measures under KTM2 - Reduce nutrient pollution from agriculture.
- The majority of Member States have mapped a total of 300 basic measures against KTM3 - Reduce pesticides pollution from agriculture.
- Two thirds of Member States have mapped a total of 487 basic measures against KTM6 - Improving hydro-morphological conditions of water bodies other than longitudinal continuity.
- Three quarters of Member States have mapped a total of 433 basic measures against KTM7 - Improvements in flow regime and/or establishment of ecological flows.
- Two thirds of Member States mapped a total of 729 basic measures against KTM8 - Water efficiency, technical measures for irrigation, industry, energy and households.
- Three quarters of Member States mapped a total of 322 basic measures against KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc).
- The majority of Member States (79%) mapped a total of 382 basic measures against 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.
- The majority of Member States (79%) mapped a total of 723 basic measures against KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure.
- 1 287 basic measures have been mapped against KTM14 - Research, improvement of knowledge base reducing uncertainty by half of the Member States.
- Two thirds of the Member States (reported at total of 1 535 basic measures under nationally defined KTMs.
- Only a few Member States reported basic measures KTM24 - Adaptation to climate change and under KTM25 - Measures to counteract acidification.

Some Member States have reported a large number of basic measures across a wide range of KTMs, whilst at the other extreme some have reported a small number of measures against a limited range of KTMs. Neither of these extremes suggests that the programme of measure will be effective in addressing the significant pressures, either because too many measures to be implemented have been adopted, or because an insufficient number of measures have been adopted.

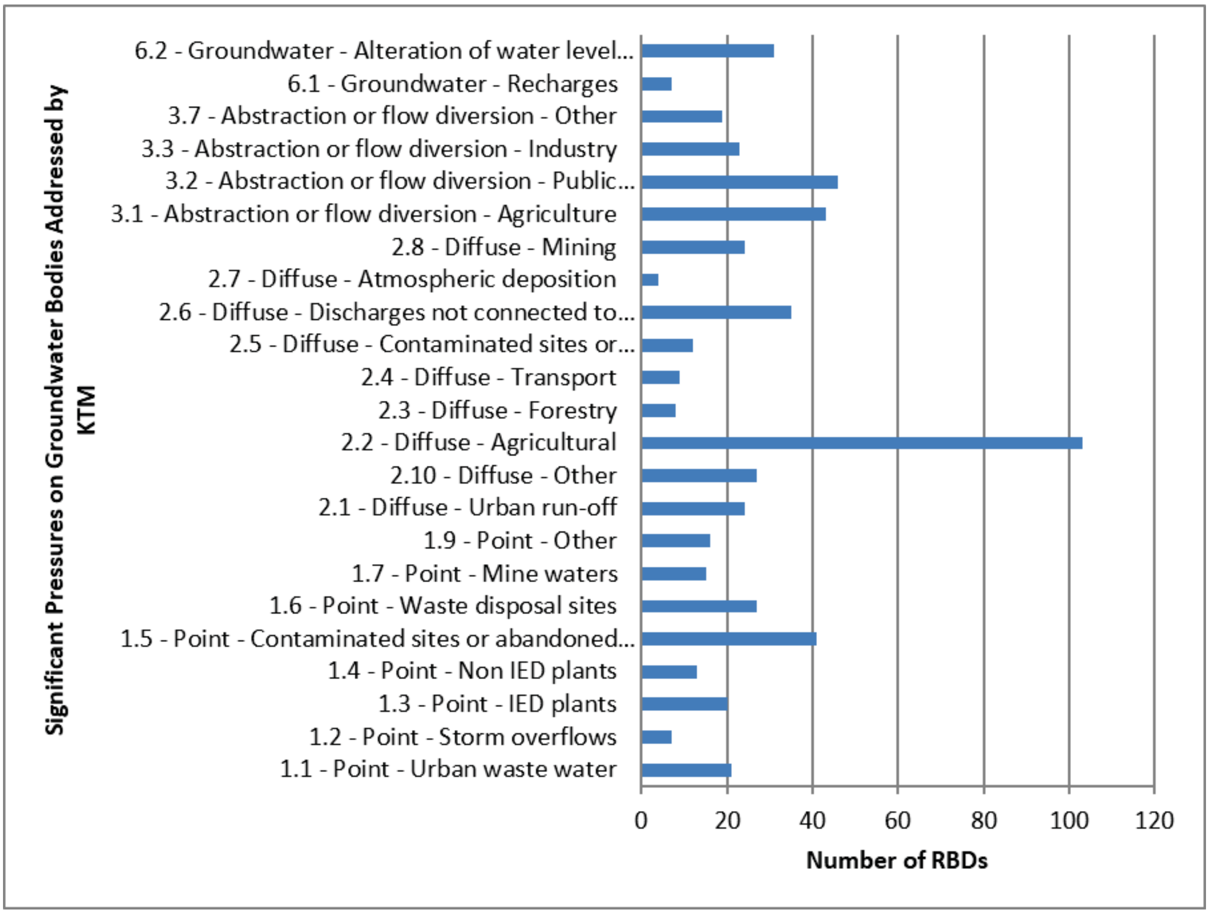
All 28 Member States which reported also provided information on the number of national supplementary measures mapped against KTM. A total of 11 382 supplementary measures were reported. This is significant progress from the first POMs where little if no information on supplementary measures was provided:

- Nearly all Member States have mapped a total of 1 460 supplementary measures against KTM6 - Improving hydro-morphological conditions of water bodies other than longitudinal continuity and 274 supplementary measures against KTM2 - Reduce nutrient pollution from agriculture.
- Nearly all Member States have mapped a total of 1 775 supplementary measures against KTM14 - Research, improvement of knowledge base reducing uncertainty.
- A few Member States reported a total of 16 supplementary measures against KTM11 - Water pricing policy measures for the implementation of the recovery of cost of water services from agriculture and 16 supplementary measures against KTM25 - Measures to counteract acidification.

As with basic measures, some Member States have reported a large number of supplementary measures across a wide range of KTMs whilst others have reported a few supplementary measures against a small range of KTMs.

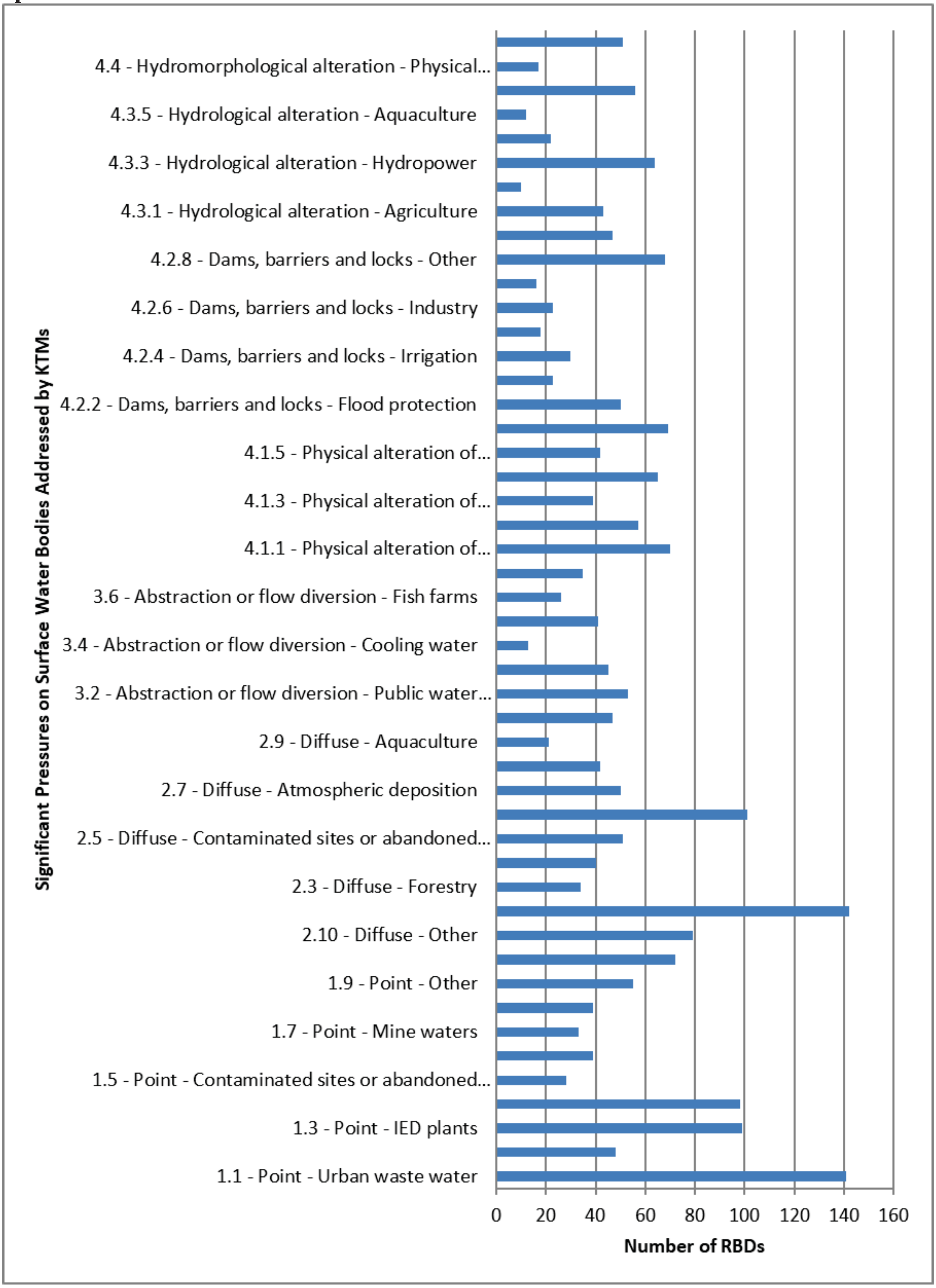
A comparison of the national measures mapped against KTMs versus the KTMs that Member States had reported as being operational for the control of significant pressures, showed that all national measures reported are operational in only a third of the Member States. For the other Member States, a number of national measures had been mapped against KTMs which were not reported as operational to address significant pressures causing failure.

Figure 1 Main significant pressures on groundwater bodies for which KTMs are operational



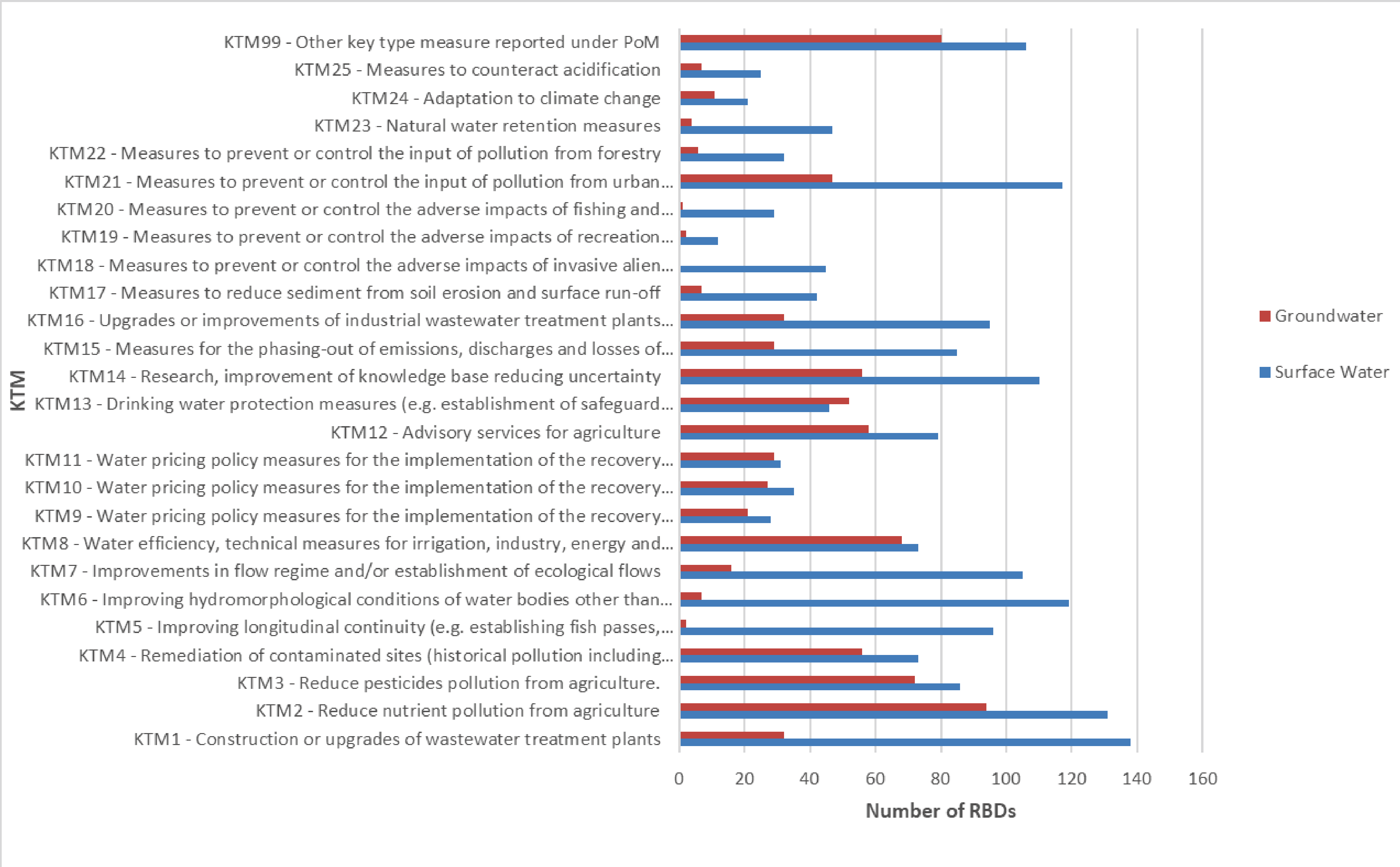
Source: WISE electronic reports.

Figure 2 Main significant pressures on surface water bodies for which KTMs are operational



Source: WISE electronic reports.

Figure 3: Number of RBDs which have reported each KTM as operational to address at least one significant pressure in surface water and groundwater


KTM99 - Other key type measure reported under PoM
KTM25 - Measures to counteract acidification
KTM24 - Adaptation to climate change
KTM23 - Natural water retention measures
KTM22 - Measures to prevent or control the input of pollution from forestry
KTM21 - Measures to prevent or control the input of pollution from urban...
KTM20 - Measures to prevent or control the adverse impacts of fishing and...
KTM19 - Measures to prevent or control the adverse impacts of recreation...
KTM18 - Measures to prevent or control the adverse impacts of invasive alien...
KTM17 - Measures to reduce sediment from soil erosion and surface run-off
KTM16 - Upgrades or improvements of industrial wastewater treatment plants...
KTM15 - Measures for the phasing-out of emissions, discharges and losses of...
KTM14 - Research, improvement of knowledge base reducing uncertainty
KTM13 - Drinking water protection measures (e.g. establishment of safeguard...
KTM12 - Advisory services for agriculture
KTM11 - Water pricing policy measures for the implementation of the recovery...
KTM10 - Water pricing policy measures for the implementation of the recovery...
KTM9 - Water pricing policy measures for the implementation of the recovery...
KTM8 - Water efficiency, technical measures for irrigation, industry, energy and...
KTM7 - Improvements in flow regime and/or establishment of ecological flows
KTM6 - Improving hydromorphological conditions of water bodies other than...
KTM5 - Improving longitudinal continuity (e.g. establishing fish passes,...
KTM4 - Remediation of contaminated sites (historical pollution including...
KTM3 - Reduce pesticides pollution from agriculture.
KTM2 - Reduce nutrient pollution from agriculture
KTM1 - Construction or upgrades of wastewater treatment plants
KTM
0
20
40
60
80
100
120
140
160
Number of RBDs
Groundwater
Surface Water

Source: WISE electronic reports.

Table 3 National basic measures mapped against KTMs

KTM	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
KTM1	15	8	3	3	1,209	6	0	3	13	3,701	4	4	7	3	3	649	0	13	0	0	2	36	106	3	6	4	9	7
KTM10	0	1	2	0	1	0	0	0	38	2	0	2	12	3	3	27	0	1	0	0	1	10	0	0	0	0	0	3
KTM11	0	0	2	0	0	0	0	0	46	6	0	1	14	3	3	43	0	1	0	0	1	0	8	0	0	0	0	0
KTM12	0	0	1	0	0	2	0	0		14	0	0	7	0	3	20	0	0	0	0	0	0	0	0	0	0	0	5
KTM13	9	7	7	0	11	1	0	0	71	38	0	3	19	2	3	58	0	1	9	0	3	61	9	1	4	1	0	4
KTM14	0	2	13	0	2	4	0	0	36	616	0	5	39	0		392	0	0	0	9	0	82	75	0	0	0	2	10
KTM15	24	2	7	0	3	2	0	0	59	13	1	2	17	5	3	115	0	0	1	2	3	30	42	1	0	2	1	7
KTM16	12	1	7	0	8	3	0	1		22	8	3	2	2	6	30	0	0	0	0	0	0	0	4	5	0	1	3
KTM17	3	1	1	0	0	2	0	0	9	7	0	1	6	2		48	0	27	1	0	0	0	0	0	0	0	0	4
KTM18	0	1	1	0	0	0	0	0	-	16	0	0	10	0	3	11	0	0	0	2	0	0	0	0	0	0	0	10
KTM19	0	1	2	0	0	0	0	0	-	0	0	0	2	2		0	0	0	6	3	0	104	0	0	0	0	0	1
KTM2	15	4	9	1	0	4	0	1	48	148	0	2	10	2	6	78	0	48	14	2	2	170	35	2	3	2	4	9
KTM20	0	0	2	0	0	0	0	0		25	0	0	1	0	3	0	0	0	6	0	1	0	0	2	0	0	0	1
KTM21	3	18	9	13	43	1	0	0	13	118	0	0	39	7	3	72	0	7	25	4	5	307	7	3	10	1	0	15
KTM22	0	0	1	0	0	0	0	0	-	0	1	0	0	0	6	0	0	1	6	0	0	0	0	0	1	0	0	6
KTM23	0	9	0	0	0	0	0	0	-	4	0	1	0	4		80	0	0	1	0	0	0	0	0	0	0	0	1
KTM24	0	0	6	0	0	0	0	0	64	0	0	5	27	0		35	0	0	0	0	0	0	1	0	0	0	0	0
KTM25	0	0	0	0	0	2	0	0	-	0	0	0	0	0		0	0	0	0	0	0	10	0	0	1	0	0	5
KTM3.	21	4	4	0	1	2	0	0	12	18	0	1	7	1	3	89	0	25	8	1	2	80	8	1	3	1	1	7
KTM4	6	6	1	0	0	0	0	0		12	0	0	1	2		31	0	0	0	0	0	0	4	1	3	0	3	10
KTM5	24	4	3	0	94	0	0	0	1	45	0	0	35	0		43	0	3	0	0	0	20	9	0	7	1	0	3
KTM6	30	10	2	0	0	1	0	0	37	59	0	0	55	23	6	182	0	12	7	4	1	26	15	0	2	5	0	10

KTM	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
KTM7	27	5	8	0	12	1	0	0	22	103	0	1	47	4	3	90	0	3	0	1	2	50	35	1	7	0	1	10
KTM8	0	6	12	13	1	0	0	0	104	299	0	2	29	4		198	0	4	4	14	1	24	7	1	0	1	0	5
KTM9	0	2	2	0	1	0	0	0	36	14	0	1	20	2	3	28	0	1	0	0	0	10	10	0	0	0	0	0
KTM99	0	10	0	1	2	0	0	0	171	548	0	4	183	16	3	32	0	11	22	9	6	390	58	2	0	32	0	35

Source: WISE electronic reports.

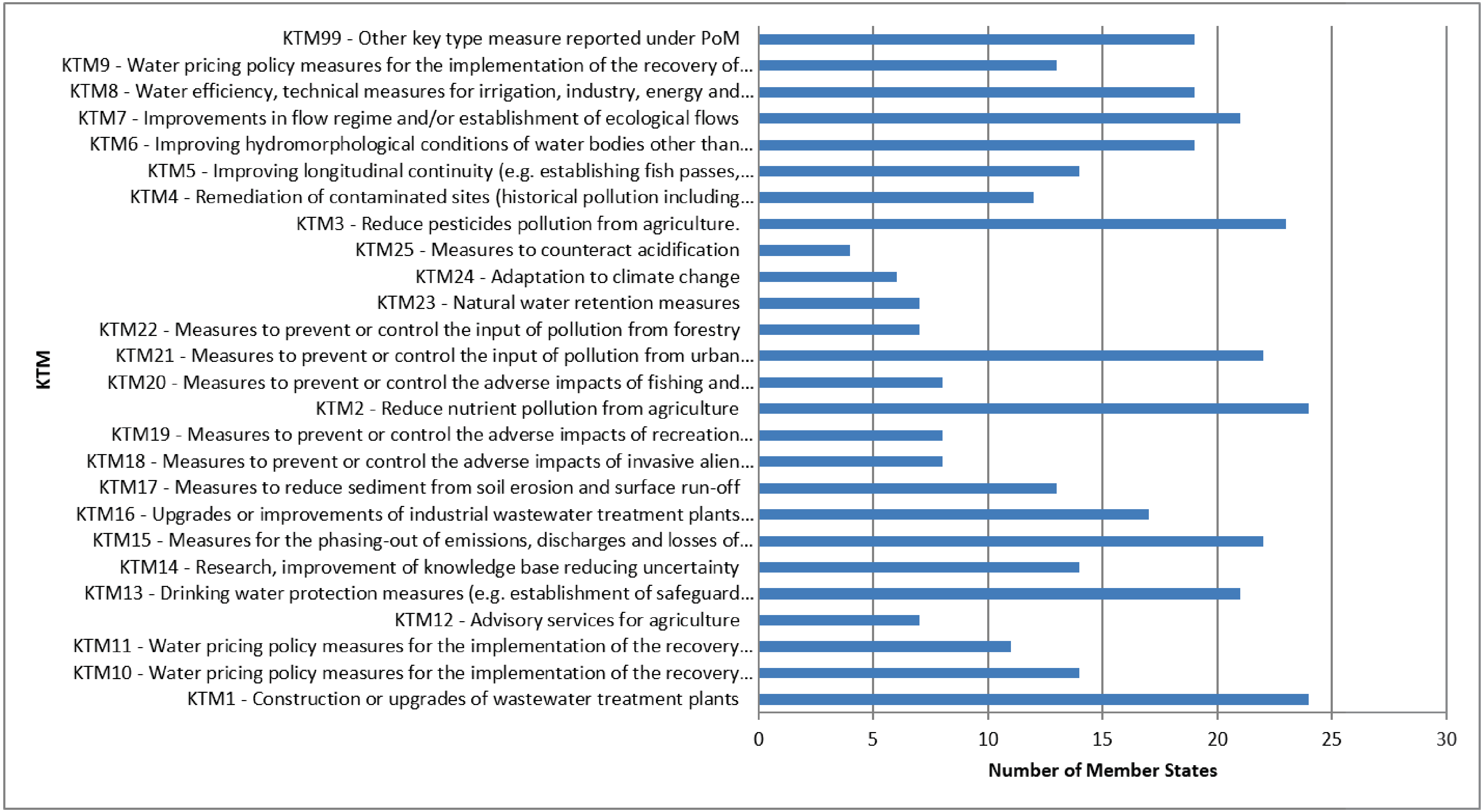
Table 4 National supplementary measures mapped against KTMs

KTM	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
KTM1	6	3	2			7	1	3		1892	6	10		2		19	9	5	3		2		160	1	2		4	2
KTM10		1					1			0		2				7			2									
KTM11										0		2		2		10			2									
KTM12	9		1			3		4	24	106	1	1	1	2	6	33	2	2	1				20		3			5
KTM13	6	2	5		1	4	1			7	2	7		2		14			1		3		9		1			6
KTM14	3	25	18	3	16	4	1	6	83	1098		9	5	2	3	204	12	2	26	16	1	31	113	59		2	6	27
KTM15		1	4			3		1	10	3		4	3	1		5	15		3	1	1	5	9	2			1	4
KTM16	6	5	3			3		1	19	28	8	7	2	1		10							23	5	1			2
KTM17	3	3	1		3	2			2	193		6		7	3	22		4	3		1		10			1		4
KTM18			2		2	1				132		1		3	3	6				1			15		1		1	9
KTM19		1	2			1						1		1					3		1							6
KTM2	36	8	5		2	5	6	10	36	38	9	8	1	4	3	58	45	8	1	1	2	5	44	4	5	2	2	10
KTM20		6	3		1	4			4	72		1		2	6	1			8		1	42	16	1				

KTM	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
KTM21		7	7		77	10		10	10	39	7	4	2	3		4	11	1	8	5	10	3	150	1	7	1		23
KTM22								3		-	3	1		1	3	11			4				1		3			2
KTM23		2	2		5	2	1			51	2	19			3	21	12	3	3	4			17	2				5
KTM24		3	3		5	2			21		1	56			3	31			1		1		26	3			1	
KTM25		1				4					2				3										6			
KTM3		2	3			2			24	11	1	16	1	1		38		9	1		2				4	2	5	4
KTM4		2	1		275	6		2		25		3		2	3	6		2	2		5	3	18	1	2		1	1
KTM5	6		2	1		3	3	8		220	2	4		7	6	11	12	2	2		1	6	6	2	2		1	10
KTM6	12	3	6	9	436	17	3	2	14	671	7	15		10	3	86	1	4	11	2	12	23	84	5	6	3	1	14
KTM7		2	8	4		5		2	6	55	2	4		7		41	24	3	3		4				2			8
KTM8		6	4	7	4	14			75	546		10			6	90			8	14		4	28					4
KTM9		2							1	0		4		2		13			2				4					
KTM99		35			23	8	1		78	1446	6	9	4	9	3	83	36	18	9	10	24	17	78	7				3

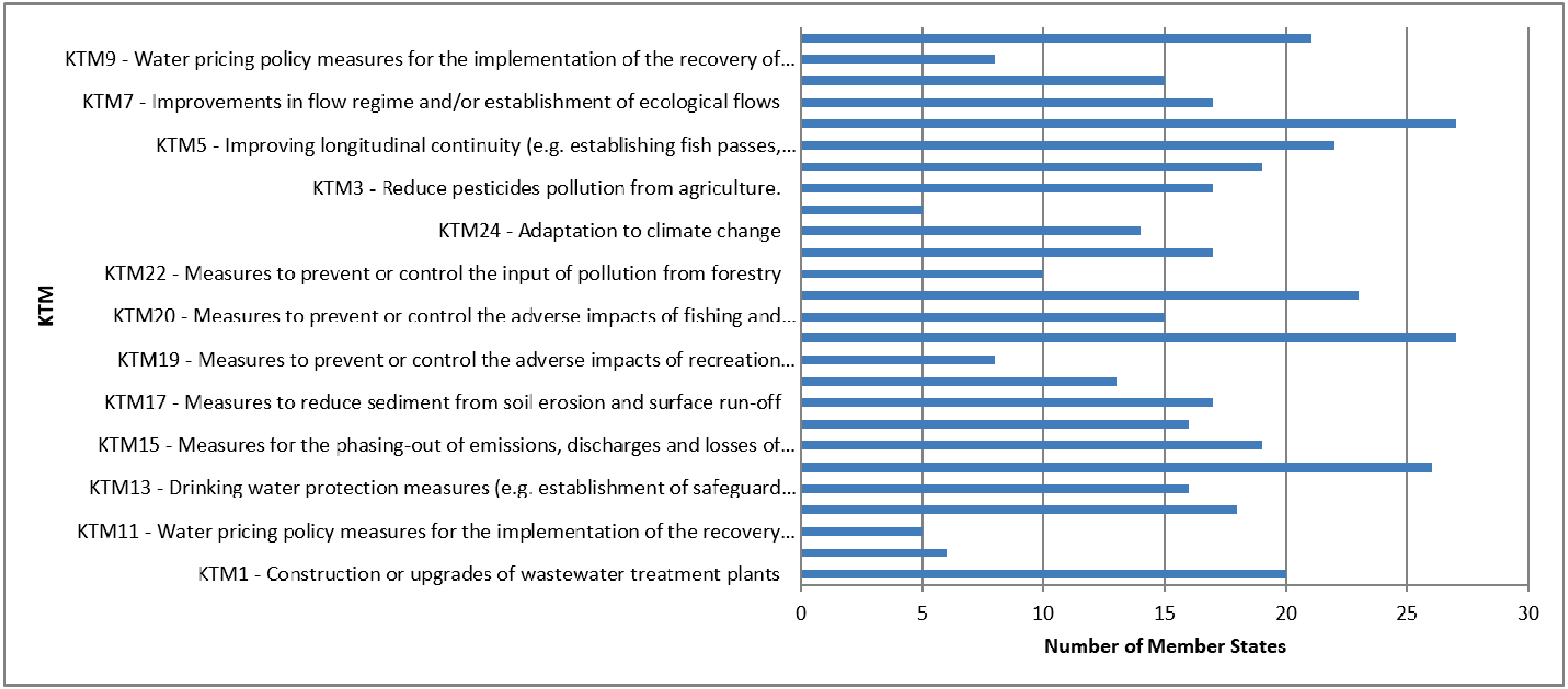
Source: WISE electronic reports.

Figure 4 Number of Member States which have mapped basic measures against each KTM



Source: WISE electronic reports.

Figure 5 Number of Member States which have mapped supplementary measures against each KTM



Source: WISE electronic reports.

Notes: List of KTMs

KTM1 - Construction or upgrades of wastewater treatment plants

KTM10 - Water pricing policy measures for the implementation of the recovery of cost of water services from industry

KTM11 - Water pricing policy measures for the implementation of the recovery of cost of water services from agriculture

KTM12 - Advisory services for agriculture

KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc)

KTM14 - Research, improvement of knowledge base reducing uncertainty

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

KTM18 - Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases

KTM19 - Measures to prevent or control the adverse impacts of recreation including angling

KTM2 - Reduce nutrient pollution from agriculture

KTM20 - Measures to prevent or control the adverse impacts of fishing and other exploitation/removal of animal and plants

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

KTM22 - Measures to prevent or control the input of pollution from forestry

KTM23 - Natural water retention measures

KTM24 - Adaptation to climate change

KTM25 - Measures to counteract acidification

KTM3 - Reduce pesticides pollution from agriculture.

KTM4 - Remediation of contaminated sites (historical pollution including sediments, groundwater, soil)

KTM5 - Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams)

KTM6 - Improving hydro-morphological conditions of water bodies other than longitudinal continuity

KTM7 - Improvements in flow regime and/or establishment of ecological flows

KTM8 - Water efficiency, technical measures for irrigation, industry, energy and households

KTM9 - Water pricing policy measures for the implementation of the recovery of cost of water services from households

KTM99 - Other KTM reported under PoM

As specified in the introduction to this chapter, Article 11(3) requires that the POMs include specified basic measures. Table 5 below shows the types of basic measures that have been reported mapped against KTMs in each Member State, and the number of RBDs within that Member State for which the measures have been reported. Only a quarter of the Member States reported that basic measures are in place to meet all the requirements of Article 11(3) of the WFD, but not all of these measures apply in all the RBDs. Two Member States have only 3 types of the basic measures required by Article 11(3) in place.

Of the types of basic measures required, half of the Member States who provided information have reported that measures are in place for the implementation of the Habitats[107] or Birds[108] Directives, and to meet the requirements of Article 11(3)(f) on controls for the artificial recharge or augmentation of groundwater and Article 11(3)(b) for the implementation of Article 9 on the cost recovery of water services.

[107] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

[108] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

Table 5 Basic measure types mapped against KTMs in the RBDs of each Member State

Basic Measure Type	Member State																										
	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
Urban Waste Water Treatment	3/3	5/8	4/4	1/1		4/10		2/3	13/14	25/25	6/8	13/14	2/2	1/1	3/3	8/8		2/2	4/4	1/1	4/4	10/10	9/10	1/1	5/5	2/2	2/2	15/15
Nitrates	3/3	5/8	4/4	1/1		6/10			12/14	17/25		11/14	2/2	1/1		7/8		2/2	4/4	1/1	4/4	10/10	8/10	1/1	1/5	2/2	2/2	15/15
IPPC IED	3/3		3/4			1/10		2/3	11/14	7/25		2/14	2/2	1/1	3/3	3/8			4/4	1/1	4/4	10/10	8/10	1/1		2/2	2/2	10/15
Habitats or Birds		1/8	2/4	1/1					12/14	2/25				1/1	3/3	3/8			4/4	1/1	4/4	1/10	8/10			2/2		3/15
Cost recovery water services		3/8	4/4		1/3				12/14	19/25		12/14	2/2	1/1	3/3	7/8		2/2			4/4	10/10	10/10			2/2		10/15
Efficient water use		3/8	3/4	1/1					12/14	20/25		6/14	2/2	1/1		7/8		2/2	4/4	1/1	4/4	10/10	3/10	1/1	5/5	2/2		11/15
Protection water abstraction	3/3	7/8	4/4		3/3				12/14	12/25		14/14	2/2	1/1	3/3	7/8		2/2	4/4		4/4	10/10	8/10		5/5	2/2	2/2	14/15
Controls water abstraction	3/3	6/8	4/4	1/1	3/3				12/14	21/25		12/14	2/2	1/1	3/3	7/8		2/2	4/4		4/4	10/10	3/10	1/1	5/5	2/2		12/15
Recharge augmentation groundwaters			2/4			1/10			12/14	2/25		1/14	2/2	1/1		3/8		2/2		1/1	4/4	10/10				2/2		11/15
Point source discharges	3/3	3/8	4/4	1/1	3/3	5/10			12/14	22/25	6/8	6/14	2/2	1/1	3/3	7/8		2/2	4/4	1/1	4/4	10/10	10/10	1/1	5/5	2/2	1/2	15/15
Pollutants diffuse	3/3	7/8	4/4	1/1	3/3	3/10		2/3	12/14	16/25	6/8	2/14	2/2	1/1	3/3	8/8		2/2	4/4	1/1	4/4	10/10	10/10	1/1	5/5	2/2	2/2	15/15
Hydro-morphology	3/3	7/8	4/4		3/3				12/14	23/25			2/2	1/1	3/3	7/8		2/2	4/4	1/1	4/4	10/10	9/10	1/1	5/5	2/2		12/15
Pollutants direct groundwater	3/3	3/8	2/4			2/10				2/25			2/2	1/1		5/8		2/2	4/4		4/4	10/10	9/10				2/2	13/15
Surface Priority Substances	3/3	6/8	3/4	1/1	3/3				12/14	6/25		10/14	2/2	1/1		8/8			4/4	1/1	4/4	10/10	8/10	1/1	5/5			15/15
Accidental pollution	3/3	3/8	2/4		2/3		No information		12/14	10/25		12/14	2/2	1/1		4/8		2/2	4/4		4/4	10/10	9/10		5/5	2/2		11/15

Source: WISE electronic reports.

Note: The first number is the number of RBDs where the measure is in place. The second number shows the total number of RBDs in the Member State – thus for Austria (AT) 3/3 indicates that measures are in place in all 3 RBDs, whereas for Spain (ES) 18/25 indicates that measures are in place in 18 of the 25 RBDs.

Targeting of measures to address the gaps to achieving WFD objectives

In order for measures to be effectively targeted, an analysis of the gap to good status should be carried out, ideally, at a water body level. Member States were asked to report indicators of the expected gap to good status for significant pressures for 2015, 2021 and 2027 together with indicators of the level of implementation expected in the KTMs to be applied to address the gaps.

From the information reported by the 28 Member States, it is clear that the implementation of such an analysis varies considerably between the Member States. Some Member States provided quantitative indicators for all RBDs showing the level of progress of implementation of KTMs expected in 2015, 2021 and 2027 and the progress towards good status that would be achieved for the main significant pressures to groundwater and surface waters. In some cases it was anticipated that the level of progress that could be achieved in addressing some significant pressures would be limited. Some Member States provided a strong analysis for some, but not all of their RBDs. A number of Member States only provided indicators for 2015 and 2021. In some cases this is because good status is expected to be achieved in all water bodies by 2021, but this is not the case for all. Some Member States provided quantitative indicators for the gap to good status for 2015 and 2021, but only provided qualitative information for the level of progress expected in the implementation of the measures. Four Member States (Germany, Finland, Malta and UK) provided some information for some significant pressures for some years for some RBDs.

A few Member States reported that it was not possible to identify quantitative indicators, for example due to the "complex pressure environment not allowing for the disaggregation of the pressure-measure relationship". A few other Member States reported that the information was not available.

It is clear that some Member States have made significant progress in identifying the gap to good status and the measures that should be implemented to address this, whilst others still have significant work to do. It is also clear that some Member States have not yet developed the methodology to achieve this level of analysis and there may be a benefit in ensuring an effective sharing of knowledge between and within Member States of how this analysis can be achieved.

Cost-Effectiveness Analysis and Prioritisation of Measures

Cost-effectiveness analysis is an appraisal technique that provides a ranking of alternative measures on the basis of their costs and effectiveness, where the most cost-effective has the highest ranking. A quantitative cost effectiveness analysis of measures was reported as having been carried out in 31 RBDs (in only five Member States). No cost-effectiveness analysis was reported to have been carried out in 22 RBDs (in five Member States). A qualitative cost-effectiveness analysis of measure was reported as having been carried out in 42 RBDs (in six Member States). A combination of qualitative and quantitative analysis was reported as having been carried out in the remaining 71 RBDs for which information was reported.

For the purpose of this assessment, further information was sought on the methodology used for the prioritisation of measures for most Member States. In all cases it was not possible to easily identify from the information provided by the Member States the methods used to prioritise measures, and how cost effectiveness analysis fits into this. It can therefore be concluded that little progress appears to have been made on this aspect of implementation since the first POMs.

Costs of planned measures

For the effective implementation of the second POMs, it is important that the costs of the planned measures are clearly identified. Member States were therefore asked to report the costs of measures (both capital investment and annual operation and maintenance costs) to meet Article 11.3(a) requirements (measures required to implement Community legislation for the protection of water) and measures to meet the requirements of Articles 11(3)(b-l), 11(4) and 11(5) (all other measures). Information could be reported either at the Member State level or at the RBD level. Table 6 shows which information was reported by each Member State and at what level.

A third of Member States reported all the information requested at the Member State level, whilst one only reported the capital investment costs, another only reported the capital investment costs for measures under Articles 11.3(b-l), 11.4 and 11.5 (all other measures). Another Member State also only reported costs for measures under Articles 11.3(b-l), 11.4 and 11.5 (all other measures) but did report both capital investment and annual operation and maintenance costs. Of these, only one Member State included depreciation in the calculations.

Of those Member States that reported information at an RBD level, only three provided full information for all RBDs. Two Member States only provided capital investment costs, no operation and maintenance costs were reported. Two Member States provided capital investment and operation and maintenance costs for both types of measures for most, but not all, RBDs. Two other Member States only provided capital investment costs for measures required by Articles 11.3(b-l), 11.4 and 11.5. The information provided by another two Member States varied widely between the RBDs. No information was provided by one Member State because the information was not available in the required format.

From the information reported, it can be estimated that the total capital investment needed for Article 11(3)(a) measures from 2016-2021 will be at least € 56000 million and that € 10200 million/year will be needed for operation and maintenance costs. The total capital investment costs for measures required by Articles 11(3)(b-l), 11(4) and 11(5) will be at least € 59600 million with € 3850 million/year in operation and maintenance costs.

Financing of measures

The planned measures identified will not be implemented unless the financing for these measures has been agreed. Lack of finance was one of the key barriers to effective implementation. Generally the Member States are expected to carry the costs of the EU environmental acquis, although, when eligible, they can call on EU funds for support.

As several Member States have met their basic needs in terms of water services with the help of EU funds, a significant source of support to Member States for the financing of measures is still EU funds, similar to the first RBMPs. Two thirds of RBDs reported that they are expecting a contribution from EU funds to the POMs. For instance, in the 2014-2020 period, EU cohesion policy invests about 15 billion EUR in the water sector.

An additional source of funding has been the LIFE+, which has been used for many different types of measures. Under its Environmental subprogramme, the development of RBMPs may be identified as a target for 'Integrated Projects', which has been done for example in Germany, Malta, Spain and UK.

Member States were asked to report the sectors for which a clear financial commitment has been secured for the implementation of the PoMs in each of these sectors. Nearly half of RBDs reported that financing has been secured for measures in all the relevant sectors, but a fifth of RBDs (in Belgium, UK, Spain, Italy and Latvia) reported that financing had not been secured for measures in any sector, whilst a tenth of RBDs reported that funding had been secured for only one sector, although for a few of these RBDs only that specific sector was reported as relevant (Figure 6).

Figure 7 below shows the number of RBDs that have secured funding for each sector. Over half of the RBDs have reported securing financing for measures in the agricultural sector, and/or from a governmental source (Parliament, Ministry of Finance etc.). At the other end of the scale, only a tenth of RBDs report that finance has been secured for measures in the energy sector for measures in the transport sector.

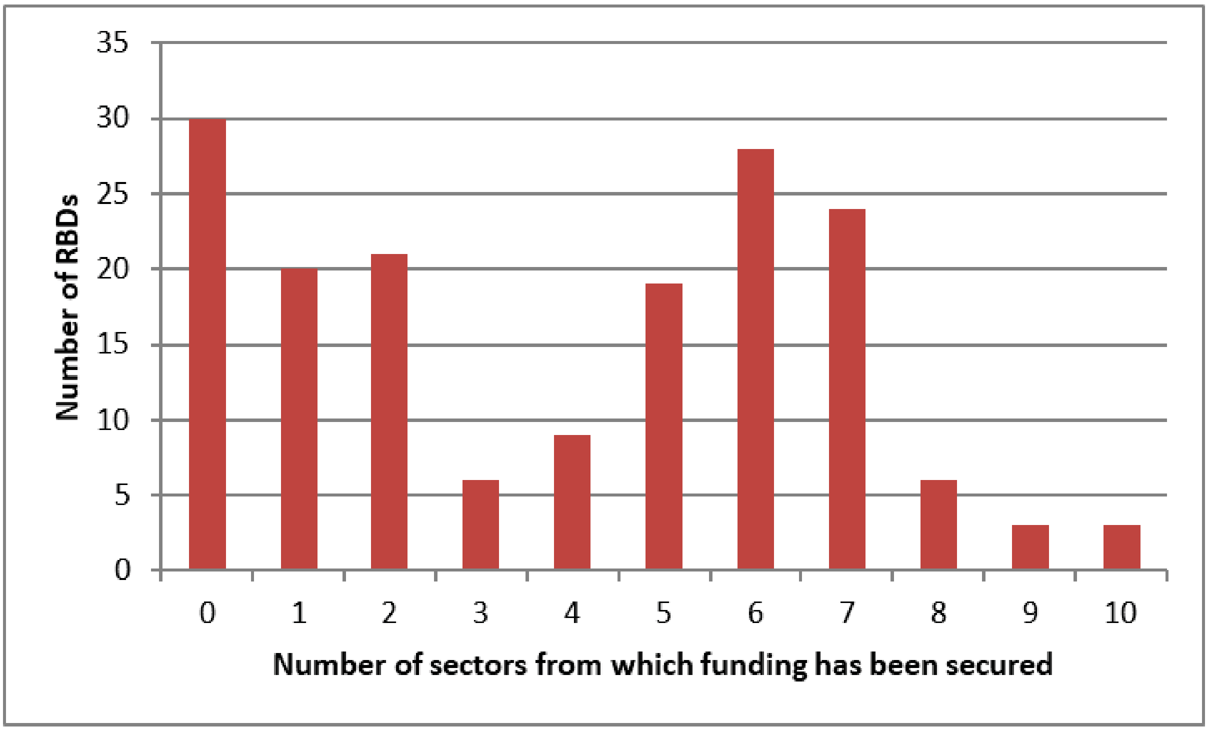
Table 6: Information reported by Member States on the costs of measures in the second cycle Programme of Measures

Member State	Level cost information reported	Article11.3(a) Capital investment reported	Article11.3(a) Annual costs reported	Depreciation included in Article 11.3(a) investment	Articles 11.3(b-l), 11.4 and 11.5 Capital investment reported	Articles 11.3(b-l), 11.4 and 11.5 Annual costs reported	Depreciation included in Articles 11.3(b-1), 11.4 and 11.5 investment
AT	Member State	Yes	Yes	No	Yes	Yes	No
BE	RBD/Region	Some RBDs, Some as 0	Some RBDs, Some as 0	No	Yes	Yes	No
BG	RBD	Yes	No	No	Yes	No	No
CY	Member State	Yes	As 0	No	Yes	As 0	No
CZ	RBD	As 0	As 0	No	Yes	No	No
DE	Nothing reported for all RBDs						
DK	Member State	No	No	No	Yes	No	No
EE	RBD	Some RBDs, Some as 0	Some RBDs, Some as 0	Yes	Yes	Yes	Yes
EL	Member State	Yes	No	No	Yes	No	No
ES	RBD	Yes	Some RBDs, Some as 0	No	Yes	Some RBDs, Some as 0	No
FI	Member State	Yes	Yes	No	Yes	Yes	No
FR	RBD	Yes	No	No	Yes	No	No
HR	Member State	Yes	Yes	No	Yes	Yes	Yes
HU	Member State/RBD	Yes	Yes	No	Yes	Yes	No
IE	Member State	Yes	Yes	No	Yes	Yes	No
IT	RBD	Some RBDs, Some as 0, Some not reported	Some RBDs, Some as 0, Some not reported	No or not reported	Some RBDs, Some as 0, Some not reported	Some RBDs, Some as 0, Some not reported	No or not reported

Member State	Level cost information reported	Article11.3(a) Capital investment reported	Article11.3(a) Annual costs reported	Depreciation included in Article 11.3(a) investment	Articles 11.3(b-l), 11.4 and 11.5 Capital investment reported	Articles 11.3(b-l), 11.4 and 11.5 Annual costs reported	Depreciation included in Articles 11.3(b-1), 11.4 and 11.5 investment
LT	Nothing reported for all RBDs. Commitments have been secured for some sectors						
LU	RBD	Some RBDs, Some as 0	No	Not reported	Yes	No	Not reported
LV	RBD	Yes	Yes	No	Yes	Yes	No
MT	Member State	Yes	Yes	No	Yes	Yes	No
NL	RBD (but all numbers identical)	No	No	Yes	Yes	No	Yes
PL	RBD	Some RBDs, Some as 0	All RBDs 0	No	Some RBDs, Some as 0	Yes	No
PT	RBD	Yes	Yes	No	Yes	Yes	No
RO	RBD (but only 1 RBD)	Yes	Yes	No	Yes	Yes	No
SE	Member State	As 0	As 0	No	Yes	Yes	No
SI	Member State	Yes	Yes	No	Yes	Yes	No
SK	Member State	Yes	Yes	No	Yes	Yes	No
UK	RBD	For most RBDs	For most RBDs	No	For most RBDs	For most RBDs	No

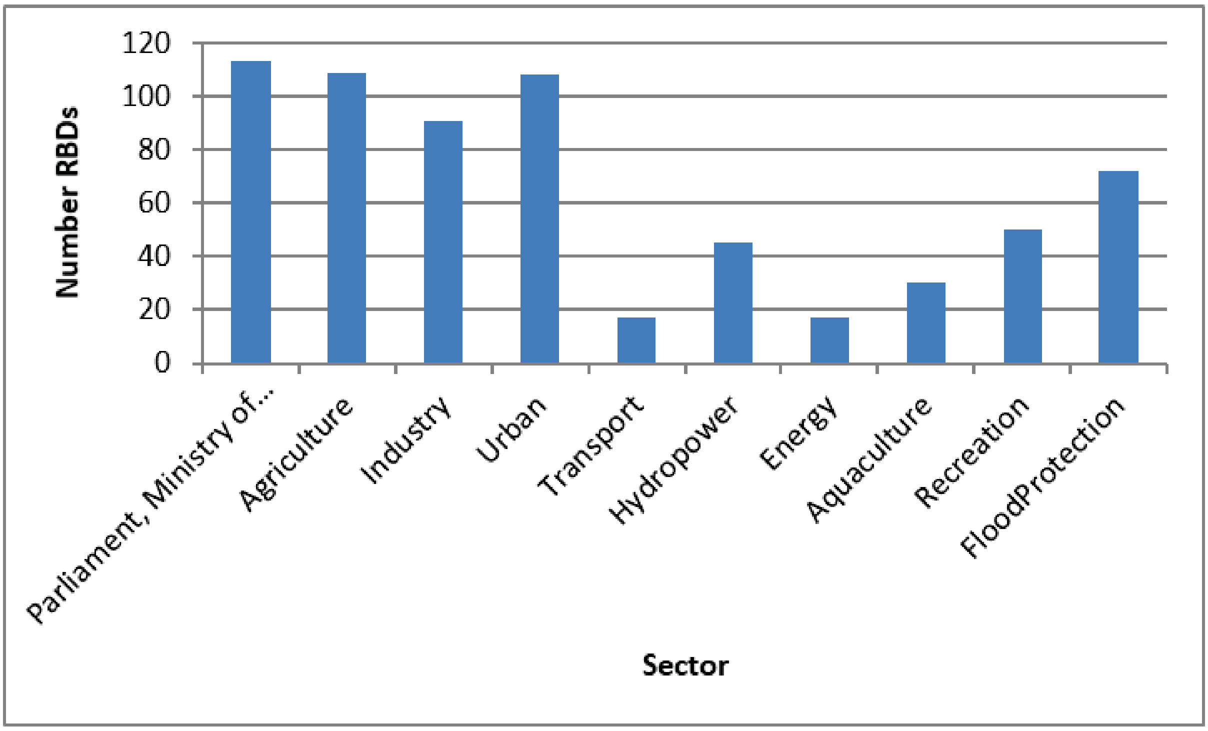
Source: WISE electronic reports.

Figure 6 Number of sectors for which each RBD has secured funding for the implementation of measures



Source: WISE electronic reports.

Figure 7 Number of RBDs for which funding is secured for the implementation of measures in each specific sector



Source: WISE electronic reports.

Co-ordination with MSFD

Article 13(2) of the MSFD[109] requires integration between the POMs adopted under the MSFD and the POMs adopted under the WFD. As the timescales of the two Directives are aligned, it is expected that joint consultation on the programmes will be carried out. This section will discuss whether the preparations of the RBMP and PoM have been co-ordinated with the implementation of the MSFD, whether the need for additional measures or more stringent measures beyond those required by the WFD in order to contribute to the achievement of the relevant MSFD objectives in coastal and marine environments have been considered in the PoM, and, if so, what parameters those measures should address. This section will also consider the KTMs that have been reported to be relevant to the purposes of the MSFD.

Table 7 shows the number and percentage of RBDs who have reported that the preparation of the RBMPs and PoMs has been co-ordinated with the MSFD and shows, that in the vast majority of cases this has been carried out. Table 8 shows that only a third of RBDs reported that the need for additional measures or more stringent measures beyond those required by the WFD in order to contribute to the achievement of the relevant MSFD objectives in coastal and marine environments have been considered in the PoM. Figure 8 shows the parameters for which additional or more stringent measures are needed, and the number of RBDs for which this applies.

For each measure reported in the inventory of measures, Member States were asked to indicate if it is relevant to the MSFD. 7 485 basic measures and 5 068 supplementary measures (a total of 12 553 measures) were reported to be relevant to the MSFD. Figure 9 shows the number of measures by KTM and Figure 10 shows the number of measures reported by Member State as relevant to the MSFD (*note*: these are a total of the measures reported for each RBD; if national measures apply in more than one RBD they will be double counted).

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[109] Directive 2008/56/EC of the European Parliament and the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (MSFD) https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0056&from=EN

Table 7: RBDs that have co-ordinated the preparations of the RBMP and PoM with the MSFD

Preparations of RBMP and PoM co-ordinated with MSFD	Number RBDs	Percentage RBDs
Yes	119	72%
No	26	16%
Landlocked country	21	12%

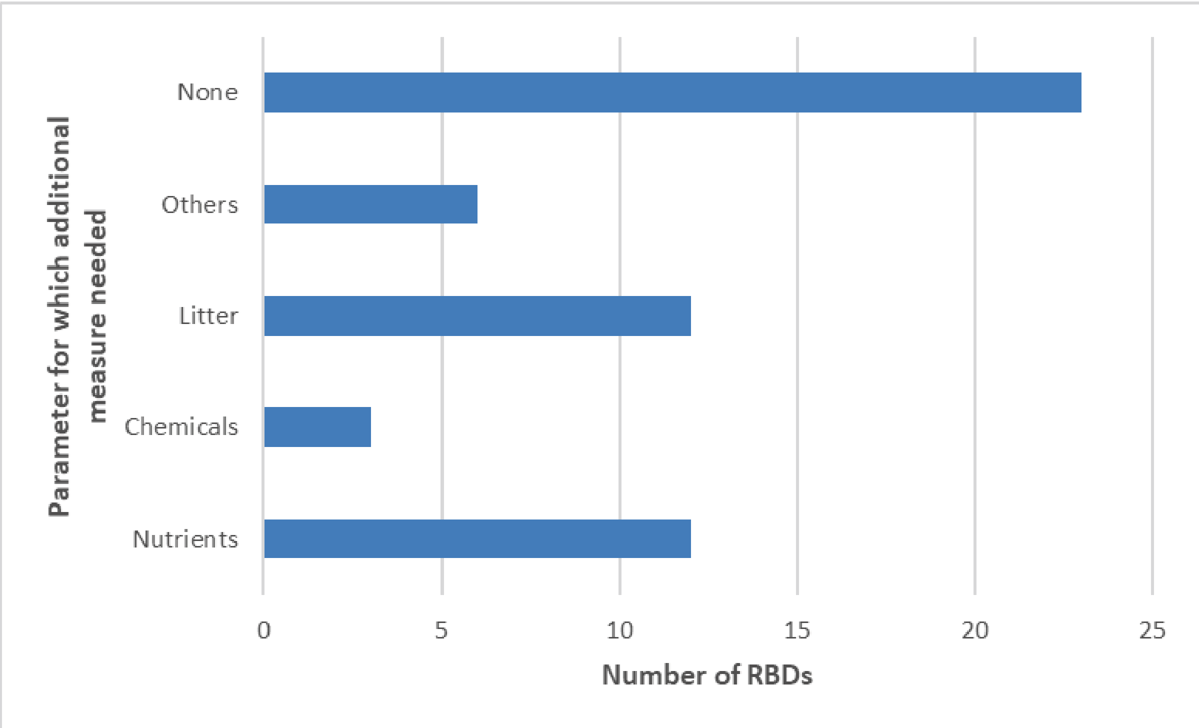
Source: WISE electronic reports.

Table 8: RBDs which reported whether the need for additional measures or more stringent measures beyond those required by the WFD in order to contribute to the achievement of the relevant MSFD objectives in coastal and marine environments have been considered in the PoM

Need for additional measures considered	Number of RBDs	Percentage of RBDs
Yes	48	27%
No	109	62%
Landlocked country	18	10%

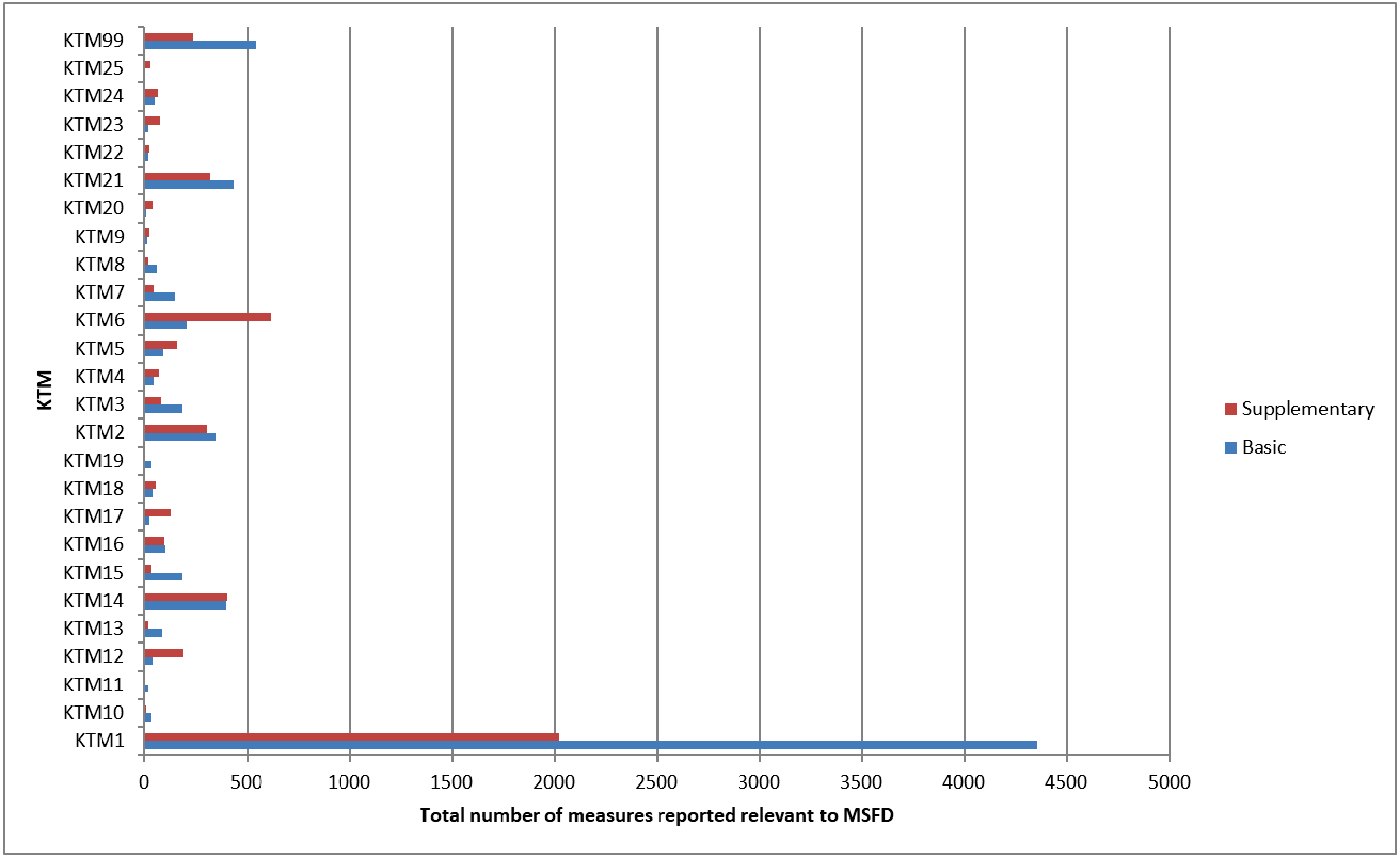
Source: WISE electronic reports.

Figure 8: The parameters for which additional measures or more stringent measures are needed beyond those required by the WFD in order to contribute to the achievement of the relevant MSFD objectives in coastal and marine environments



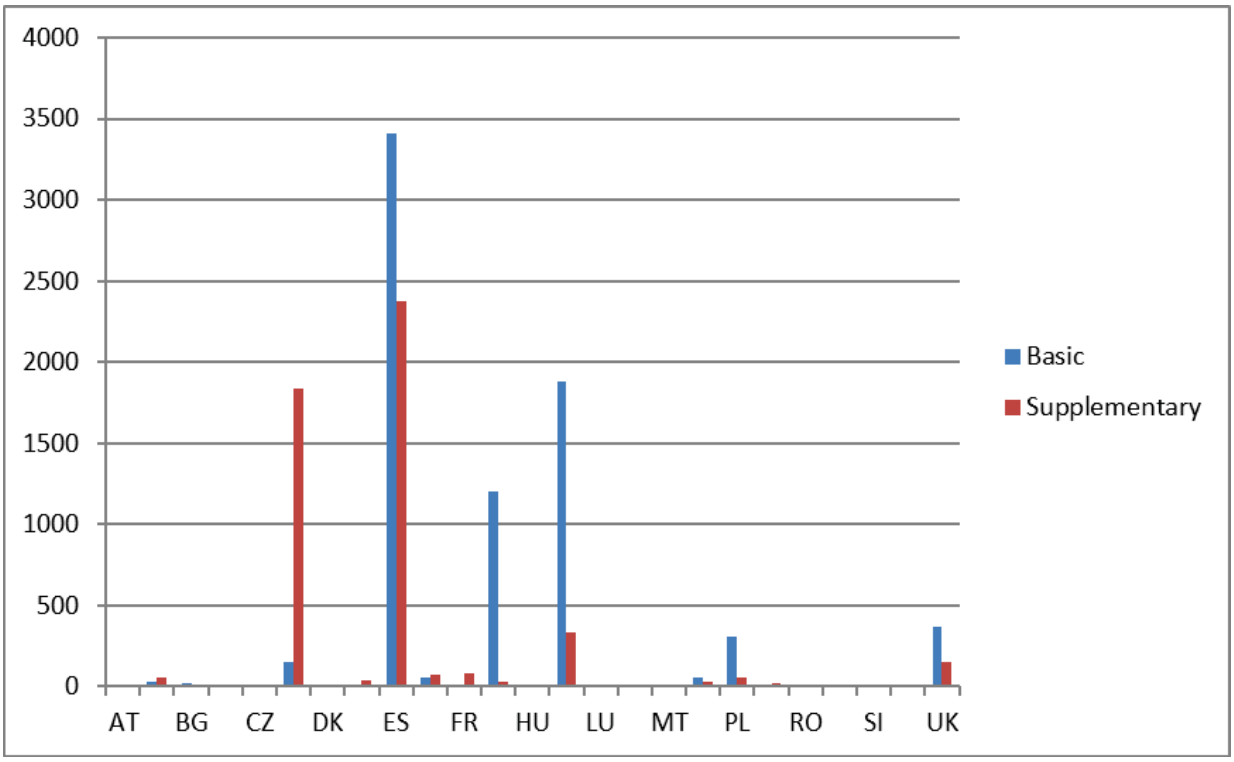
Source: WISE electronic reports.
Note: "None" indicates that the need for additional measures was considered but the conclusion was that no additional measures are needed.

Figure 9: Number of basic and supplementary measures reported as relevant to the MSFD by KTM


KTM99
KTM25
KTM24
KTM23
KTM22
KTM21
KTM20
KTM9
KTM8
KTM7
KTM6
KTM5
KTM4
KTM3
KTM2
KTM19
KTM18
KTM17
KTM16
KTM15
KTM14
KTM13
KTM12
KTM11
KTM10
KTM1
KTM
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
Total number of measures reported relevant to MSFD
Supplementary
Basic

Source: WISE electronic reports.

Figure 10: Number of MSFD relevant measures reported by Member State



Source: WISE electronic reports.

Co-ordination with the Floods Directive

The integration and high level co-ordination between the WFD and the Floods Directive[110] has been discussed in Section <> of this document on Governance. Article 9(2) of the Floods Directive requires that the development of the first FRMPs should be carried out in co-ordination with the review of the WFD RBMPs. This section investigates whether the objectives and requirements of the Floods Directive have been considered in the second RBMP and PoM, whether specific win-win measures in terms of achieving the objectives of the WFD and Floods Directive, drought management and use of Natural Water Retention Measures (NWRM) have been included in the PoM and whether the design of new and existing structural measures, such as flood defences, storage dams and tidal barriers, have been adapted to take into account WFD environmental objectives.

Table 9 summarises the results of the analysis carried out on these aspects. A minority of RBDs reported that the objectives and requirements of the Floods Directive had not been considered in the PoM. The majority of RBDs reported to have included win-win measures in the RBMPs in terms of achieving the objectives of the WFD and Floods Directive, drought management and use of Natural Water Retention Measures (NWRM), with only a few RBDs reporting that

[110] Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32007L0060&from=EN

they have not included such win-win measures in the PoM. A similarly high proportion of RBDs reported that the design of new and existing structural measures have been adapted to take account of WFD objectives. A few RBDs reported that structural measures had not been adapted.

Table 9: Summary of aspects relating to the integration of the PoMs for the WFD with the requirements of the Floods Directive

	Objectives and Requirements of FD Considered in PoM		Win Win measures included		Structural measures adapted	
	Number RBDs	Percentage RBDs	Number RBDs	Percentage RBDs	Number RBDs	Percentage RBDs
Yes	144	85%	149	88%	148	88%
No	25	15%	20	12%	21	12%

Source: WISE electronic report

Main changes in implementation and compliance since 1st cycle

The assessment of the first RBMPs showed that the measures were often not concrete and the expected achievements not always clear. In general, there was limited understanding that the PoM are to reflect the result of the analysis of pressures and impacts and the status information from the monitoring programmes. Often the definition of the measures was too vague and there was little clarity on the scope of the measure.

Furthermore, the financial commitment, the actors responsible for the implementation, the planned timetable and the expected effects on the improvement of the status were not described in the majority of the RBMPs. This lack of detail in the definition of the measures may have led to insufficient action to tackle the specific problems of the water bodies and hindered the achievement of the WFD at local level.

It is clear from the assessment of the second RBMPs that most Member States have taken some steps to improve the link between the status and measures by providing some information on the gap to good status, and the level of implementation of measures that is required to address that, for some of the relevant significant pressures. However, only a few Member States could be considered to have reported this analysis thoroughly and it is clear that a sharing of information on the methodologies used to carry out this analysis between and within Member States would assist in improving this aspect of implementation further for the third POMs.

The number of basic measures and supplementary measures reported has increased, although the number of measures reported by some Member States does appear to be excessive – it is questionable whether the number of measures reported can be properly implemented. Only very few Member States have reported that all the basic measures required by Article 11(3) are in place. In particular measures for the implementation of the Habitats and Birds Directive, for controls of artificial recharge or augmentation of groundwater and for the cost recovery of water services are lacking to a great extent.

The methodologies used by the Member States for the selection and prioritisation of measures are still not sufficiently transparent. Member States do not appear to be using quantitative cost effectiveness analysis techniques widely to assist them in the selection of measures.

All Member States have started to implement all or some of the measures planned in the first POMs, with the main obstacles to progress being a lack of finance, and unexpected planning delays. It is therefore important for the effective implementation of the second POMs that financing is in place. Despite this, only 46% of RBDs have reported that funding has been secured for the implementation of measures in all relevant sectors and 17% of RBDs have reported that no financing has been secured for the second POMs.

Measures related to other significant pressures

Introduction, key relevant requirements of WFD

Annex II of the WFD requires Member States to identify "other anthropogenic impacts on the status of water bodies, and Article 11(3)(i) requires basic measures to be in place "for any other significant adverse impact on the status of water identified under Article 5 and Annex II". This section of the report will provide an overview of the measures included in the second POMs to address the other anthropogenic pressures identified, specifically:

- Introduced species and diseases
- Exploitation or removal of animals or plants
- Litter or fly tipping
- Anthropogenic pressure - Other
- Anthropogenic pressure - Unknown
- Anthropogenic pressure - Historical pollution

Assessment of implementation and compliance with WFD requirements in 2nd cycle

Figure 8 below shows the number of RBDs where operational measures are reported in place to address other significant pressures in groundwater and surface water.

1. ***Measures related to other significant pressures in groundwater***

One Member State identified “Introduced species and diseases”, a quarter of the Member States “Anthropogenic pressure – Other”, a third of the Member States “Anthropogenic Pressure – Unknown” and a few Member States identified “Anthropogenic pressure - Historical pollution” as significant pressures to groundwater.

One Member State reported the KTM “KTM99 - Other KTM reported under PoM - No KTM data available” as being in place to address introduced species and diseases. Other KTMs reported as being in place to address “Anthropogenic pressure – Other” include:

- KTM12 - Advisory services for agriculture,
- KTM14 - Research, improvement of knowledge base reducing uncertainty,
- KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure,
- KTM25 - Measures to counteract acidification.

Other, nationally developed KTMs that are reported to address this pressure include “Measures to prevent or control the adverse impacts of other human activities”, “Environmental management of soil extraction sites”, “Other national measures” and “Measures to prevent or limit groundwater contamination”.

KTMs reported as in place to address “Anthropogenic Pressure – Unknown” in groundwater include,

- KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc) and, unsurprisingly,
- KTM14 - Research, improvement of knowledge base reducing uncertainty.

The measures in place to address “Anthropogenic pressure - Historical pollution” include:

- KTM3 - Reduce pesticides pollution from agriculture,
- KTM4 - Remediation of contaminated sites (historical pollution including sediments, groundwater, soil),
- KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc),
- KTM14 - Research, improvement of knowledge base reducing uncertainty,

- 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.

No nationally derived measures were reported to control historical pollution.

2. ***Measures related to other significant pressures in surface waters***

About half of the Member States identified **"Introduced species and diseases"** as a significant pressure in surface waters and all reported KTMs to address it. The KTMs reported to be in place include:

- KTM1 - Construction or upgrades of wastewater treatment plants,
- KTM5 - Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams),
- KTM6 - Improving hydro-morphological conditions of water bodies other than longitudinal continuity,
- KTM14 - Research, improvement of knowledge base reducing uncertainty,
- KTM18 - Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases,
- KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure,
- KTM23 - Natural water retention measures and
- KTM24 - Adaptation to climate change.

Other nationally derived KTMs include "Lake restoration", "Active fish stock/ shellfish stock management" and "Active vegetation management".

"Exploitation or removal of animals or plants" was identified by a quarter of the Member States as a significant pressure to surface waters. Measures in place to address it include:

- KTM6 - Improving hydro-morphological conditions of water bodies other than longitudinal continuity,
- KTM14 - Research, improvement of knowledge base reducing uncertainty,
- KTM18 - Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases,

- KTM19 - Measures to prevent or control the adverse impacts of recreation including angling,
- KTM20 - Measures to prevent or control the adverse impacts of fishing and other exploitation/removal of animal and plants,
- KTM24 - Adaptation to climate change.

Other nationally derived KTMs reported include “Measures to prevent or control the adverse impacts of other human activities” and “Other national measures to preserve and improve the structure and functions of aquatic ecosystems”.

“Litter or fly tipping” was reported as a significant pressure to surface waters by a few Member States. KTMs reported to address it include:

- KTM14 - Research, improvement of knowledge base reducing uncertainty,
- KTM19 - Measures to prevent or control the adverse impacts of recreation including angling,
- KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure

The nationally derived KTMs “Other measures at the source” and “Other management measures” were reported by one Member State.

About half of the Member States identified **“Anthropogenic pressure – Other”** as a significant pressure to surface water bodies with operational measures in place to address it, and provided details of the KTMs. One Member State also identified this as a significant pressure with operational measures in place, but did not report the KTMs. A wide range of measures in reported to be place to address this pressure including:

- KTM4 - Remediation of contaminated sites (historical pollution including sediments, groundwater, soil),
- KTM6 - Improving hydro-morphological conditions of water bodies other than longitudinal continuity,
- KTM12 - Advisory services for agriculture,
- KTM14 - Research, improvement of knowledge base reducing uncertainty,
- KTM17 - Measures to reduce sediment from soil erosion and surface run-off,

- KTM18 - Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases,
- KTM19 - Measures to prevent or control the adverse impacts of recreation including angling,
- KTM20 - Measures to prevent or control the adverse impacts of fishing and other exploitation/removal of animal and plants,
- KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure,
- KTM23 - Natural water retention measures,
- KTM24 - Adaptation to climate change and
- KTM25 - Measures to counteract acidification.

Other nationally derived KTMs include "Measures to prevent or control the adverse impacts of other human activities", "Lake restoration", "Measures to retain sediment and nutrient before discharged to surface waters", "Reduce nutrient pollution from other sources", "measure in river water bodies limiting significant pressure on lake water body" and "Develop evidence base to support management of marine litter and marine litter strategy".

More than two-thirds of the Member States reported KTMs to address the significant pressure **"Anthropogenic pressure – unknown".** One Member State did not report this as a significant pressure where operational measures are in place, and two Member States reported that operational measures are in place, but did not report KTMs. The KTMs reported as being in place to address this pressure include:

- KTM6 - Improving hydro-morphological conditions of water bodies other than longitudinal continuity,
- KTM8 - Water efficiency, technical measures for irrigation, industry, energy and households,
- KTM9 - Water pricing policy measures for the implementation of the recovery of cost of water services from households,
- KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc),
- KTM14 - Research, improvement of knowledge base reducing uncertainty,

- 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,

- KTM18 - Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases,

- KTM19 - Measures to prevent or control the adverse impacts of recreation including angling,

- KTM20 - Measures to prevent or control the adverse impacts of fishing and other exploitation/removal of animal and plants, and

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

Other nationally derived KTMs include "Measures to prevent or control the adverse impacts of other human activities", "Lake restoration", "Reduce nutrient pollution from other sources", "Characterise and quantify hydrological input of land based contaminants (including litter) to coastal waters from major sub catchments", "Investigate the role transboundary contaminants through hydrographic pathways and the extent of its contribution to marine contamination", "Carry out investigations to gauge potential contribution of contaminants to our coastal waters by atmospheric deposition", and "Carry out a survey of all direct discharges to sea and identify their source with the objective of setting up a plan to curtail/regulate such discharges", "Risk management", and a "Study on development and application of methodology for assessing the ecological status in terms of salinity of water bodies with natural mineral loading".

More than a third of the Member States identified **"Anthropogenic pressure – Historical pollution"** as a significant pressure. All reported that operational measures are in place to address them and provided details of the KTM. One Member State also reported this as a significant pressure with operational measures in place, but did not give details of the KTMs. KTMs reported as in place to address the pressure include:

- KTM4 - Remediation of contaminated sites (historical pollution including sediments, groundwater, soil),

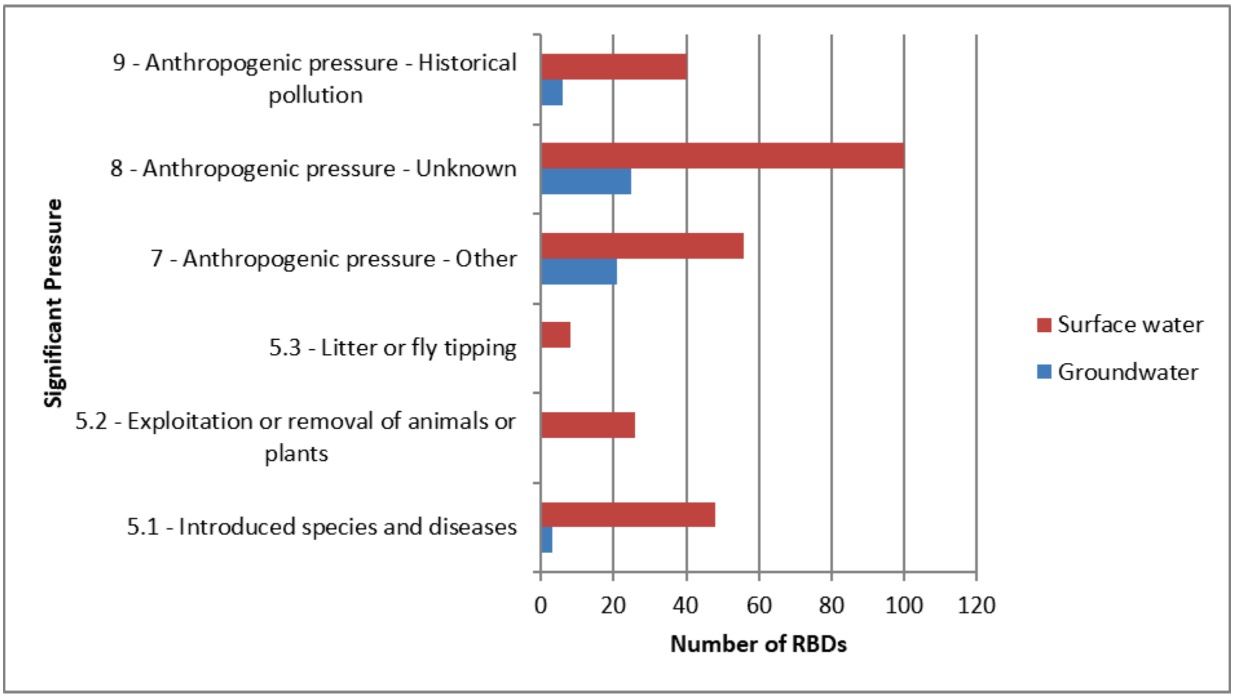
- KTM14 - Research, improvement of knowledge base reducing uncertainty and

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

Other nationally derived KTMs include “No measure in this cycle - review of less stringent target in next cycle”, “Reduce nutrient pollution from other sources”, and “Other generic measures”.

The analysis of the gap to good status and the identification of indicators for the implementation of measures is also valid for measures related to other significant pressures, as discussed for the other pressures above.

Figure 8 Number of RBDs with operational KTMs to address other significant pressures



Source: WISE electronic reports.

Main changes in implementation and compliance since 1st cycle

The approach taken to addressing other pressures was not assessed in the first cycle and therefore it is not possible to make a direct comparison.

5.9.2 Conclusions

Progress has been made with the implementation of the first POMs, although a lack of finance is a significant obstacle. 27 RBDs in five Member states (Belgium, UK, Spain, Italy and Latvia) reported that financing had not been secured for measures in any sector.

Most Member States have made some progress in identifying the gap to good status for each significant pressure, and the level of implementation of measures required to achieve good status. Six Member States (Germany, Greece, Lithuania, Finland, Malta and UK) provided some information for a number of significant pressures for some RBDs and few Member States only provided indicators of the expected gap to good status for significant pressures for 2015 and 2021. However, more work is needed to refine this for the third POMs.

It is clear that a lack of finance is likely to continue to present an obstacle to the implementation of the second POMs as 54% of RBDs have yet to secure finance for all relevant sectors.

Not all Member States have reported other significant pressures. It is not clear whether this is because they are not relevant or because they have not assessed them.

For those Member States that have identified other pressures, measures are in place to address them, the gap to good status has generally been identified, and indicators developed to identify the level of implementation required to achieve good status.

5.9.3 Recommendations

- Member States should ensure that the RBMPs clearly identify the gap to good status for individual pressures and water bodies, and that Programmes of Measures are designed and implemented to close that gap.
- Clear financial commitments should be ensured for all RBDs and information on the costs of the measures provided.
- KTMs should be reported to address significant Priority Substances, RBSPs and abstraction pressures, identified as causing failure of objectives.
- All KTMs should be operational and measures should cover all the significant pressures identified as causing failure of objectives.

5.10 Measures related to abstractions and water scarcity

5.10.1 Introduction

More than 7 600 (7%) of Europe's surface water bodies are affected by significant water abstraction pressures and 16% of the area of groundwater bodies is affected by over-abstraction, being 11% of the area in worse than good quantitative status[111]. Since the first RBMPs were published, there has been little progress in improving status due to reducing abstraction pressures; although it is noted that total water abstraction decreased by around 7% between 2002 and 2014[112]. However, it should also be noted that significant abstraction pressures are not always metered and are often just estimated, e.g. based on surveys or cropping patterns, which can lead to significant degree of uncertainty.

In the past, water scarcity management in the EU has largely focused on increasing supply by drilling new wells, constructing dams and reservoirs, applying desalination techniques, constructing large-scale water-transfer infrastructures, etc.; and there are still RBDs where such actions remain as a major focus (as for instance Ebro RBD in Spain). However, as Europe cannot endlessly increase water supply, demand measures should be applied including the use of economic instruments, water loss controls, water-reuse and recycling, increased efficiency of domestic, agricultural and industrial water use combined with water savings[113]. Moreover, land-use or cropping-pattern changes should be applied, as well as the use of natural water retention measures and water-saving campaigns should be supported by public education programs. Water savings will bring additional benefits, for example by reducing pollution discharges, treatment costs and energy consumption.

The WFD provides a comprehensive framework for the protection and management of water. Sound water management requires joint management of qualitative and quantitative aspects. Water quantity can have a strong impact on water quality and therefore on the achievement of GES, e.g. by exercising abstraction pressures. Hence, quantitative requirements are implicit in the definition of GES and explicitly through the inclusion of flow regime as a supporting hydro-morphological element.

In particular, good quantitative status is required for groundwater, where a balance between abstraction and recharge must be ensured. Furthermore, groundwater levels should not be subject to anthropogenic alterations that might have impacts on surface waters and groundwater dependent ecosystems.

[111] EEA (2018) European waters – assessment of status and pressures 2018. EEA 2018 State of Water report

[112] https://www.eea.europa.eu/data-and-maps/indicators/use-of-freshwater-resources-2/assessment-2

[113] E.g. supported by Art.46 of Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005

When developing the WFD RBMPs and associated PoMs, quantitative and qualitative aspects should be jointly considered to be coherent and to create synergies where possible. Quantitative issues should, in particular, be taken into account when making operational the objective of GES and the objective of no further deterioration of current status (Articles 4(1), 4(5), 4(6) and 4(7)). In particular, actions to manage and preserve water quantity (e.g. actions to address water scarcity) should be considered as measures (basic/supplementary) when developing the RBMP and associated PoM.

Article 11(3)(e) of the WFD explicitly requires controls over the abstraction of surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorization of abstraction and impoundment. These permits have to be periodically reviewed and, where necessary, updated. Furthermore, other basic measures to be considered in addressing water abstractions, are those under Article 11(3)(c) to promote an efficient and sustainable water use and Article 11(3)(f) which refers to controls, including a requirement for prior authorisation of artificial recharge or augmentation of groundwater bodies, as well as those on water pricing considered under Article 10. Supplementary measures (Article 11(4)) can address other related topics, such as water reuse.

Assessment of implementation and compliance with WFD requirements in 2nd cycle

For the majority of Member States, the reported information to WISE concerning abstractions, water scarcity and related measures is coherent and there are no doubts or unexpected gaps. However, for some Member States, the information reported was unclear for some RBDs (for instance in Bulgaria, Czech Republic, Lithuania, Germany or France), where water scarcity/over abstraction had not been considered as relevant in the reporting, despite the fact that they have RBDs where more than 10% of surface or groundwater bodies are affected by significant abstraction pressures. In Ireland water abstraction was not reported as a significant pressure.

Water exploitation and trends

Water exploitation and/or trends have only been reported to WISE for some RBDs (e.g. in Cyprus, Spain, Hungary, Italy, Malta, Portugal, Slovakia, UK). However, the data assessment by the European Environmental Agency[114] allows showing an overview on water consumption, as reflected on the following four maps (January, April, July and October) for the latest available year (2014):

[114] http://www.eea.europa.eu/data-and-maps/explore-interactive-maps/water-exploitation-index-for-river-1

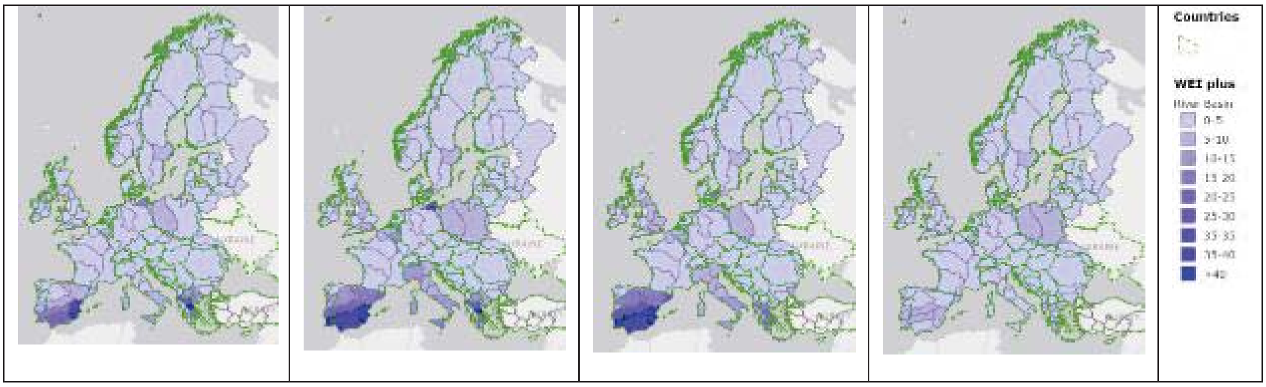


Figure: Water Exploitation Index + of European RBDs in January, April, July and October 2014

The maps show the most severe water consumption pressures for spring and summer mainly in the Western and Eastern Mediterranean.

Main uses for water consumption

In many Member States, the most relevant uses for water consumption have not been reported to WISE because the pressures from those uses on water quantity have not been considered as significant (some reported information came from Belgium, Ireland, Greece, Spain, Croatia, Italy, Malta and UK). However, the most relevant water uses continue stable compared to the first cycle, mainly for energy production in Northern Europe; and abstractions for agriculture in Southern Europe.

Water quantity pressures have been reported as significant only in 11 Member States[115] and for most (all except Belgium and Denmark), information is reported on the most relevant uses for water consumption. It should also be noted that in some Member States, although water quantity pressures are not reported as significant (and thus no data on water consumption uses are provided), there are significant water abstraction pressures present in one or more of their RBDs (e.g. in Bulgaria, Croatia, Czech Republic, Germany, France).

Measures related to abstractions and water scarcity

Controls over the abstraction of surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorization of abstraction and impoundment (under Article 11(3)(e)) are used along all Member States, with certain differences regarding the existence of a register or of controls for all abstractions. Only in Ireland it was reported that ~~basic measures under Article 11(3)(e) are not relevant as~~ there is no permitting regime to control water impoundment or register of impoundments.

[115] Belgium, Cyprus, Denmark, Greece, Spain, Hungary, Italy, Malta, Portugal, Slovakia, UK

Most Member States[116] apply exemptions to permitting and/or register for small abstractions, and though this lowers administrative burden it might be inconsistent, if groundwater bodies do not achieve good quantitative status due to the accumulation of such minor abstractions. The causal chain for specific water bodies has not been assessed in this report.

Water permits have to be periodically reviewed and, where necessary, updated. The granted permits are in place for very different timespans, ranging from short periods up to very long periods which hardly allow adapting abstraction permits to thresholds required for achieving the WFD objectives.

Other basic measures to address water abstractions are in place widely across the EU, such as those under Art.11.3 (c) to promote an efficient and sustainable water use and – less extended – Article 11(3)(f) controls, including a requirement for prior authorisation of artificial recharge or augmentation of groundwater bodies. Supplementary measures (Article 11(4)), such as e.g. water reuse, are in place in many RBDs, and in particular in those which suffer from water scarcity.

The key technical measures most employed by Member States to tackle significant abstraction pressures are KTM7 - Improvements in flow regime and/or establishment of ecological flows and KTM8 - Water efficiency, technical measures for irrigation, industry, energy and households. Some further KTM have also been applied in some cases, including KTM9/10/11 - Water pricing policy measures for the implementation of the recovery of cost of water services from households/ industry/ agriculture, KTM12 - Advisory services for agriculture, KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc), KTM14 - Research, improvement of knowledge base reducing uncertainty, KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure, for groundwater related pressures, and KTM24 - Adaptation to climate change.

Main changes in implementation and compliance since 1st cycle

According to the reporting on the second RBMPs, for most Member States no major changes have occurred regarding measures to address water abstractions and scarcity. However, several Member States (15 out of 28 assessed Member States[117]) are planning new measures or significant changes to basic measures related to water abstraction and scarcity (e.g. basic measures under Article 11(3)(c) and 11(3)(f)).

Some Member States which previously had specific recommendations from the European Commission to improve measures related to water abstraction and scarcity still present major

[116] Bulgaria, Czech Republic, Cyprus, Estonia, Spain, Finland, France, Croatia, Hungary, Italy, Lithuania, Malta, the Netherlands, Portugal, Romania, Sweden, Slovenia, Slovakia, UK

[117] Belgium, Bulgaria, Cyprus, Czech Republic, Estonia, Croatia, Hungary, Italy, Luxembourg, Malta, Netherlands, Portugal, Romania, Sweden, Slovakia

gaps on implementation (Spain, Portugal and to lesser extent Sweden) and other still need progress in those previous recommendations (Greece, Italy, Malta, Slovenia).

Some Member States have taken measures to improve controls on abstractions, which can reflect good practice (Cyprus, Hungary, Malta, Portugal, Slovenia, UK).

5.10.2 Conclusions

More than 7 600 (7%) of Europe's surface water bodies are affected by significant water abstraction pressures and 16% of the area of groundwater bodies is affected by over-abstraction.

Basic and supplementary measures are in place in most of the RBDs concerned with water scarcity. However, progress in reducing pressures is slow.

More progress is needed especially in those Member States in which small abstractions are exempted from controls and/or register, but water bodies are suffering from significant water abstraction pressures and therefore do not achieve good status (e.g. Estonia, Spain, France, Italy, Malta, Poland, Portugal, UK).

Some Member States still need to make progress in fulfilling previous recommendations to improve water scarcity management (~~Ireland,~~ Spain, Portugal, Italy, Malta, Sweden, Slovenia).

However, relevant action in extending metering, water abstraction controls and review licenses can be observed in some countries, while water abstraction datasets have improved in others.

5.10.3 Recommendations

- Member States should progress in reducing existing significant water abstraction pressures, and in truly acting in river basin districts concerned with water scarcity issues.

- Groundwater bodies with over-abstraction problems are often well identified. Thus, action needs to be focused on implementing the required measures to revert trends and achieve good quantitative status.

- Relevant action is required in extending metering, water abstraction controls and review of licenses and water abstraction registers. Small abstractions exempted from control/registers should be reviewed in areas with significant abstraction pressures.

- Member States are encouraged to monitor water consumptions/abstractions per sector and assess trends over the WFD cycles, as quantitative and qualitative aspects should be jointly considered in the status assessment and establishment of measures. Recommended and endorsed indicators such as Water Exploitation Index+ should be further applied in water scarce basins.

Measures related to pollution from agriculture

5.11.1 Introduction

Key relevant requirements of WFD

As set out in chapter 6.9 above, in accordance with the environmental objectives laid out in WFD Article 4 and based on a risk assessment and the status assessment supported by the monitoring programmes, Member States are required to implement necessary measures to prevent the deterioration of water bodies and to achieve good water status in surface and groundwater. These measures should be listed in the POMs (WFD Article 11).

The POMs must include basic measures and supplementary measures addressing the identified pressures. Basic measures relevant for the agricultural sector include those set out in WFD Article 10 (IPPC Directive,[118] Nitrates Directive[119]) and in Annex VI including the Habitats Directive[120] and Plant Protection Products Directive[121]. WFD Articles 16 and 17 further affect the agricultural sector by requiring the establishment of a list of priority substances that pose a risk to the aquatic environment, including those in relation to fertiliser and pesticide application in the agricultural sector.

The assessment of the first RBMPs showed that basic measures alone, mostly likely, may not lead to sufficient improvements in water body status in all cases; supplementary measures (according to WFD Annex VI, Part B) may be needed to target the significant pressures which the agricultural sector poses on the water environment and to achieve the objectives set out in Article 4.

Assessment of implementation and compliance with WFD requirements in 2nd cycle

Main pressures

According to the EEA report "European waters -- Assessment of status and pressures" (2018), agriculture is the main driver for failure of good chemical status to EU groundwater, causing diffuse pollution by nitrates and pesticides. Agricultural production is also a major source of diffuse pollution into surface water, mostly associated with excessive emissions of nutrients

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[118] Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32008L0001

[119] Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:31991L0676

[120] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora https://eur-lex.europa.eu/legal-content/FRF/TXT/?uri=celex:31992L0043

[121] Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC https://eur-lex.europa.eu/legal-content/frn/TXT/?uri=CELEX:32009R1107

and chemicals such as pesticides. Water abstraction for agriculture is amongst the main significant pressures causing failure of good quantitative status of groundwater bodies[122].

Based on the assessment of the first RBMPs, the Commission recommended to almost all Member States to assess actions needed to close the gap between the current status and the achievement of good status in terms of load reductions for nutrients and pesticides. This recommendation was followed by half of the Member States, which reported their RBMPs, as shown in table 1 below. The remaining Member States are still lacking a gap assessment and it remains unclear how the selection and location of measures will contribute to closing the gap.

Those Member States or RBMPs, which have performed a gap assessment, either based themselves on the loads to be reduced or the areas to be covered by agricultural measures. For those Member States which carried out gap assessments, nitrogen is addressed in all cases and phosphorus by two-thirds of them. Pesticides are addressed in the gap assessment by only a few Member States.

Table 1 Gap assessment in terms of load reductions for nutrients and pesticides

Member State	Information on gap assessment in the second RBMPs
Cyprus	A gap assessment for nitrogen was performed including an evaluation/prediction of how effective the measures are/will be at reducing the pressures to the level needed for achieving good status.
Czech Republic	A gap assessment exists for pesticides, nitrogen and phosphorus. .
Germany	A gap assessment for the reduction in the number of applications of pesticides is only provided for a few RBDs. A gap assessment on the load of nitrogen/phosphorus to be reduced to achieve objectives was done in all RBDs.
Greece (EL)	A gap assessment on the load of nitrogen/phosphorus was done (e.g. in Nitrates Vulnerable Zones) No gap assessment has been reported for the reduction in the number of application of pesticides.
Spain	A gap assessment has been partly performed for water quantity (abstraction pressures) and nitrates pollution.
Croatia	A gap assessment has been performed for diffuse nutrient pollution.
Hungary	A gap assessment for nitrogen and phosphorus was performed and is reported.
Ireland	Gap assessments on the load of nitrogen/phosphorus to be reduced were done (e.g. the Nitrates Action Programme monitoring). No gap assessment for the reduction in number of applications of pesticides.

[122] ”European waters -- Assessment of status and pressures 2018

Italy	A gap assessment can only be found for nutrients in a few RBDs
Latvia	A gap assessment has been performed on the load of nitrogen/phosphorus to be reduced to achieve objectives for 2015. There is also information on the area (km2) of agricultural land required to be covered by measures to tackle nutrient pollution to achieve WFD objectives.
Netherlands	A gap assessment has been performed for diffuse nutrient pollution, physical alteration of channel/bed/riparian area/shore from agriculture and dams, barriers and locks serving the purpose of irrigation in all basins.
Poland	The gap assessment addresses diffuse chemical pollution and nitrates.
Romania	A gap assessment for nutrients and pesticides was performed and the areas that need to be covered by measures are indicated.
Sweden	A gap assessment was carried out for the load of nitrogen/phosphorus to be reduced and for reduction in the number of applications of pesticides to achieve objectives.

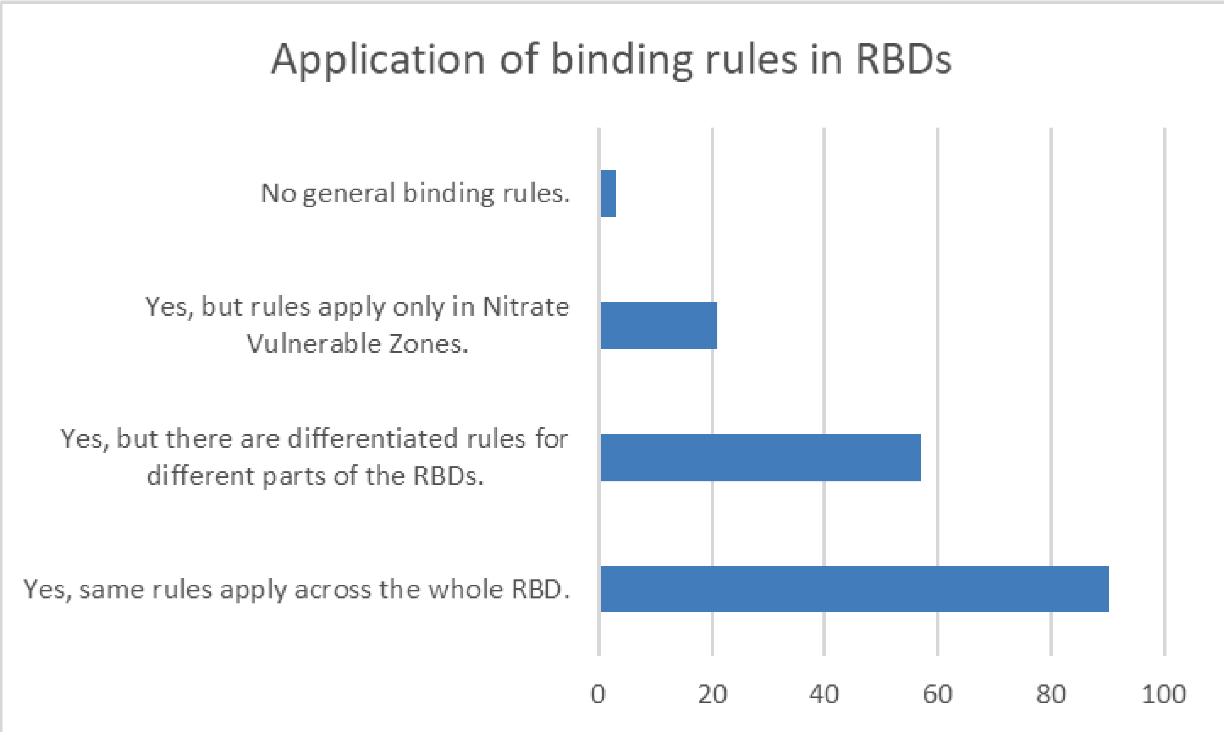
Source: Second RBMPs.

Types of measures applied in the second cycle programmes of measures

According to the assessment of the second RBMPs, all programmes of measures contain basic and supplementary measures. To tackle diffuse pollution, the WFD requires the implementation of basic measures under Article 11(3)(h) to prevent or control the input of pollutants from agriculture at source. Such basic measures are reported for all assessed Member States, but not for all RBDs and not for all diffuse pollutants (sediments, phosphorus, pesticides, nitrates, microbiological/bacteriological and other pollutants).

Member States are also required to state whether general binding rules are in place for the control of diffuse pollution from agriculture. Furthermore, Member States are required to report whether these rules apply across the whole RBD, only in Nitrate Vulnerable Zones (NVZ) or if there different rules apply for different parts of the RBD, linked to where pressures have been identified. The figure below gives an overview of the application of binding rules in the RBDs at EU level. Overall, general binding rules are in place in 161 RBDs. In only three RBDs are binding rules not applied. In most RBDs (83), the same binding rules apply across the whole RBD.

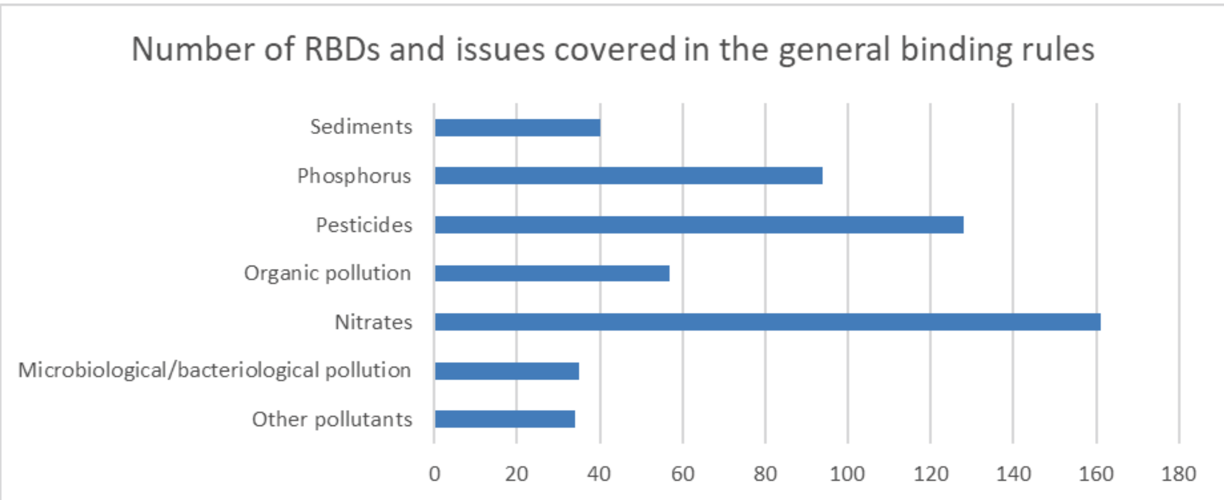
Figure 13: Application of general binding rules in RBDs for the control of diffuse pollution from agriculture



Source: WISE electronic reporting.

If general binding rules are applied, Member States are required to provide information on the particular issues covered (sediments, phosphorus pesticides, organic pollution, nitrates, microbiological/bacteriological and other pollutants).

Figure 14: Number of RBDs and issues covered in the general binding rules

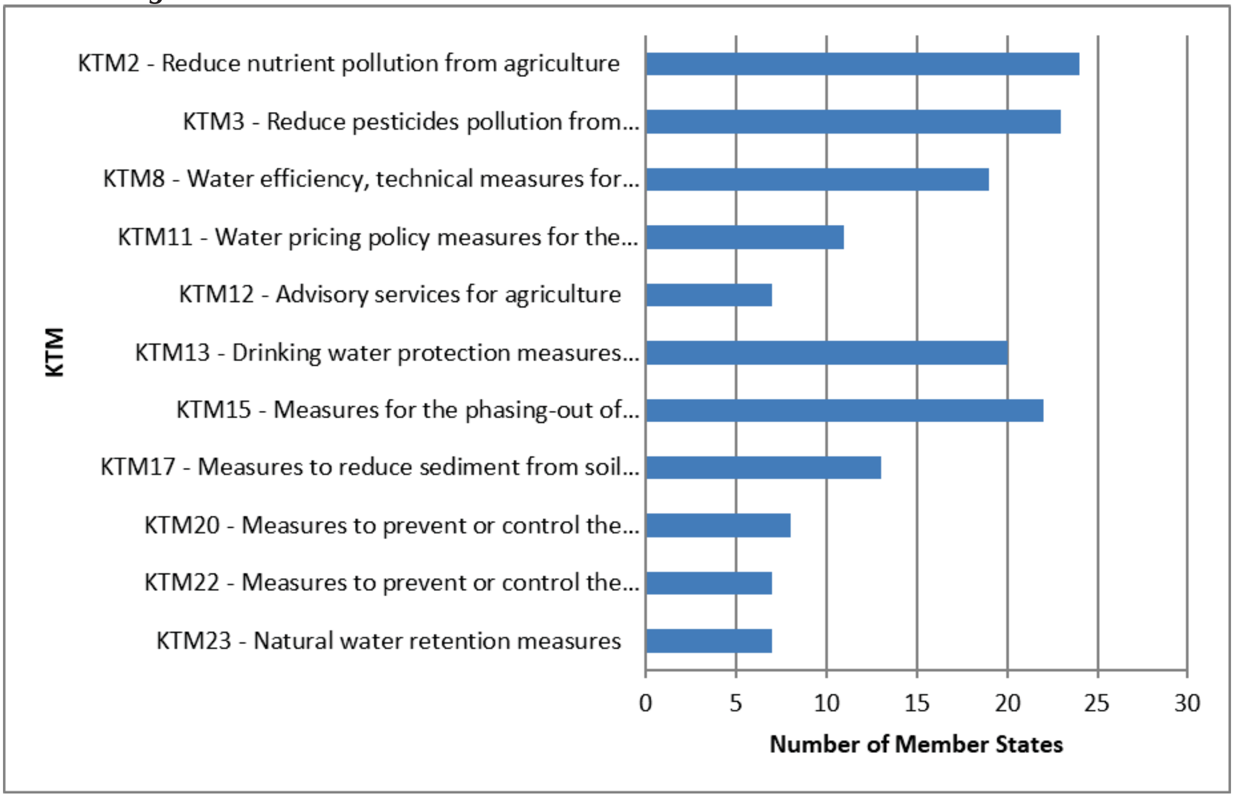


Source: WISE electronic reporting.

According to Figure 2 above, general binding rules for nitrates are applied in all except five RBDs. General binding rules for all other pollutants are less often applied.

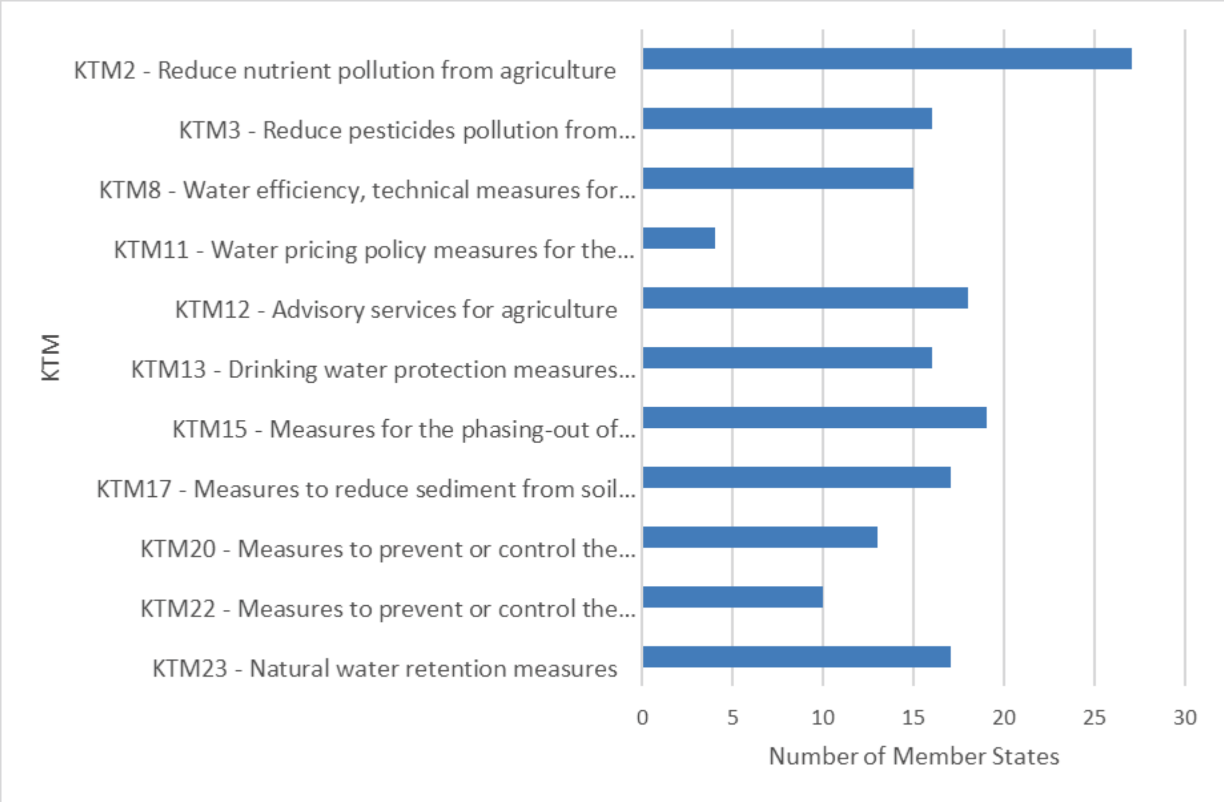
The figures below show the number of Member States which report national basic and supplementary measures under the main KTMs related to agriculture.

Figure 15: Number of Member States which report national basic measures under KTM related to agriculture.



Source: WISE electronic reporting.

Figure 4: Number of Member States which report national supplementary measures under KTM related to agriculture



Source: WISE electronic reporting.

Most Member States have reported national basic measures under KTM2 to reduce nutrient pollution from agriculture. There are also supplementary measures reported under KTM2 in almost all Member States with few exceptions. The majority of Member States also have basic measures reported under KTM3 to reduce pesticides pollution from agriculture, KTM8 on water efficiency, technical measures, KTM15 to phase-out or reduce emissions of Priority Substances and KTM13 on drinking water protection measures. Other KTMs reported to a lesser extent are: KTM14 on research, improvement of knowledge base reducing uncertainty, KTM12 on advisory services for agriculture, KTM16 to upgrades or improvements of industrial wastewater treatment plants (including farms),KTM23 - Natural water retention measures from agriculture, KTM99 on other key type measures reported under PoM.

Special attention is given to drinking water protection. Most Member States have defined, or are in the process of defining, specific zones including specific water protection measures (see also chapter 15) and apply basic measures under KTM13 (Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc)). In several countries, there are also supplementary measures reported under KTM13.

While basic measures are mandatory in most cases, the supplementary measures are mostly applied on a voluntary basis and are linked to the EU Rural Development Programs under the Common Agricultural Policy (CAP). Payments under Article 38 of the Rural Development Regulation contribute to the implementation of the Water Framework Directive.

Considering the fact that agricultural pressures and in particular nutrients are still amongst the main reasons for not achieving good status, the high dependency on voluntary action by the farming sector might not lead to an adequate degree or rate of improvement across all RBDs, if the uptake by farmers remains low.

The CAP´s mandatory cross-compliance framework includes statutory requirements related to water protection and management arising from the implementation of the Groundwater Directive and Nitrates Directive, as well as GAEC[123] standards relevant for the protection of waters. In addition, under the CAP´s Greening, additional rules have been introduced for protecting water and habitats by establishing ecological focus areas. It is acknowledged that there is room for improvement in the implementation of this measure.[124]

Farmers Consultation

Almost all Member States reported having consulted with farmers or farmers associations when setting up the programmes of measures.

Financing of measures

More than two-thirds of the Member States reported that the financing of agricultural measures is secured in all their RBDs and, in a few cases, in most of their RBDs. The EU Rural Development Program is mentioned as the main source of funding. For those Member States where financing of measures is not secured, the effectiveness of the POMs with regard to agriculture might be significantly impacted. Also, the voluntary nature of measures could be a limiting factor if their uptake by farmers remains low.

The WFD also requires the application of the polluter pays principle under Article 9. This is only partly implemented in the agricultural sector as most supplementary measures are still financed by external sources such as the EU Rural Development Programs and national sources.

[123] Good Agricultural and Environmental Conditions https://ec.europa.eu/agriculture/direct-support/cross-compliance_en

[124] See also Special report no 21/2017 from the European Court of Auditors: *"Greening: a more complex income support scheme, not yet environmentally effective"* https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=44179

Subsequently, the Commission has acknowledged in its reports on greening that there was room for improvement in implementation and a number of regulatory changes have been adopted to both simplify the functioning of the scheme and to enhance its environmental performance.

Main changes in implementation and compliance since 1st cycle

Due to differences in the reporting of Member States under the first and second RBMPs and different methods of status assessments of the RBMPs, a detailed comparison between the first and second cycle is not possible. However, some observations can be made:

- The main pressures remain diffuse pollution (with excessive emissions of nutrients and chemicals such as pesticides) and water abstraction in certain areas.
- Agriculture remains one of the main drivers for water pollution and over-abstraction.
- Some progress has been made in terms of identifying and quantifying the gap between the current status and good status in terms of load reductions for nutrients and pesticides.
- The types of measures applied by the agricultural sector have not changed. Many of the supplementary measures found in the second cycle programmes of measures are linked to the Rural Development Programmes with potential for inadequate progress in mitigating risk to water due to the voluntary nature of measure implementation, when there is a low uptake by farmers.
- Farmers' involvement seems to have increased as most Member States report having consulted with farmers or farmers associations when setting up the programmes of measures. However, the quality of this engagement remains unclear and ongoing advisory support for farmers in implementation of measures is absent from most RBMPs.

5.11.2 Conclusions

Agriculture continues to be a significant pressure on surface and groundwater in most RBDs in the EU. Agriculture has been identified as a major source of pollution and over-abstraction and is partly responsible for habitat degradation. Only about half of the Member States have performed a gap assessment in terms of load reductions for nutrients and pesticides for their second RBMPs, following the Commission recommendation from the first cycle. For those who have not yet carried out such a gap assessment, it remains unclear how the selected measures will contribute to achieving good status. Member States need to closely monitor whether the objectives are going to be achieved or not. This includes investigation of the causes of the possible failure and establishment of necessary additional measures.

Basic measures under Article 11.3 are mandatory in most RBDs. Supplementary measures are mostly applied on a voluntary basis and linked to the EU Rural Development Programs. Considering the fact that agricultural pressures, and in particular nutrients, are still a main reason for not achieving good status, the high dependency on voluntary action by the farming sector might not lead to an adequate degree or speed of improvement to achieve WFD objectives within a reasonable timeframe. This is of particular importance when developing the next phase of the Common Agricultural Policy, which is likely to continue to be a major source of funding.

5.11.3 Recommendations

- In the third RBMPs, Member States should identify appropriate sources of funding, such as Common Agricultural Policy Strategic Plans, to facilitate implementation of measures to contribute to achieving the WFD objectives in all RBDs. The effective involvement of environmental authorities in the designing of CAP Strategic Plans should support this process.
- Member States should ensure that there are explicit links in the RBMPs between the WFD and other related Directives (e.g. Nitrate Directive, Sustainable Use of Pesticides Directive etc.), supporting programmes and instruments (e.g. CAP Strategic Plans, LIFE etc.) and include both nitrogen and phosphorus in the general binding rules.
- Member States should state clearly to what extent, in terms of area covered and pollution risk mitigated, basic measures (minimum requirements to be adhered to) or supplementary measures (designed to be implemented in addition to basic measures) will contribute to achieving the WFD objectives in all RBDs.
- Member States should ensure a clear strategy is developed that defines the basic measures that all farmers should adhere to as well as the additional supplementary measures that may be required. The strategy should be developed in cooperation with the farming community to ensure technical feasibility and acceptance and an expert and effective advisory service should be made available to farmers to aid successful implementation of the measures. The strategy should be reflected in the system of conditionality, eco-schemes and agri-environment-climate commitments of the CAP Strategic Plans.

5.12 Measures related to pollution (including nutrients, organic matter and chemicals) from sectors other than agriculture

5.12.1 Introduction

In the context of this chapter, pollution is considered in terms of:

(a) general physico-chemical elements and river basin specific pollutants (RBSPs) from non-agricultural sources causing failure or risk of failure to achieve GES;
(b) priority substances from non-agricultural sources causing failure or risk of failure to achieve good chemical status of surface waters; and
(c) groundwater pollutants from non-agricultural sources causing failure or risk of failure to achieve good chemical status of groundwaters.

Chemical pollution from non-agricultural sources, like that from agriculture, poses a threat to the aquatic environment and to human health via the environment. Effects include acute and chronic toxicity in aquatic organisms, accumulation of pollutants in ecosystems, loss of habitats and biodiversity, and contamination of drinking water supplies and fishery products. As a matter of priority, causes of pollution have to be identified so that measures to combat it can be put in place. Pressure and impact assessment for the identification of sources of pollutants has to be carried out under Article 5 WFD. On the basis of the information collected in accordance with that Article and Article 8, Member States have to establish an inventory of emissions, discharges and losses of all priority substances, and the eight so-called "other pollutants" in the EQSs Directive, for each RBD or part of a RBD lying within their territory, including their concentrations in sediment and biota, as appropriate.

Emissions of pollutants should be dealt with at source, in the most economically and environmentally effective manner.

According to WFD environmental objectives, in making operational the programmes of measures specified in the RBMPs, the Member States must implement the necessary measures in accordance with WFD Article 16(1) and (8), with the aim of progressively reducing pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances to the aquatic environment. Specifically in relation to groundwater, the Member States shall implement the measures necessary to prevent or limit the input of pollutants into groundwater and to prevent the deterioration of the chemical status of all bodies of groundwater.

More explanation about the types of measures applied is provided in chapter 6.9.

Chapter 5.2 provides information on the assessment of pressures and impacts on surface and groundwater bodies as well as on the establishment and use of inventories of discharges, emissions and losses of chemical substances. Chapter 6.4 provides information on the monitoring of priority substances discharged to surface waters and on the priority substances causing failure of good chemical status. Chapter 6.6 provides information on WFD groundwater chemical monitoring and substances causing failure to achieve good chemical status for groundwater bodies.

KTMs to tackle pollution from non-agricultural sources

There are two broad categories of measures that could be established for the control and reduction of pollution from non-agricultural sources:

- measures referring to the source of pollution that allow the reduction/phasing-out of more than one pollutant (e.g. a wastewater treatment process); and

- measures relating to the specific substances causing the pollution (e.g. banning or restricting the use of a substance).

Assessment of implementation and compliance with WFD requirements in the second cycle

All 27 Member States assessed provided information on measures addressing pollution by nutrients, organic matter and chemicals (priority substances, river basin specific pollutants, groundwater pollutants and other physico-chemical parameters) arising from sectors and sources other than agriculture.

Non-agricultural sectors contributing to pollution include urban wastewater, atmospheric deposition, mining, Industrial Emissions Directive (IED) plants and non-IED plants, historical pollution, storm overflows, urban run-off, forestry, transport, contaminated or abandoned industrial sites, discharges not connected to sewerage networks, and waste disposal sites.

Chapter 6.9 provides more information on the main significant pressures likely to give rise to pollution of surface and groundwater bodies for which KTMs are operational.

The KTMs reported to be pertinent to tackling pollution from non-agricultural sources include:

KTM1 - Construction or upgrades of wastewater treatment plants,
KTM4 - Remediation of contaminated sites (historical pollution including sediments, groundwater, soil),
KTM5 – 'Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams)
KTM6 – 'Improving hydromorphological conditions of water bodies other than longitudinal continuity'
KTM7 – 'Improvements in flow regime and/or establishment of ecological flows'
KTM8 – 'Water efficiency, technical measures for irrigation, industry, energy and households'
KTM9 – 'Water pricing policy measures for the implementation of the recovery of cost of water services from households'
KTM10 – 'Water pricing policy measures for the implementation of the recovery of cost of water services from industry'
KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc),
KTM14 - Research, improvement of knowledge base reducing uncertainty,
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,
KTM18 – 'Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases'

KTM20 – ‘Measures to prevent or control the adverse impacts of fishing and other exploitation/removal of animal and plants’
KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infra-structure,
KTM22 - Measures to prevent or control the input of pollution from forestry,
KTM25 - Measures to counteract acidification, and
KTM99 - Other KTM reported under PoM.

The majority of Member States reported several of the KTMs mentioned above as pertinent to tackling pollution from non-agricultural sources. However, the reporting to WISE was not always consistent with the reporting in the RBMPs. Furthermore, some KTMs pertinent to non-agricultural pollution were not always reported under Topic 12 itself, giving the impression that they were not considered relevant. More details on the number of RBDs which reported each KTM as operational to address at least one significant pressure as well as on the number of measures and the distinction between basic and supplementary measures are provided in chapter 6.9.

While in the first RBMPs, the availability of measures against chemical pollution of surface waters by particular substances was generally not reported, in the second RBMPs, several Member States reported KTM15 and/or other KTMs in relation to specific substances. Although some Member States indicated that they were looking at measures to combat mercury pollution, others indicated that it was difficult to see how sufficient measures could be taken against that pollutant at Member-State level..

Progress towards achieving the objectives between 2015 and 2027 via measures related to pollution from non-agricultural sources is expected in most of the Member States which reported information on relevant pressure gap indicators and KTMs.

Basic measures to reduce pollution from non-agricultural sources are being taken in most of the Member States:

- An **authorisation and/or permitting regime to control wastewater point source discharges** is in place in all Member States for surface and in most Member States for groundwater, although coastal waters are not covered in at least one instance.
- A **register of wastewater discharges** (Basic measures under Article 11(3)g) is available in all RBDs of most of the Member States for surface and groundwater. In a few Member States the register of wastewater discharges is available for surface water only. No register of wastewater discharges was adopted in any RBDs in Ireland, however discharges from sewerage systems owned, managed and operated by Water Service Authorities require a wastewater discharge licence or certification of authorisation from the Environmental Protection Agency.

- There are no **thresholds below which wastewater discharges do not require permits and are not subject to registration** (WFD Article 11(3)(g)) in more than half of the Member States. Small discharges are exempted from controls in fewer than half of the Member States. In a few Member States, small discharges do not require permits but are registered.
- There is **prohibition of all direct discharges** to groundwater in almost half of the Member States and in some of the RBDs of a few additional Member States. Some direct discharges to groundwater are authorised in accordance with Article 11(3)(j) in other Member States, at least in some of their RBDs.
- There are **measures** in place **to eliminate / reduce pollution from priority substances and other substances** in all (reported) RBDs in the majority of the Member States.

Main changes in implementation and compliance since the first cycle

In the first RBMPs, the measures focusing on household-related pollution covered mostly measures related to the Urban Wastewater Treatment Directive and to WFD Article 11(3)(g), (h) and (k). The identification of substance-specific measures was generally missing in the first RBMPs, as substance-specific measures were reported only for a few RBDs, and they were generally not linked to failure of chemical or ecological status. Many of the measures addressing chemical pollution in the Member States were general and it was not always clear whether the value they provided could be attributed to action taken specifically to meet the WFD objectives.

In the second RBMPs, substance-specific measures to reduce the emissions of the chemical substances preventing the achievement of good status have been adopted in most of the Member States. In a few Member States, the substance-specific measures are clearly reported in the RBMPs but in many other Member States, the main evidence for substance-specific measures comes only from the WISE electronic reports, according to which KTMs are in place in many Member States for at least some of the priority substances and or river basin specific pollutants causing failure of good status. In these cases, however, the specific measures proposed in the respective RBMPs are often generic and not substance-specific, thus not addressing specific priority substances or river basin specific pollutants.

In a few Member States, no substantial improvement in terms of substance-specific measures was observed in many or all of their RBDs, and the measures to tackle pollution from non-agricultural sources are still very general and not linked to failure of chemical and ecological status.

It has to be pointed out that because of the limited level of detail reported in some of the first RBMPs on this issue, it is challenging to identify all relevant progress made in Member States.

Several Member States are making particular progress on improving urban wastewater treatment, through the construction or upgrading of treatment plants. However, it is not always clear whether funding has been secured for planned upgrades.

5.12.2 Conclusions

Basic measures to reduce pollution from non-agricultural sources such as an authorisation and/or permitting regime to control wastewater point source discharges, the operation of registers of wastewater discharges, and the prohibition or limitation of all direct discharges to groundwater, and/or other measures to eliminate / reduce pollution from priority substances and other substances are in place in most of the Member States.

The identification of substance-specific measures was a major gap in the first RBMPs, as substance-specific measures were reported only for a few RBDs, and they were often general and not linked to failures of chemical and ecological status. This situation has improved in the second RBMPs, as substance-specific measures to reduce the emissions of the pollutants preventing the achievement of good status have been adopted in several Member States. There is however still significant room for improvement as the specific measures proposed in the RBMPs of many Member States are often generic and not substance-specific, and in a few Member States the measures are still very general and not linked to failure of chemical and ecological status.

Progress towards achieving the objectives between 2015 and 2027 via measures related to pollution from non-agricultural sources is expected in most of the Member States which reported information on relevant pressure gap indicators and KTMs. Although some Member States specifically referred to the need to phase out the emissions of priority hazardous substances, the rationale for identifying measures appeared in most cases to be the need to meet the EQSs for good status. Therefore measures are likely to be missing where needed in some RBDs to achieve the phasing out of emissions.

5.12.3 Recommendations

- Member States should ensure that measures (including KTMs) are identified to address pollution by individual substances (Priority Substances, RBSPs and Groundwater pollutants) from non-agricultural sources.
- Member States should assess the likely effectiveness of measures so that they can identify and implement appropriate supplementary measures to achieve the objective of good status as soon as possible.
- Member States should ensure the operation of a register of discharges and a suitable authorisation/permitting regime for all relevant water bodies.

- The progress made on implementing improvements to urban waste water treatment, including sourcing funding and prioritising the most important locations, should be continued and accelerated where possible.

- Member States should ensure that measures aim at phasing out the emissions of Priority Hazardous Substances, including where the EQSs have not been exceeded.

5.13 Measures related to hydro-morphological alterations

5.13.1 Introduction

The WFD explicitly requires Member States to manage the effects on the ecological status of water which result from changes to physical characteristics of water bodies. It requires action in those cases where the hydro-morphological modifications are having an impact on the ecological status interfering with the ability to achieve the WFD objectives and to avoid deterioration due to new modifications or new sustainable human development activities.

Measures related to hydro-morphological improvements in the RBMPs are mainly reported as supplementary measures with the aim of achieving the objectives established pursuant to Article 4. Also basic measures under article 11(3) can impose controls over activities related to hydro-morphological modifications. In addition to controls and registers of physical modifications, certain regulatory actions may be taken to support the improvement of hydro-morphology, such as reviewing existing permits to incorporate mitigation measures for the achievement of WFD objectives.

WFD hydro-morphological measures planned to reduce existing hydro-morphological pressures and improve the ecological status or potential of impacted water bodies should not be taken in a silo approach but it is beneficial both in terms of the effects to be achieved and funding opportunities to coordinate the planning of WFD measures with the planning process for other sectors (e.g. planning for the energy, transport and agricultural sectors).

Assessment of implementation and compliance with WFD requirements in 2nd cycle

Links of measures to significant hydro-morphological pressures

Significant hydro-morphological pressures have been identified in practically all Member States assessed for this report. No hydro-morphological pressures were identified in a single case which may be due to the lack of appropriate assessment methods and appropriate monitoring data to understand the nature of hydrological and morphological modifications.

Hydro-morphological pressures should be clearly related to the main sectors responsible for causing these pressures on the water environment However, in the second RBMPs of most Member States, the identified hydro-morphological pressures are not clearly apportioned to specific sectors, according to the WISE reporting. The significant hydro-morphological pressures have been clearly linked to sectors only in a fifth of Member States. In a third of Member States, the sector linked to the significant hydro-morphological pressures of all or the largest share of affected water bodies is either unknown or reported as “other” (i.e. not linked to one of the key sectors in the WISE reporting). In almost half the Member States, there is only partial apportionment of the hydro-morphological pressures to sectors, i.e. for part of the pressures or in part of the RBDs, apportionment has been made, while for other pressures or in other RBDs, the sector is unknown or "other".

The KTM reported most frequently by Member States as operational to address significant hydro-morphological pressures in the second RBMPs are:

- KTM 5 - Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams).
- KTM 6 - Improving hydro-morphological conditions of water bodies other than longitudinal continuity (e.g. river restoration, improvement of riparian areas, removal of hard embankments, reconnecting rivers to floodplains, improvement of hydro-morphological con-dition of transitional and coastal waters, etc).
- KTM 7 - Improvements in flow regime and/or establishment of ecological flows.
- KTM 14 - Research, improvement of knowledge base reducing uncertainty
- KTM 17 - measures to reduce sediment from soil erosion and surface run-off
- KTM 23 - Natural water retention measures
- KTM 24 – Adaptation to climate change
- KTM 99 – Other KTM reported under the POMs

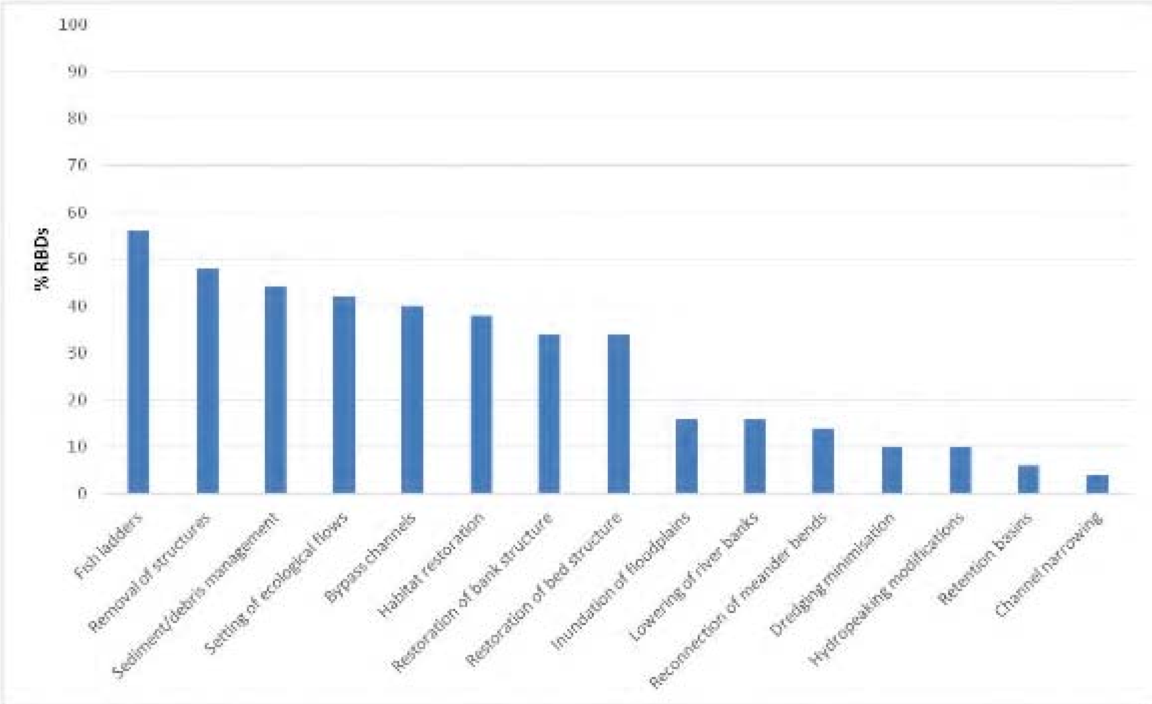
Section 8.9 provides additional information on the number of national measures (basic and supplementary) mapped against each of these KTM in each Member State.

The majority of Member States have reported operational KTM to address the significant hydro-morphological pressures in all their RBDs where such pressures are identified. In a few Member States, no KTM to tackle hydro-morphological pressures were reported in WISE, although hydro-morphological pressures are identified. It is noted though that in these Member States, information in the published RBMPs gives evidence that hydro-morphological measures are planned for the second cycle, despite the gap in the WISE reporting.

In a few Member States, operational KTM for hydro-morphological pressures are reported only for some but not all of their RBDs. In some Member States, KTM are addressing only some but not all of the main hydro-morphological pressures identified. In one example, KTM are addressing only pressures linked to continuity barriers but not other types of hydro-morphological pressures. In one of the RBDs in another country, KTM (research activities) are generally addressing physical alterations.

The main types of specific national measures taken to address hydro-morphological modifications were checked in 50 representative RBDs across Member States. The hydro-morphological measures most frequently planned in the second RBMPs are related to continuity interruption (e.g. fish ladders, removal of structures such as weirs, bypass channels), sediment/debris management, setting of ecological flows, habitat restoration and specific restoration of modified bed and bank structures.

Figure 1 Main types of specific national measures on hydro-morphology



Source: Published RBMPs of 50 RBDs selected for detailed assessment across the EU. The RBDs selected were those with the most extensive hydro-morphological pressures in each Member State.

Indeed, restoring river continuity is in many RBDs one of the priority issues for hydro-morphological improvements. River continuity is specifically related to the free passage of fish and is in this respect distinguished into upstream continuity (allowing the fish to migrate upstream) and downstream continuity (allowing downstream migration). Management objectives for restoring river continuity are reported to have been set in all RBDs of approximately half of the Member States, while in another few Member States, such objectives have been set for some but not all of their RBDs. More than a third of Member States have reported not to have set any management objectives for river continuity. The objectives set for river continuity are quantitative (e.g. km of rivers connected, number of obstacles to be made passable) in all RBDs of almost half of the Member States, while in another quarter of Member States, the objectives are quantitative only for some of the RBDs. In one Member State, although continuity objectives are set, they have not been quantified.

Basic measures under WFD article 11.3(i)

Almost all Member States take basic measures to address hydro-morphological pressures according to WFD article 11.3(i). These measures correspond to authorization/permitting regimes to control physical modifications, which cover changes to the riparian area. Only one has such an authorization/permitting regime, which does not cover changes to the riparian area. In another Member State, no authorisation/permitting regime for physical modifications has been reported.

The majority of Member States also has registers of physical modifications in place in all their RBDs or in a few of their RBDs. In one fifth of Member States, there is no register of physical modifications in any of the RBDs.

Natural water retention and green infrastructure measures

In the 2015 recommendations of the Commission based on the assessment of progress on the implementation of the programmes of measures from the first RBMPs, many Member States were asked to provide evidence that they consider natural water retention and green infrastructure measures in their second RBMPs.

Win-win measures in terms of achieving the objectives of the WFD and Floods Directive, drought management and use of Natural Water Retention Measures are reported to be included in the programmes of measures in the majority of Member States. In one Member State, such win-win measures are reported for some but not all of its RBDs, while in a few Member States, such win-win measures have not been included in their programmes of measures.

The specific KTM on natural water retention (KTM23) is reported as operational to address significant hydro-morphological pressures (e.g. related to flood protection and agriculture) or abstractions in one third of Member States. In one country , KTM23 is applied but only in relation to diffuse pollution pressures (hydro-morphology or abstractions). In the majority of Member States though, KTM23-Natural water retention measures is not reported yet as part of the operational KTM to tackle significant pressures. Examples of measures reported under KTM23 refer to the restoration of floodplain meadows and floodplain forests but also reconstruction of drainage systems in agriculture and forestry or removal of weirs in the context of river restoration.

Measures for ecological flows and their implementation

Having a sufficient ecological flow regime is a prerequisite to reach GES in rivers and it is crucial to maintain a flow throughout the river continuum. Therefore, establishing ecologically based flow regimes is an important measure in the RBMPs.

In the second RBMPs, ecological flows have been reported to be derived and implemented for all relevant water bodies in very few Member States. In the majority of Member States, ecological flows have been derived and implemented only for some water bodies yet in all or part of their RBDs. Therefore, in most Member States, the work on defining and implementing ecological flows is still ongoing in the second cycle.

In one fifth of Member States and in some of the RBDs of another fifth, ecological flows have not been derived yet, but there are plans to do so during the second planning cycle.

As shown in Figure 1, setting of ecological flows is planned as a specific measure in 42% of the second RBMPs, in the majority of Member States. Explicit references that the establishment of ecological flows is addressed by specific regulations were found for several Member States, while in some of these, the relevant requirements are new compared to the legislation which was valid under the first RBMPs. In other Member States, there are still ongoing initiatives to set new standards and methodologies for ecological flow definition in order to achieve WFD objectives.

Table 1 Derivation and implementation of ecological flows in the second RBMPs

Derivation and implementation of ecological flows		**Member States**
Ecological flows **derived**	**in all** water bodies	*All RBDs:* ES, CY, EE, HU, NL *In some RBDs:* FR (4 RBDs), IT (2 RBDs),
	in some water bodies (work is still ongoing)	*All RBDs:* CZ, AT, DK, RO, SE, SI, IE, EL *In some RBDs:* UK (Scotland, England, Wales, Northern Ireland), BE (1 RBD), BG (1 RBD), DE (7 RBDs), FI (7 mainland RBDs), FR (10 RBDs), PL (8 RBDs), PT (9 RBDs), LT (2RBSs)
Ecological flows **implemented**	**in all** water bodies	*All RBDs:* CY, HU, NL *Some RBDs:* FR (2 RBDs)
	in some water bodies (work is still ongoing)	*All RBDs:* CZ, ES, AT, EE, RO, SE, SI *Some RBDs:* UK (Scotland, England, Wales), BG (1 RBD), DE (7 RBDs), FR (2 RBDs), IT (2 RBDs), PL (8 RBDs), PT (8 RBDs), EL, LT (2RBSs)
Ecological flows derived **but not implemented** but there are plans to do so in 2nd cycle		*All RBDs:* DK *Some RBDs:* UK (Northern Ireland), BE (1 RBD), FI (7 mainland RBDs), IE
Ecological flows **not derived** but there are plans to do so in 2nd cycle		*All RBDs:* LV, LU, MT, SK, HR *Some RBDs:* BE (7 RBDs), BG (3 RBDs), IT (5 RBDs), PL (1 RBD), PT (1 RBD), LT (2RBSs)
Ecological flows **not derived** and no plans to do so in 2nd cycle*		DE (3 RBDs), FI (1 RBD), IT (1 RBD), PL (1 RBD)

Source: WISE reporting 2016; Note (*): For some of the RBDs, where there is no intention to derive ecological flows, this is due to the fact that no river water bodies are reported.

Ambition of hydro-morphological measures in closing the gap to good status/potential

In terms of the level of ambition in tackling significant hydro-morphological pressures, the situation differs between Member States. In some Member States, there will be small to medium progress in terms of closing the gap for hydro-morphological pressures by 2021, but the main progress is expected between 2021 and 2027. In other countries, the information reported in WISE indicates that no or very little progress is expected in closing the gap for significant hydro-morphological pressures between 2015 and 2021.

Overall, however, from the information reported by the 27 Member States, it is clear that the implementation of the analysis of the gap to good status and of the level of implementation expected in the KTMs varies considerably between the Member States (see also section 8.9). Quite frequently data on the gap to good status are only reported for 2015 and 2021 but not for 2027, or are reported for only part of the pressures or part of the KTM. For some Member States, no conclusion on the level of ambition in closing the gap for hydro-morphological pressures can be reached due to the lack of reporting on the relevant indicators.

Main changes in implementation and compliance since 1st cycle

In the first RBMPs, a linkage between water uses, types of hydro-morphological pressures and specific hydro-morphological measures could be found only in around 40% of the RBMPs assessed across the EU. Thus, it was not possible to assess in detail whether the hydro-morphological measures planned covered all the significant hydro-morphological pressures. In the second RBMPs, information on the links between measures, hydro-morphological pressures and water uses/sectors has largely improved, partly due to the improved WISE reporting which requires a linkage between KTM, pressures and specific sectors. Nevertheless, for a large number of water bodies affected by hydro-morphological pressures, the sector/driver is still unknown/obsolete.

In addition, through the improved WISE reporting, the gap to be closed for hydro-morphological pressures is better specified for 2015 and 2021.

Several hydro-morphological measures of the first RBMPs have not been implemented yet mainly due to lack of financing, planning procedures, public acceptance of measures, legal issues and issues related to land ownership. In most cases, measures of the first RBMPs which were incomplete by end 2015 are included in the second RBMPs.

In some Member States, no specific hydro-morphological measures or very limited measures were reported in the first RBMPs). In these Member States, the reporting of operational KTM and more detailed measures related to hydro-morphological modifications in the second RBMPs is considered an improvement compared to the first RBMPs.

5.13.2 Conclusions

The majority of Member States, with few exceptions, have reported operational KTMs to address significant hydro-morphological pressures. In some Member States, no specific hydro-morphological measures or very limited measures were reported in the first RBMPs. Overall, the reporting of operational KTM and more detailed measures related to hydro-morphological modifications in the second RBMPs is considered an improvement compared to the first RBMPs.

The hydro-morphological measures most frequently planned in the second RBMPs are related to continuity interruption (e.g. fish ladders, removal of structures such as weirs, bypass channels), sediment/debris management, setting of ecological flows, habitat restoration and specific restoration of modified bed and bank structures.

In the second RBMPs, information on the links between measures, hydro-morphological pressures and water uses/sectors has largely improved, partly due to the improved WISE reporting which requires a linkage between KTM, pressures and specific sectors. Nevertheless, for a large number of water bodies affected by hydro-morphological pressures, the sector/driver was reported as still unknown/obsolete.

In addition, through the improved WISE reporting, the gap to be closed for hydro-morphological pressures is better specified for 2015 and 2021. In some Member States, there will be small to medium progress in terms of closing the gap for hydro-morphological pressures by 2021, but the main progress is expected between 2021 and 2027. In other Member States, the information reported in WISE indicates that no or very little progress is expected in closing the gap for significant hydro-morphological pressures between 2015 and 2021. For some Member States, no conclusion on the level of ambition in closing the gap for hydro-morphological pressures can be reached due to the lack of reporting on the relevant indicators.

In most Member States, the work on defining and implementing ecological flows is still ongoing in the second cycle. Ecological flows were reported to have been derived and implemented for all relevant water bodies only in few Member States. In the majority of Member States, ecological flows have been derived and implemented only partially.

5.13.3 Recommendations

- Member States should continue the work on restoration of water bodies, and in particular improve river continuity and restore habitats in many RBDs throughout Europe. Authorisation and permitting systems to ensure appropriate control of physical alterations should be applied more widespread in all Member States.

- Ecological flows required to achieve GES should be properly derived wherever relevant based on all relevant biological quality elements, and their implementation for the timely achievement of GES ensured.

- The use of green infrastructure and/or natural water retention measures should be more widespread to allow for a large range of environmental, social and economic benefits that these types of interventions have the potential to provide, as compared to grey infrastructure.

5.14 Economic analysis and water pricing policies

5.14.1 Introduction

At the time of its introduction, the WFD was one of the first framework directives to explicitly refer to economic analysis and include the use of economic instruments (e.g. environmental charges and taxes). This is based on the polluter pays principle and on the understanding that economic instruments can be important tools in managing environmental pressures that affect Europe's waters.

The WFD includes three general economic concepts, closely related but not equivalent, each one imposing specific requirements on water economics in general and water pricing schemes specifically:

- Cost recovery establishes the overall amount that users are charged for water services (through fees or taxes). The WFD requirements, however, are not limited to the financial costs for the provision of a water service, but also of the costs of associated negative environmental impacts (environmental costs) as well as forgone opportunities of alternative water uses (resource costs).
- Incentive pricing deals with the way water users pay for their use and whether the right price signals are transmitted, i.e. it addresses the question how water is being paid for and how the water price affects the behaviour of water users.
- The polluter pays principle establishes how environmental costs should be covered among economic agents, i.e. it looks at the adequacy of contributions from the different agents based on their role in causing these costs.

The principle of cost recovery is referred to in Article 9(1) of the WFD as follows:

"Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs, having regard to the economic analysis conducted according to Annex III, and in accordance in particular with the polluter pays principle.

Member States shall ensure by 2010

- *that water-pricing policies provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives of this Directive,*
- *an adequate contribution of the different water uses disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle.*

Member States may in so doing have regard to the social environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected."

As a basis for this, Article 5 of the WFD requires Member States to undertake an economic analysis of water uses according to the specifications of Annex III. Annex III of the WFD requires that the economic analysis of water uses should contain enough information in sufficient detail (taking account of the costs associated with collection of relevant data) in order to:

- *Make the relevant calculations necessary for taking into account the principle of recovery of the costs of water services under Article 9, taking into account long term forecasts of supply and demand for water in the RBD and where necessary:*

- *estimates of the volume, prices and costs associated with water services.*

- *estimates of the relevant investment including forecasts of such investments.*

- *Make judgments about the most cost-effective combination of measures with respect to water uses to be included in the Programmes of Measures under Article 11 based on estimates of the potential costs of such measures.*

Assessment of implementation and compliance with WFD requirements in the 2nd cycle and key changes since the 1st cycle

Water services and cost recovery

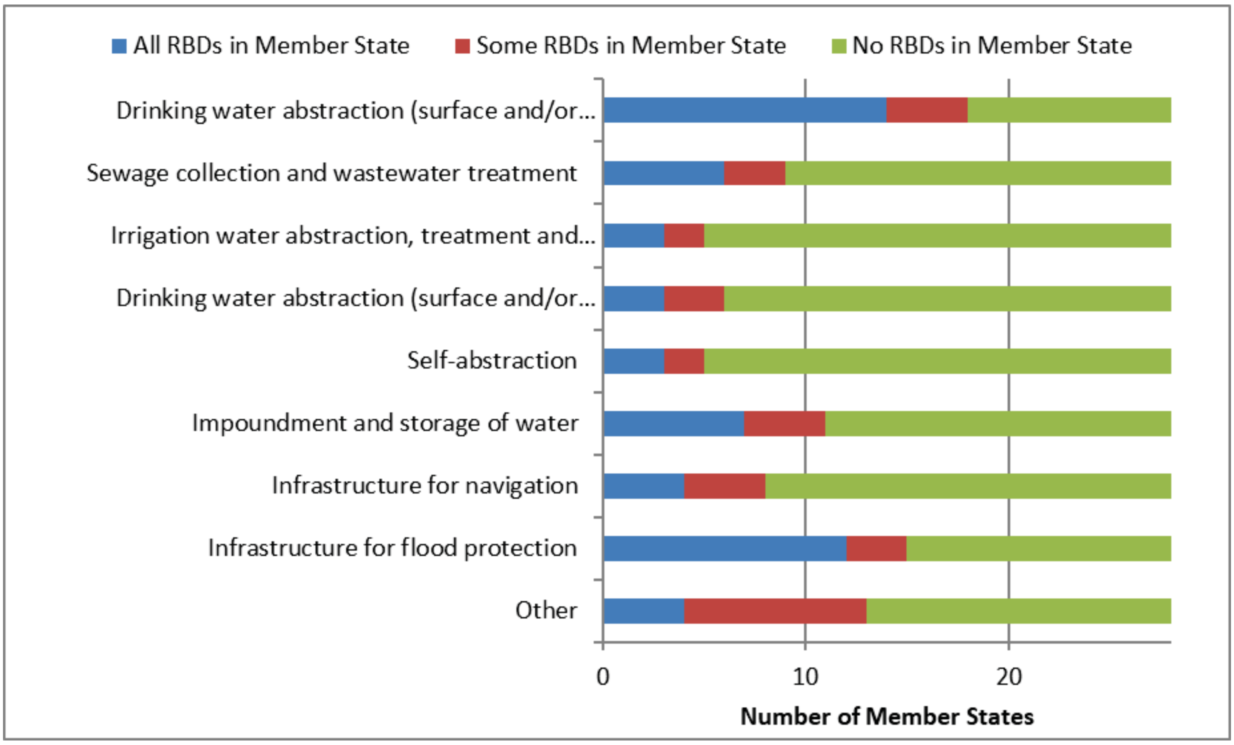
In about one third of the Member States assessed, only public water supply and waste water collection/treatment are covered (in the first cycle, a narrow definition was used by more than half of the Member States). Such a **narrow definition** limits very significantly the potential impact of Article 9 provisions by reducing the scope of the analysis and cost recovery calculations to a limited number of water services. Compared to the first cycle however, where more than half of the Member States used a narrow definition of water services, this is a significant improvement.

In more than one third of the Member States, a rather **wide definition** of water services is used, including water use activities that have a significant impact on water bodies such as for example (inter alia), hydropower generation, navigation and flood protection, or self-abstraction for irrigation and industrial purposes. In Latvia for example, a broad definition of water services has been used, and cost recovery rates are presented for all these services.

According to **Article 9.4** of the WFD, Member States can choose not to apply the "cost recovery principle" for some water services, in cases where this does not compromise the purposes and the achievement of the objectives of the WFD. While most Member States take waste water and sanitation as the core area for cost recovery, it is counter-intuitive to note that one fifth of the Member States applied Article 9.4 for precisely this area.

Self-abstraction is the water service for which Art 9.4 has been most often used. Further it is noted that the application of Article 9.4 varies across Member States, and also across RBDs in the same Member State. Additionally, in some Member States, the water services for which Article 9.4 is applied do not correspond with the water services which are reported for Article 9 cost recovery purposes.

Figure 1: Article 9.4 applied in (all/some/none) RBDs in Member States



Source: WISE reporting 2016.

Calculation of cost recovery rates and the inclusion of environmental and resource costs

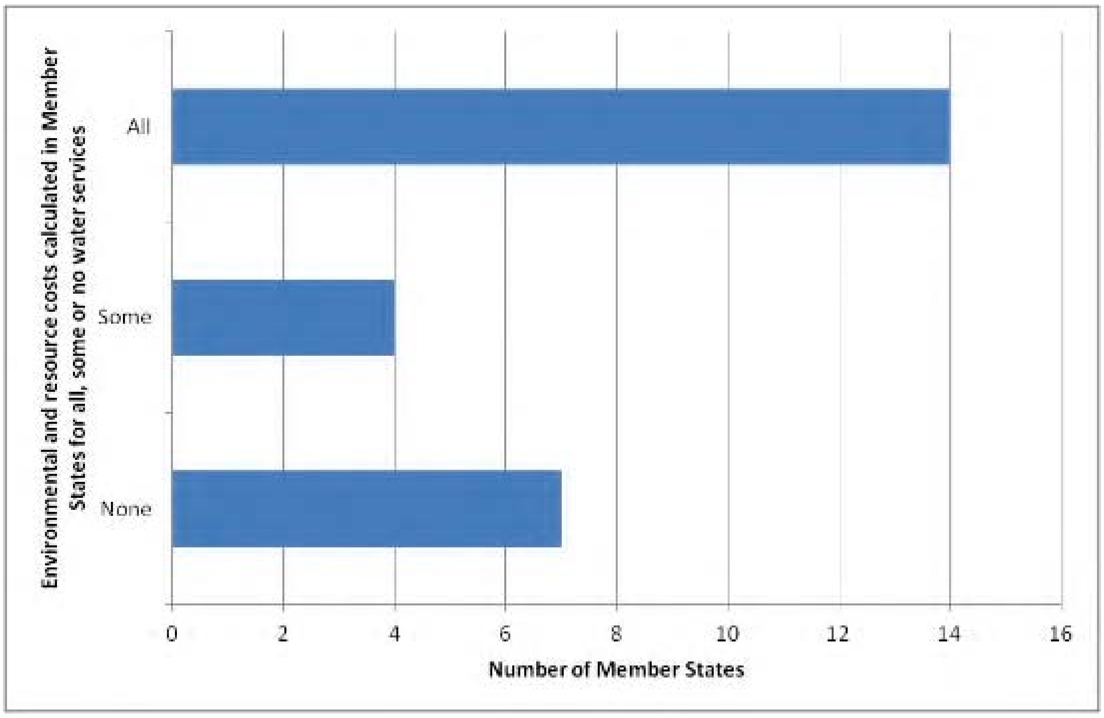
The main observation with regards to the calculation of cost recovery rates is that there are **varying methodologies** in place, which can be attributed to the fact that such calculations need to take into account the local conditions but which makes it difficult to make comparisons across RBDs or Member States.

Overall there is a consensus in all Member States about the need to cover the **financial costs** of water services. Considerable work is reported in all Member States regarding the calculation of financial costs of water services (in all Member States there is some information of financial cost recovery presented). At the same time, the approaches vary across the Member States and it is not always clear how exactly financial costs are calculated and if all elements of financial costs are taken into account in the calculation, for example regarding capital costs (investment costs, depreciation, cost of capital, replacement costs etc).

Regarding the estimation and integration of **environmental and resource costs** it is reported that environmental and resource costs are calculated for all reported water services in half of the Member States (in about one third of the Member States environmental and resource costs are not calculated, and in a few Member States only some water services are). However, this does not automatically mean that the calculation is transparent.

The significance of these costs is judged very differently among the Member States, from being highly important to not significant at all. The situation also differs significantly with regard to their (partial or full) internalization, often even within Member States. As in the first RBMPs, an often-shared opinion is that the environmental and resource costs are already minimized through permit systems and internalized through charges and fees. In several Member States, in cases in which the good environmental status is not reached in a water body due to a specific water service, the environmental and resource costs of that service are assumed to be as high as the costs of the measures that would be needed to reach the good status (abatement cost approach).

Figure 2: Environmental and resource costs calculated in RBDs in all Member States assessed for all/some/no water services



Source: WISE reporting 2016.

The use of quantification and monetary valuation of ecosystem services is so far not used for supporting the Article 9 implementation.

Water-pricing policies, adequate incentives and volumetric charges

Water-pricing policies are unevenly implemented across the EU. Price levels for water services vary significantly across the assessed Member States, ranging from 0 over very small amounts to rather high levels.

Incentive pricing is not referred to in many of the RBMPs. Even when referred to, the information is mostly too general and does not present the situation in appropriate analytical detail. In most cases, a global explanation is provided, stating that the regulations and instruments in place guarantee that incentives are set.

In the first cycle, in many cases there was not sufficient information on whether **water metering** was in place for different water uses, information that is fundamental when considering an incentive pricing policy. In the second cycle, the information has improved, even if water metering is not a requirement in all Member States and for all water uses, since various exemptions for some activities (mostly agricultural activities) exist.

Across the EU, **volumetric charges** are in place for 59% of all reported water services. For 31% of the reported water services, volumetric charges are partially in place, and only for 11% of the reported water services, no volumetric charges are in place. The assessment of the incentive function of volumetric charges is not reported in detail, and only general statements regarding this issue are given.

Finally, in the first RBMPs, limited efforts were made on documenting the **adequate contribution** of water uses, and this situation did not change much in the second RBMPs. The contributions of the water uses to the recovery of the costs are still unclear in many cases, or very vaguely described. Especially in agriculture, adequate contributions are mostly not defined (in 58% of all reported water services, there is either no contribution reported at all, or the situation is unclear). In Hungary and Slovakia however, pricing policies have been modified to increase cost recovery in agriculture. New pricing policies for the cost recovery in agriculture have also been set in Greece

Polluter pays principle

The polluter pays principle is mentioned in most second RBMPs only in a general way without providing details, e.g. regarding which policy instruments or other mechanisms guarantee that the polluter pays principle is applied and how.

Economic analysis

The economic analysis has been updated in virtually all RBDs assessed (fully in 143 and partially in 15 RBDs). It has not been updated in only four RBDs, and for two RBDs the situation is not clear. One Member State has not updated the economic analysis in any of its RBDs.

5.14.2 Conclusions

In spite of the efforts made by several Member States, in part thanks to the ex-ante conditionality for the 2014-2020 European Structural and Investment Funds, progress on the implementation of the principle of cost recovery and the use of economic instruments has been limited, which limits the potential of promoting efficient water management. The RBMPs in the majority of cases do not report much progress or changes since the first implementation cycle. Only a number of Member States have changed their previous approaches to water pricing or their water pricing policies based on the work done to implement Article 9.

Some progress can be noted. A significant amount of Member States have widened the definition of water services to water use activities that have a significant impact on water bodies, such as for example hydropower generation, navigation and flood protection, or self-abstraction for irrigation and industrial purposes. This does not mean however that the respective cost recovery calculations are fully developed or transparently presented.

On the calculation of financial costs of water services, considerable work is reported by all Member States (even if not always complete/transparent).

Environmental and resource costs are treated more specifically in the second cycle compared to the first cycle: there are more efforts evident to calculate these costs and more information is available on methodologies and approaches, and there is more transparency on whether these costs have been internalized or not.

In the second cycle the information has improved on whether water metering was in place for different water uses, even if water metering is not a requirement in all Member States and all water uses, since various exemptions for some activities (mostly agricultural activities) exist.

The economic analysis has been updated in almost all RBDs

Nonetheless the implementation of Article 9 remains incomplete, which limits the potential of promoting efficient water management in the EU. Several key points require further attention. It is noted that reporting is uneven across Member States and even across RBDs within the same Member State. In many cases methodologies to calculate costs are insufficiently documented and essential information is missing. This makes it difficult to efficiently assess the effectiveness of the use of economic instruments.

Cost recovery is not always applied to all water use activities having a significant impact on water bodies. The application of Article 9.4 also varies across Member States, and across RBDs in the same Member State.

The Member States that calculate the environmental and resource costs of water services generally use a wide range of different methodologies, which can be attributed to the fact that such calculations need to take into account the local conditions but makes it difficult to make comparisons across Member States. However, in many cases these costs are considered as calculated through their internalization, without a primary effort to actually estimate them. Hence, significant gaps remain and there is room to improve the transparency on how these costs have been dealt with. The European Commission could support the development of more consistent methodologies.

Limited changes in the water pricing policies have taken place in order to implement the Article 9 provisions. Information on the incentive function of water pricing and the adequate contribution of water uses is often rather limited and generic.

5.14.3 Recommendations

- Reporting on cost recovery policies should be sufficiently detailed and transparent, while at the same time focusing only on the information that is relevant to assess the effectiveness of the use of economic instruments. To the extent possible it should be done in a way that allows for comparison across RBDs.

- Cost recovery should be applied to all water use activities that have a significant impact on water bodies, including impoundments, abstraction, storage, treatment and distribution of surface waters, and collection, treatment and discharge of wastewater, also when they are 'self-services', for instance self-abstraction for agriculture. Exemptions based on Article 9(4) should be transparently justified.

- Sufficient information should be provided about how the financial, environmental and resource costs have been calculated and how the adequate contribution of the different users is ensured (disaggregated into at least industry, households and agriculture), i.e. demonstrating how the polluter pays principle has been taken into account.

- Sufficient information should be provided about the water-pricing policies, including the use of adequate incentives for users to use water efficiently, and documenting volumes, prices, and costs associated with water services (as required by the Annex III).

- In line with the requirements of the Annex III Member States should provide a transparent overview of estimated investments and investment needs.

5.15 Protected Areas

5.15.1 Introduction

According to Article 6 and Annex IV of the WFD, Member States shall ensure the establishment of a register or registers of all areas lying within each RBD which have been designated as requiring special protection under specific Community legislation for the protection of their surface water and groundwater, or for the conservation of habitats and species directly depending on water, including the protection of Natura 2000 sites and economically significant aquatic species.

For water bodies which are designated as Protected Areas, the environmental objectives set are beyond good status, as more stringent objectives may have to be set for those areas in the relevant Community legislation.

The relevant EU legislation for the protection of water with additional or more stringent objectives includes the following directives:

- Drinking Water Directive (80/778/EEC, as amended by Directive 98/83/EC).
- Shellfish Directive (2006/113/EC) (repealed)
- Freshwater Fish Directive (2006/44/EC) (repealed).
- Bathing Water Directive (2006/7/EC)
- Nitrates Directive (91/676/EEC)
- Urban Wastewater Treatment Directive (91/271/EEC)
- Birds Directive (2009/147/EC)
- Habitats Directive (92/43/EEC)

Member States were required to report on monitoring, additional objectives and additional measures for protected areas under the Habitats/Birds, Shellfish and Drinking Water Directives. The Freshwater Fish Directive and the Shellfish Directive were repealed on 22 December 2013. According to the WFD, the level of protection should be maintained through the inclusion of the designated areas as Protected Areas under WFD, but Member States were not required to report on additional objectives and measures for freshwater fish protected areas.

Annex VII (7)(1) of the WFD requires that the RBMPs contain a summary of the measures required for implementing Community legislation for the protection of water. Additional measures for Protected Areas should be an integral part of the RBMPs in order to ensure that the requirements of those Protected Areas are included in the overall management of the RBDs and to ensure the coherence of the entire water planning with the objectives already established by other Community and national legislation.

Article 11(5) of the WFD states that "additional measures as may be necessary in order to achieve those objectives are established, including, as appropriate, the establishment of stricter EQSs following the procedures laid down in Annex V."

Article 4(1)(c) of the WFD states that 'Member States shall achieve compliance with any standards and objectives at the latest 15 years after the date of entry into force of this Directive, unless otherwise specified in the Community legislation under which the individual Protected Areas have been established'. Therefore, water bodies in the Protected Areas must be of good status by 2015 at the latest, and earlier if required by another piece of Community legislation. If a water body is not of good status then it would be expected that an exemption under Article 4(4) of the WFD has been applied.

Assessment of implementation and compliance with WFD requirements in 2nd cycle

Identification of protected areas

All 28 Member States, which have been assessed, have in general reported and identified protected areas for the relevant Directives (see Table 1).

Table 1 Number of protected areas for each type at Member State level

Member State	Protected area type								
	Article 7 Abstraction for drinking water	Bathing	Birds	Fish	Habitats	Nitrates	Shellfish	Urban Waste Water Treatment Directive Sensitive Area	Other
AT	201	134	61		97				
BE	605	40	220		278	13		1	5
BG	359	94	116	120	219	6	12	14	
CY	25	113			37	6		1	
CZ	374	160	18		593	5827			761
DE	2971	1641	598	168	3269		16		
DK	402	1038	110		234		96		
EE	2	43	66	109	328	1			
EL	169	1509	135	13	196	32	12	39	409
ES	892	2049	461	706	1097	111	181	409	
FI	2132	273	198	21	343				
FR	25690	3344	194		940		80	107	

Member State	Protected area type								
	Article 7 Abstraction for drinking water	Bathing	Birds	Fish	Habitats	Nitrates	Shellfish	Urban Waste Water Treatment Directive Sensitive Area	Other
HR	250	917	27	44	626	11	18	70	134
HU	1952	238	55	7	374	1		3	133
IE	866	130		34	44		64	57	
IT	13870	2609	437	552	1474	2596	100	177	696
LT	2417	69	64		173				505
LU	6	11	15		30				
LV	211	54	5	145	139	131			39
MT	1	87	5		14			1	2
NL	25	376	61		128		6		
PL	368	126	133		645	94			1270
PT	418	499	53	81	87	17	72	12	69
RO	2755	49	136	7	270		4		251
SE	1266	439	117	28	1058	1	32		
SI	1259	46	11		214		3	54	
SK	202	26	40	65	219	1520		1	7
UK	1623	616	225	448	489	614	211	372	

Source: WISE reporting 2016.

Note: The values in the table represent unique Protected Areas as determined from the Protected Area codes entered by each Member State into WISE. A Protected Area that is associated with more than one water body category is counted only once.

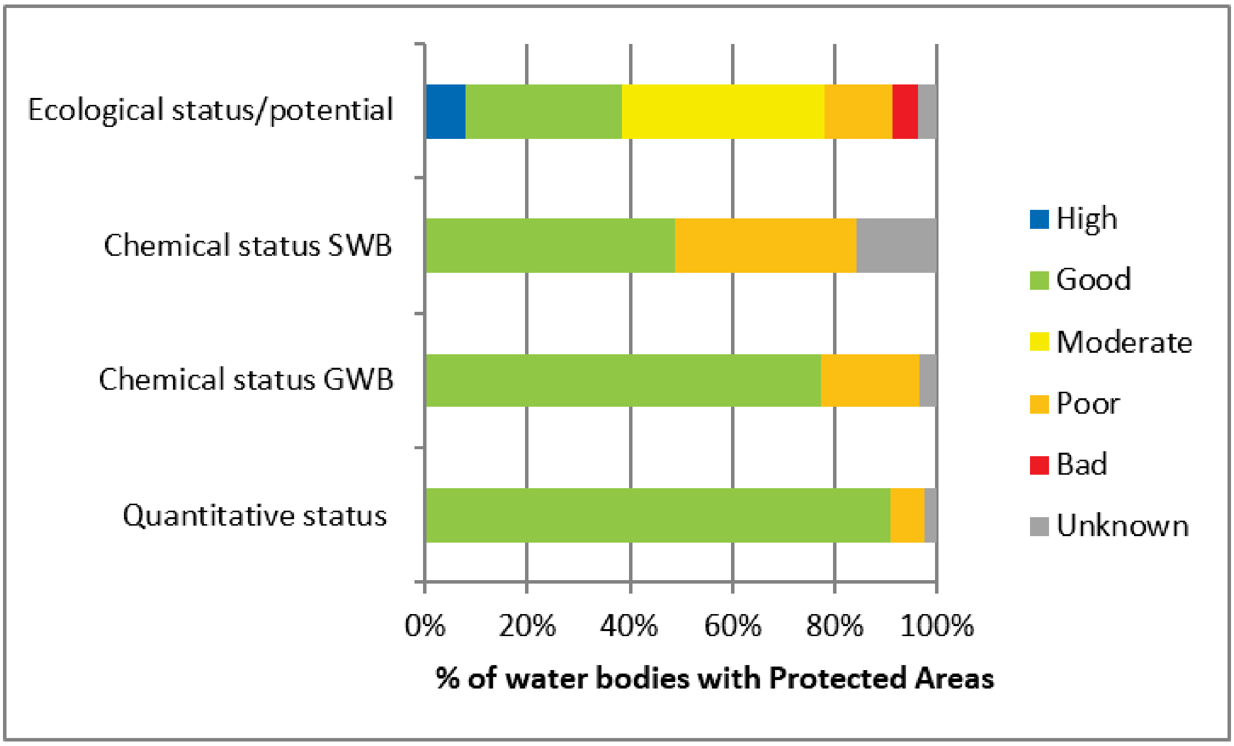
Status assessment

The reporting of the status assessment regarding both surface and groundwater protected areas and also regarding ecological, quantitative and chemical status is quite comprehensive in the second RBMPs. The share of water bodies with unknown status is relatively low, with the exception of chemical status of surface water bodies in protected areas which is unknown for a share of almost 20% (see Figure 1).

Nearly 70% of the ecological status assessments have been made with high or medium confidence, meaning that the status assessment should be based on monitoring data. Only for 6% of the water bodies, it is reported that no information is available for a status assessment.

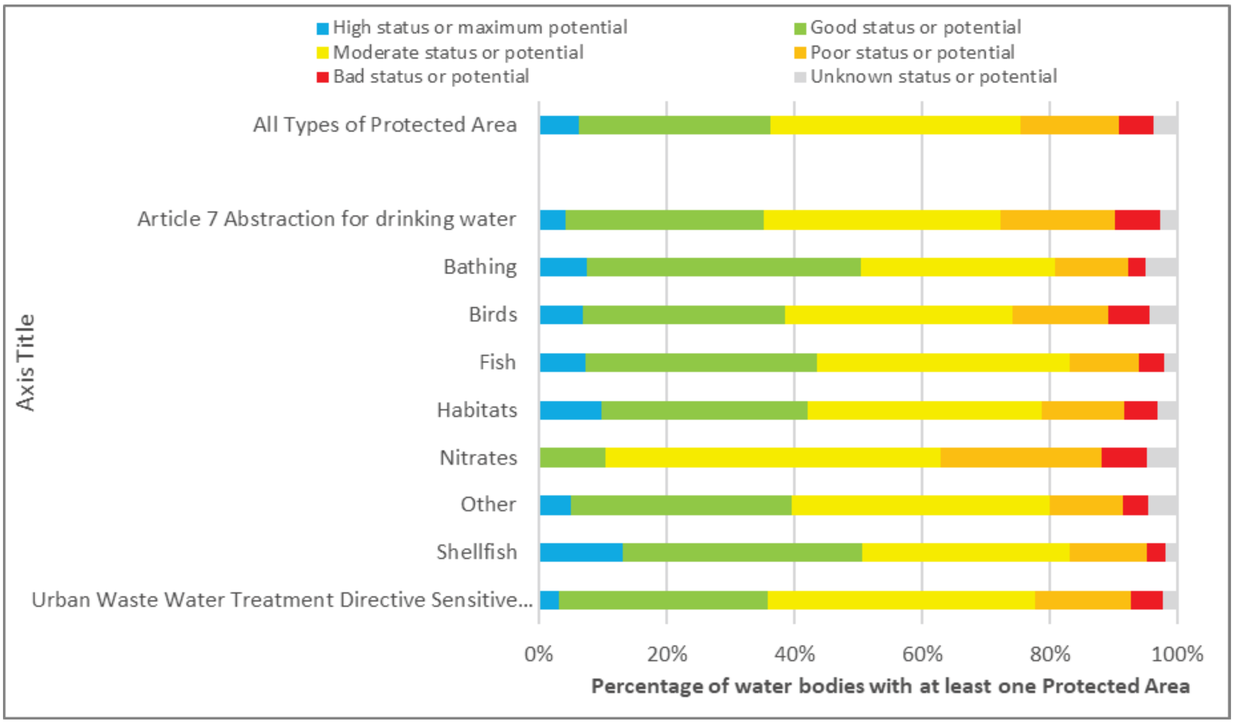
Also in the case of groundwater, nearly 70% of the quantitative status assessments have been made with high or medium confidence. Only for 8% of the water bodies, it is reported that no information is available for a status assessment.

Figure 1 Status of water bodies within protected areas



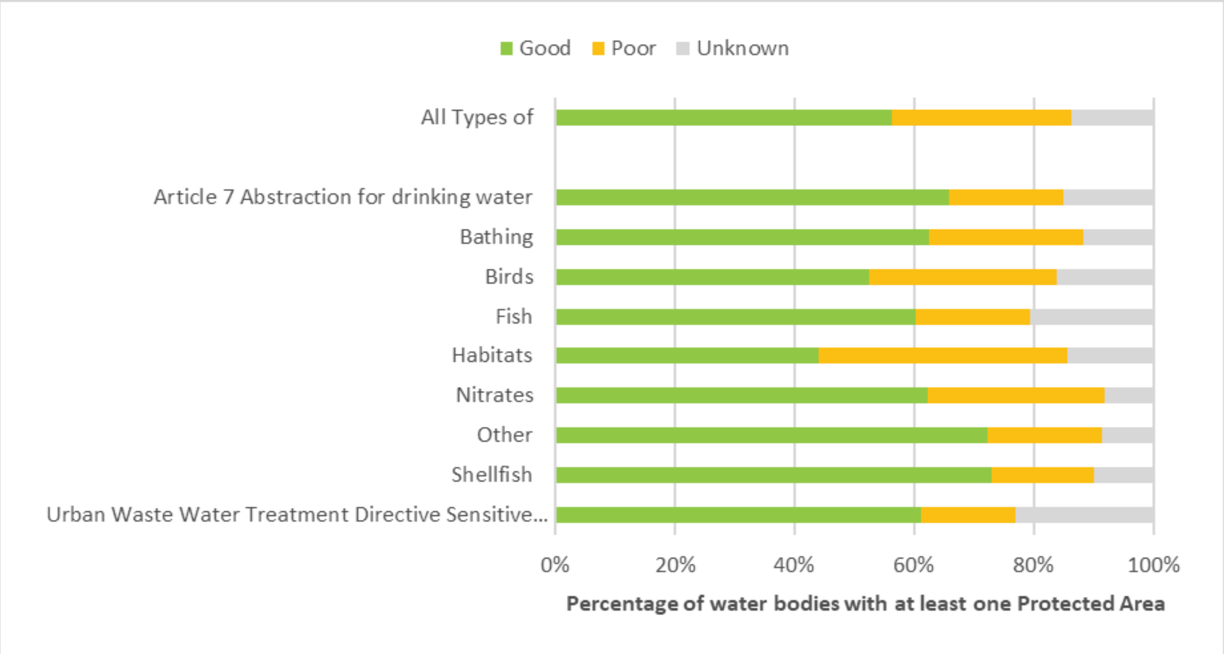
Source: WISE reporting 2016

Ecological status/potential

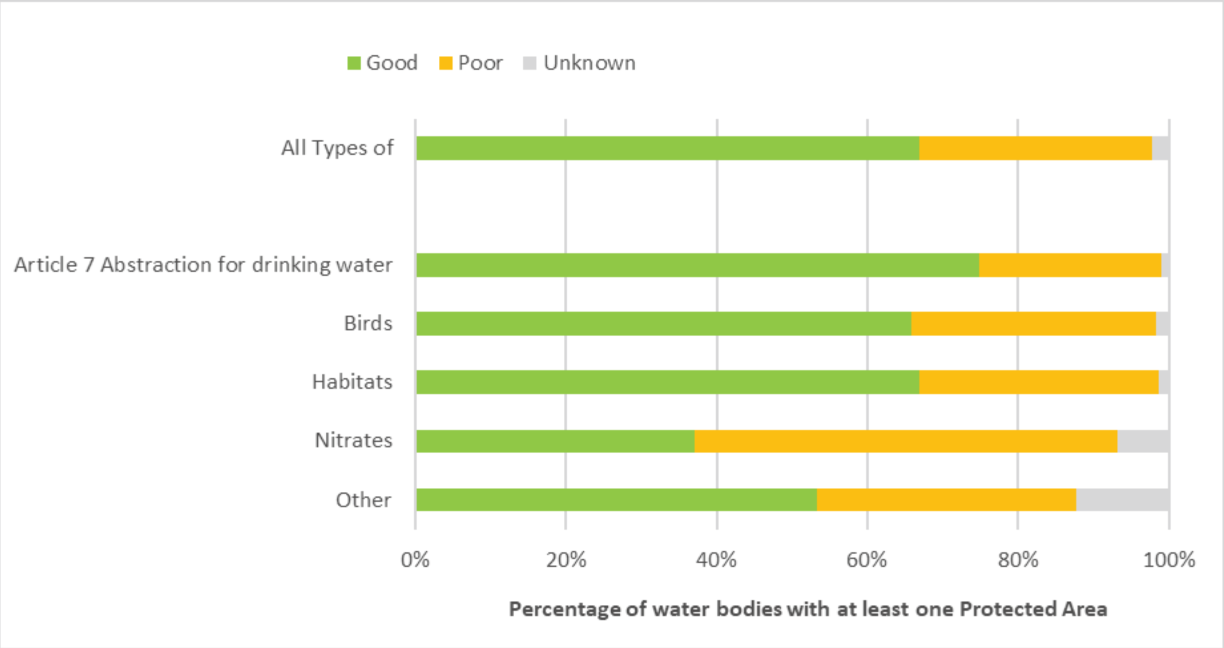


Source: WISE reporting 2016

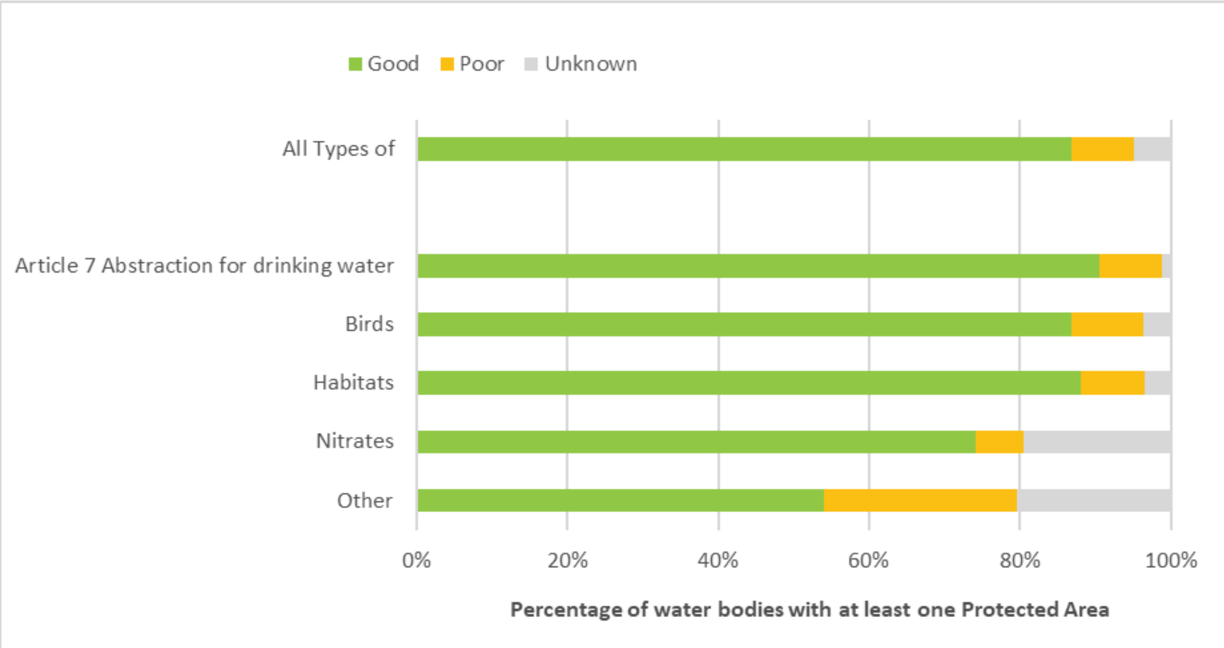
Chemical status - surface water



Chemical status – groundwater



Quantitative – groundwater

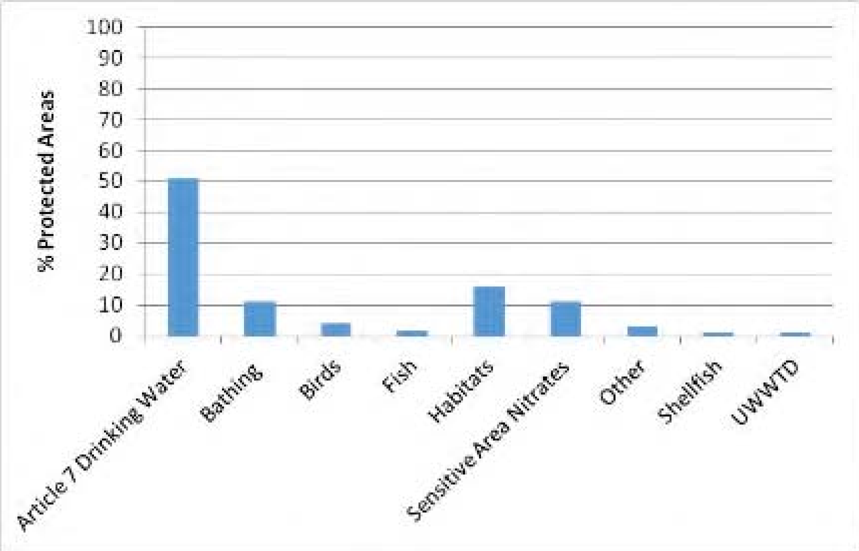


Additional objectives in protected areas

The establishment of additional objectives for the different types of protected areas is shown on the EU level in Figure 2.

It is concluded that drinking water areas (under Article 7) are the dominant type of protected area for which objectives have been set, followed by protected areas related to the Habitats Directive, Nitrate Sensitive Areas and bathing waters. Objectives related to the repealed directives (Fish and Shellfish) are very limited and concentrated in a few countries. The situation is similar for protected areas under the Urban Wastewater Treatment Directive, for which specific objectives have been set in only few countries.

Figure 2: Objective setting in protected areas per category of protected area.



Source: WISE reporting 2016

Table 2 shows whether specific objectives have been set to protect water dependent habitats and species for protected areas under the Birds and Habitats Directives (amounting to approximately 16 000 protected areas) in the different Member States. For 44% of the protected areas under the nature Directives, the additional needs (to reach the more stringent objectives) are still unknown. Considering also that for 13% of the protected areas for which objectives have been set, work to determine the needs is ongoing, this indicates that for nearly 60 % of the protected areas under nature Directives, the needs for improvement are not yet established. The low reported monitoring activities in relation to protected areas makes this critical, as the data necessary to determine the needs are not being produced.

Only for 17% of protected areas under the nature Directives, specific water objectives have been set and the needs for changes should be known. Further information in some of the relevant RBMPs indicates that a considerable part of this category consists of water bodies, where the more stringent objectives are already met, meaning that no further effort is needed.

For a number of nature protected areas (26%), the achievement of the WFD good status is expected to be sufficient also to achieve favourable conservation status under the nature Directives. Some Member States have reported all their protected areas in this category, and further clarification may be needed on whether this decision is based on individual assessments of water bodies.

Table 2: Percentage of protected areas under the Birds and Habitats Directives in the RBMPs for which specific objectives have been set or not set.

Member State	No specific objectives set - Additional needs are not known	No specific objectives set - Achievement of WFD good status is sufficient to achieve favorable conservation status	Some specific objectives set - But work still on-going to determine needs	Specific objectives set (all water dependent habitats and species)
Austria (AT)	0	0	0	0
Belgium (BE)	27	47	7	19
Bulgaria (BG)	0	26	44	30
Cyprus (CY)	0	100	0	0
Czech Republic (CZ)	100	0	0	0
German y (DE)	82	0	0	18
Denmar k (DK)	0	100	0	0
Estonia (EE)	87	13	0	0

Member State	No specific objectives set - Additional needs are not known	No specific objectives set - Achievement of WFD good status is sufficient to achieve favorable conservation status	Some specific objectives set - But work still on-going to determine needs	Specific objectives set (all water dependent habitats and species)
Greece (EL)	36	64		
Spain (ES)	62	28	10	0
Finland (FI)	0	80	20	0
France (FR)	84	12	4	0
Croatia (HR)	0	100	0	0
Hungary (HU)	6	25	16	53
Ireland (IE)			100	
Italy (IT)	53	13	33	1
Lithuania (LT)		70	9	21
Luxembourg (LU)	0	97	3	0

Member State	**No specific objectives set - Additional needs are not known**	**No specific objectives set - Achievement of WFD good status is sufficient to achieve favorable conservation status**	**Some specific objectives set - But work still on-going to determine needs**	**Specific objectives set (all water dependent habitats and species)**
Latvia (LV)	0	0	100	0
Malta (MT)	0	10	90	0
The Netherlands (NL)	0	0	100	0
Poland (PL)	0	0	0	100
Portugal (PT)	0	93	7	0
Romania (RO)	0	100	0	0
Sweden (SE)	0	0	100	0
Slovenia (SI)	100	0	0	0
Slovakia (SK)	0	100	0	0
United Kingdo	1	26	34	39

Member State	No specific objectives set - Additional needs are not known	No specific objectives set - Achievement of WFD good status is sufficient to achieve favorable conservation status	Some specific objectives set - But work still on-going to determine needs	Specific objectives set (all water dependent habitats and species)
m (UK)				
EU	**44**	**26**	**13**	**17**

Source: WISE reporting 2016

Table 3 shows the percentage of shellfish areas where a standard has been set and those without any standard. It should be noted that most countries have used the same standards as in the repealed Directive, and only very few countries have fully or for a considerable percentage of the protected areas introduced standards different to those in the repealed Directive. Also few countries have either no standards at all or no standards for a considerable percentage of the shellfish areas.

Table 3: Percentage of protected shellfish areas where information on standards has been reported

Member State	**Microbiological standards have been set to protect shellfish and these are identical to those in the repealed Shellfish Directive 2006/113/EC.**	**Microbiological standards have been set to protect shellfish and these are different to those in the repealed Shellfish Directive 2006/113/EC.**	**No microbiological standards have been set to protect shellfish.**
Austria (AT)	-	-	-
Belgium (BE)	-	-	-
Bulgaria (BG)	0	0	100
Cyprus (CY)	-	-	-
Czech Rep (CZ)	-	-	-
Germany (DE)	41	0	59
Denmark (DK)	0	100	0
Estonia (EE)	-	-	-
Greece (EL)		92	8
Spain (ES)	42	0	58
Finland (FI)	-	-	-
France (FR)	100	0	0
Croatia (HR)	100	0	0
Hungary (HU)	-	-	-
Ireland (IE)		100	
Italy (IT)	57	1	42
Lithuania (LT)	-	-	-
Luxembourg (LU)	-	-	-

Member State	Microbiological standards have been set to protect shellfish and these are identical to those in the repealed Shellfish Directive 2006/113/EC.	Microbiological standards have been set to protect shellfish and these are different to those in the repealed Shellfish Directive 2006/113/EC.	No microbiological standards have been set to protect shellfish.
Latvia (LV)	-	-	-
Malta (MT)	-	-	-
The Netherlands (NL)	100	0	0
Poland (PL)	-	-	-
Portugal (PT)		59	41
Romania (RO)	100	0	0
Sweden (SE)	0	100	0
Slovenia (SI)	100	0	0
Slovakia (SK)	-	-	-
United Kingdom (UK)	98	0	2
EU	56	22	22

Source: WISE reporting 2016; Note: "-" in the table indicates no information available.

Protected area exemptions

In the second RBMPs, exemptions for protected areas have been reported to a very limited extent, as only 6% of the protected areas have been exempted from the relevant protected area objectives or standards. More than half of the exemptions for protected areas have been applied in only few Member States.

Exemptions have not been applied equally for all Directives, ranging from 1-2% of exemptions applied for Drinking Water protected areas and Nitrate Sensitive Areas up to 15% exemptions applied for protected areas under the Habitats Directive. The most frequently reported type of exemptions is time extension under Article 4(4), because of technical feasibility issues, amounting to nearly 50% of all the exemptions applied.

Monitoring

Reporting of monitoring specifically targeted towards protected areas is very limited – in certain countries even missing. Especially for groundwater (both for drinking water and dependent habitats and species), the reported monitoring activities are in general very low or often missing (see table 4). Figure 2 shows that more than 50% of the protected areas with objectives set are drinking water areas – meaning several thousands of sites, that need to be monitored. Table 4 shows the monitoring sites especially related to protected drinking water areas, summing up to approximately 13 000 sites. According to table 4, more than half of the monitoring sites are reported by one country, while more than one third of countries report no monitoring sites at all of protected drinking water areas.

The reported information shows a need for specific monitoring of protected drinking water areas as well as of other types of protected areas. In a number of countries, there seems to be a contradiction between the confidence of the status assessment (high or medium) and the limited reported monitoring activity especially related to protected areas. High or medium confidence on the status assessment requires a data basis established through a monitoring program and this coherence is not present in the reporting of a number of countries.

Table 4 Number of monitoring sites associated with drinking water protected areas for groundwater and surface water

	Monitoring sites drinking water	
Member State	Groundwater	Surface water
AT	0	0
BE	21	84
BG	375	327
CY	0	0
CZ	0	0
DE	374	79
DK	7084	0
EE	0	0
ES	773	977
FI	346	22
FR	0	22
HR	286	0
HU	0	0
IT	641	64
LU	0	0

	Monitoring sites drinking water	
LV	0	0
MT	0	0
NL	0	0
PL	0	120
PT	0	0
RO	0	197
SE	1253	86
SL	0	0
SK	60	7
UK	60	7
EU	**11273**	**1992**

Source: WISE reporting 2016.

Measures for protected areas

The main information available from the reporting on measures related to protected areas concerns safeguard zones. According to Article 11(3)(d) of the WFD, measures are needed to meet the requirements of Article 7 (Waters used for the abstraction of drinking water), including measures to safeguard water quality in order to reduce the level of purification treatment required for the production of drinking water. According to Article 7(3) of the WFD Member States shall ensure the necessary protection for the bodies of water identified according to Article 7(1) (drinking water protected areas) with the aim of avoiding deterioration in their quality in order to reduce the level of purification treatment required in the production of drinking water. Member States may establish safeguard zones for those bodies of water.

Table 5 shows whether safeguard zones have been established in the second RBMPs and whether there is going to be any change as a result of the second cycle. For nearly 80% of the RBMPs, safeguard zones are established and no changes are foreseen as a result of the second RBMPs.

Table 5: Number of RBMPs where safeguard zones have been established (or not established), indicating also needs to change the regulations.

Member States	**Safeguard zones and no plans to change the regulations as a result of this RBMP**	**Safeguard zones but there will be significant changes to them as a result of this RBMP**	**No safeguard zones but plans to implement them as a result of this RBMP**	**No safeguard zones and no plans to establish them**
Austria (AT)	3	0	0	0
Belgium (BE)	4	2	0	0
Bulgaria (BG)	1	3	0	0
Cyprus (CY)	1	0	0	0
Czech Rep (CZ)	3	0	0	0
Germany (DE)	10	0	0	0
Denmark (DK)	4	0	0	0
Estonia (EE)	2	0	0	0
Greece (EL)		14		
Spain (ES)	23	0	0	0

Member States	Safeguard zones and no plans to change the regulations as a result of this RBMP	Safeguard zones but there will be significant changes to them as a result of this RBMP	No safeguard zones but plans to implement them as a result of this RBMP	No safeguard zones and no plans to establish them
Finland (FI)	7	1	0	0
France (FR)	14	0	0	0
Croatia (HR)	0	2	0	0
Hungary (HU)	1	0	0	0
Ireland (IE)		3		
Italy (IT)	5	1	2	0
Lithuania (LT)	4			
Luxembourg (LU)	1	0	0	0
Latvia (LV)	0	3	1	0
Malta (MT)	1	0	0	0
The Netherlands (NL)	0	4	0	0

Member States	Safeguard zones and no plans to change the regulations as a result of this RBMP	Safeguard zones but there will be significant changes to them as a result of this RBMP	No safeguard zones but plans to implement them as a result of this RBMP	No safeguard zones and no plans to establish them
Poland (PL)	9	1	0	0
Portugal (PT)	9	0	0	0
Romania (RO)	1	0	0	0
Sweden (SE)	0	5	0	0
Slovenia (SI)	2	0	0	0
Slovakia (SK)	1	0	0	0
United Kingdom (UK)	11	0	2	2
EU	**107**	**22**	**5**	**2**

Source: WISE reporting 2016

For the remaining water bodies especially those protected under the Habitat and Birds Directives, needs are either not known or it is reported that the WFD good status is sufficient to achieve favourable conservation status. In both cases, measures are not necessary in the second cycle.

Overall, there is very limited information about measures to be implemented in protected areas, which is probably also related to the fact, that only a very small number of protected areas have a specific objective set – and most of them probably already fulfil the objective.

Main changes in implementation and compliance since 1st cycle

Changes with regard to protected areas since the first cycle are generally very limited. There seems to be a general reduction in the reported monitoring activities specifically targeted towards protected areas and especially regarding ground water. This is critical as monitoring data should be the basis for setting objectives, determining needs for improvement (gap analysis) and for the implementation of measures in the third cycle.

5.15.2 Conclusions

Very little has changed with regard to protected areas since the first cycle. There seems to be a large gap between the intensions of the WFD concerning protected areas and the Member States' efforts – and this goes for both drinking water protected areas and for nature protected areas.

There is a large proportion of the protected areas, where the knowledge about status, pressures etc. is lacking - and therefore no objectives are set. Specific objectives have only been set for a limited number of protected areas and for a considerable part of water bodies in this category, the more stringent objectives are already met, meaning that no further effort is needed. Furthermore, for a significant part of the water bodies related to protected areas, GES under the WFD is reported as sufficient also to reach the more stringent objectives according to other Directives. Therefore, the need for additional measures in protected areas can be described only for a very small number of water bodies.

Reporting of monitoring specifically targeted towards protected areas is very limited – in certain countries even missing. Especially regarding groundwater monitoring (both for drinking water, but also for groundwater dependent habitats and species), the gap between the actual level of reported monitoring and the needed monitoring is large. In the light of an insufficient activity in specific monitoring of protected areas, it is difficult to see how knowledge about the needs in protected areas can change significantly during the second cycle.

5.15.3 Recommendations

- Member States should ensure that the register of Protected Areas required under Art. 6 of the WFD is complete and kept up to date, that additional objectives linked to the conservation of those Protected Areas are identified where needed, that adequate monitoring is in place and that all measures necessary to fulfil the specific objectives for Protected Areas are included in the Programmes of Measures.

5.16 Adaptation to climate change and drought

5.16.1 Introduction

Adaptation to climate change

Floods and droughts have already affected large parts of the EU and have an important impact on socio-economic developments. In the future, climate change will probably increase both the number and magnitude of these hydrological extremes[125]. The WFD does not explicitly refer to adaptation to climate change, although Annex II refers to the need to identify 'significant pressures' affecting water bodies. Furthermore, when drafting the CIS guidance document No. 24 River Basin Management in a Changing Climate, Member States agreed that from the second planning cycle onwards climate-related threats and adaptation planning should be incorporated in their RBMPs. This is reinforced by the fact that almost all the elements which are included in the definition of WFD qualitative and quantitative status are sensitive to climate change and due to the step-by-step cyclical approach are well-suited for adaptation action. The requirements include:

- Assessing direct and indirect (primary and secondary) climate pressures in order to provide information for the pressures analyses.
- Assessing monitoring programmes to ensure early climate impact signal detection.
- Close monitoring of climate impacts in reference sites (sites with limited anthropogenic modification).
- Integrating potential additional pressures, impacts and constraints caused by climate change in the economic analysis of WFD.
- Undertaking a 'climate check' of the PoMs by applying a transparent and fully documented methodology.
- Outlining of specific adaptation measures with preference of robust no-regret actions is further recommended.

Assessment of implementation and compliance with WFD requirements in 2nd cycle

Even if the WFD does not explicitly refer to climate change, it is mentioned as being linked to the Directive in nearly all RBDs in various ways, with few exceptions. Climate change aspects which are reported to have been considered include the following:

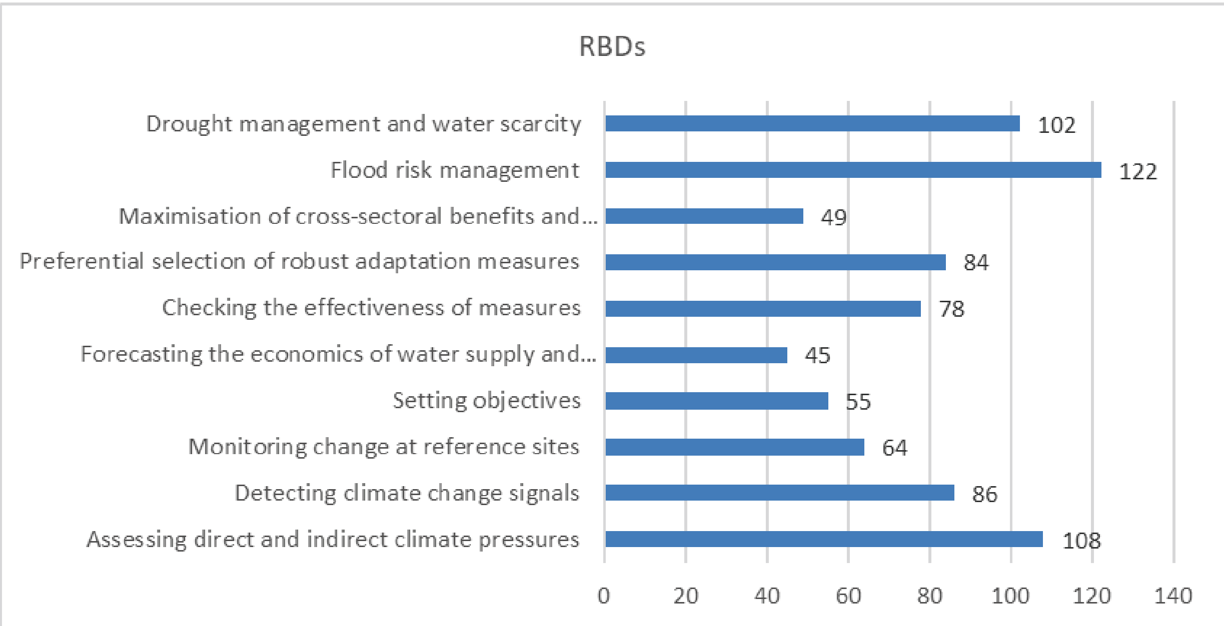
- Assessing direct and indirect climate pressures
- Detecting climate change signals
- Monitoring change at reference sites

[125] EEA (2017): Climate change, impacts and vulnerability in Europe 2016, EEA Report No 1/2017

- Setting objectives
- Forecasting the economics of water supply and demand
- Checking the effectiveness of measures
- Selecting preferably robust adaptation measures
- Maximising cross-sectoral benefits and minimising negative effects across sectors
- Applying flood risk management
- Addressing drought management and water scarcity

The table below shows the number of RBDs for which each of the climate change aspects has been considered in the second RBMPs.

Figure 1: Number of RBDs for which each of the climate change aspects have been considered



Source: WISE reporting 2016.

Climate change has been mostly considered in the context of flood risk management (112 RBDs) followed by the assessment of direct and indirect climate pressures (98 RBDs).

The CIS Guidance on climate change has been used by most Member States.

The 'climate check' of the PoMs is supposed to carry out a sensitivity analysis of the proposed measures based on a fully transparent methodology to evaluate long-term effectiveness and cost-efficiency under changing climatic conditions. The results of the climate check should be integrated in other RBMP processes. A climate check of PoMs has been carried out in all RBDs, except for some RBDs in a few Member States

Specific sub-plans addressing the issue of climate change have been reported for a few Member States.

32% of the Member States (eight out of 25 assessed in this report) in one way or another adopted specific adaptation measures to climate change under KTM24 in their RBMPs. The table below gives an overview of those countries which are applying KTM24. Even if the total number of Member States applying adaptation measures has decreased (from 11 in 2009), it should be noted that due to the mainstreaming efforts of climate change at EU and Member State level over the last years, several planned measures with a different objective will support adaptation.

Table 1 Application of KTM24-Adaptation to climate change in the second RBMPs in the Member States

Member State	Application of KTM24-Adaptation to climate change
Bulgaria (BG)	KTM24 is made operational to address significant pressures in 2 of the RBDs (BG2000 and BG3000) and national measures are mapped against KTM24. KTM24 is applied to tackle abstractions and hydro-morphological pressures.
Germany (DE)	DE2000, DE4000, DE5000, DE6000, DE7000 all apply KTM24-adaptation measures to address significant pressures.
Finland (FI)	Specific climate change adaptation measures, KTM24, have not been applied to tackle pressures in any RBD. However, there are national measures mapped against KTM24 in one RBD (FIWDA).
France (FR)	Specific climate change adaptation measures, KTM24, have been applied in FRA FRB2, FRD, FRE, FRH FRK, FRL. In all basins there are national measures mapped against KTM24.
Italy (IT)	KTM24 are made operational to address significant pressures related to agricultural diffuse pollution in ITA and ITE, as well as abstractions and hydrological alterations in ITG.
Romania (RO)	KTM24 is not made operational to address significant pressures in the RBD, although national measures have been mapped against KTM24.
Slovakia (SK)	KTM24 is made operational to address significant pressures in SK4000. Also national measures are mapped against KTM 24 in SK4000
Croatia (HR)	KTM24 is not made operational to address significant pressures in the RBDs, although national measures are mapped against KTM 24 in all basins.

Source: WISE reporting 2016.

Main changes in implementation and compliance since 1st cycle

The main change on how climate change is addressed in the plans in comparison to the first cycle is that the number of basins where climate change has been considered has increased significantly and only a few Member States/RBDs have not considered climate change yet. While in the first cycle a climate check of PoMs was carried out in 41% of the RBMPs (46 out of 112), this is now done in all RBDs except RBDs in six Member States (117 out of 143 RBDs, which corresponds to 82%).

Adaptation to Droughts

Drought[126] is a natural phenomenon. It is a temporary, negative and severe deviation along a significant time period and over a large region from average precipitation values (a rainfall deficit), which might lead to meteorological, agricultural, hydrological and socioeconomic drought, depending on its severity and duration.

A specific Communication from the Commission to the European Parliament and the Council for addressing the challenge of water scarcity and droughts in the EU[127] gave further indication on the key measures that should be promoted in the RBMPs and other tools in order to reduce the impacts of these phenomena.

The WFD includes several references to droughts:

- It contributes to mitigating the effects of droughts (Article 1.e).
- According to Article 4(6), temporary deterioration in the status of bodies of water shall not be in breach of the requirements of this Directive if this is the result of circumstances of natural cause or force majeure which are exceptional or could not reasonably have been foreseen, in particular prolonged droughts.
- Supplementary measures (Article 11(4)) can include (ix) demand management measures, inter alia, promotion of adapted agricultural production such as low water requiring crops in areas affected by drought.
- The RBMPs may be supplemented by the production of more detailed programmes and management plans for sub-basin, sector, issue, or water type, to deal with particular aspects of water management, such as when and where needed, a specific drought management (sub)plan (Article 13(5)).

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[126] Based on Schmidt, J.J. Benítez & C. Benítez (2012) Document: Working definitions of Water scarcity and Drought. Version 4, and taken note by Water Directors (4 June 2012)

[127] European Commission (2007) Communication from the Commission to the European Parliament and the Council - Addressing the challenge of water scarcity and droughts in the EU {SEC(2007) 993} {SEC(2007) 996}/* COM/2007/0414 final */

Within the Common Implementation Strategy of the WFD, a Technical report on Drought Management Plans[128] was adopted in 2007, and refers to the three key elements for the proper mitigation of drought impacts:

- Indicators and thresholds establishing onset, ending, and severity levels of the exceptional circumstances (prolonged drought).
- Measures to be taken in each drought phase in order to prevent deterioration of water status and to mitigate negative drought effects.
- Organizational framework to deal with drought and subsequent revision and updating of the existing drought management plan

Furthermore, the 2009 Guidance document No. 24 (River Basin Management in a Changing Climate) provides further guidance, such as e.g. its "Principle 11: Drought management and water scarcity: Use the WFD as the basic methodological framework to achieve climate change adaptation in water scarce areas and to reduce the impacts of droughts". Furthermore, the Water Blueprint[129], including the Review of the EU policy on water scarcity and droughts, in 2012 encourages Member States to better integrate drought risk management and climate change aspects in their future RBMPs and when developing cross sectoral and multi hazard risk management plans.

Assessment of implementation and compliance with WFD requirements in 2nd cycle

Overall, in the second cycle of the WFD implementation, there are 11 Member States where drought is considered not to be relevant. However, this reflects a geographically quite varied picture which is not aligned with the drought occurrence as they are identified by the European Drought Observatory[130].

For 14 Member States, drought is a relevant issue, even if the relevance covers only the sub-basin level or one specific RBD.[131] The main strength of these Member States lies in the adoption of Drought Management Plans, whilst the major weaknesses refer to the lack of such plans, at least for the RBDs concerned with droughts (see table below).

In total, six Member States have reported Drought Management Plans in the second RBMPs.

Table: Strengths and weaknesses of Member State's drought management in the second RBMPs (selection)

	Strengths	Weaknesses
Cyprus	Drought Management Plans	

[128] http://ec.europa.eu/environment/water/quantity/pdf/dmp_report.pdf

[129] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Blueprint to Safeguard Europe's Water Resources COM/2012/0673

[130] http://edo.jrc.ec.europa.eu/edov2/php/index.php?id=1000.

[131] For one Member State (Croatia), no information is reported regarding the relevance of droughts.

	including key measures are approved and aligned with RBMP	
Czech Republic	There is a specific sub-plan to address water scarcity and droughts in 2 RBDs	
Germany		No Drought Management Plans have been reported for Germany (Danube RBD).
Spain	Drought Management Plans are in place	There is concern about a possible broad application of Article 4(6) exemptions due to drought, following the 2017 draft Drought Management Plans, not yet adopted
Finland		All Finnish RBDs recognise the existence of local or sub-basin drought spells as one of the effects of climate change. However, none of the RBDs has developed a Drought Management Plan.
France		Droughts are relevant for the country. No Drought Management Plan have been reported for France.
Hungary		There is no clear distinction in the country between droughts and water scarcity. No Drought Management Plan has been developed in Hungary
Italy	Drought Management Plan are developed for some RBDs	No Drought Management Plan has been reported for one RBD (ITH).
Malta		Drought Management Plans have not been reported
The Netherlands	Sub-plans addressing water scarcity and droughts have been reported for all RBDs in the 2nd cycle	Exemptions have been applied following Article 4(6) due to prolonged droughts for all four RBDs.
Poland		Drought Management Plans have not been reported for Poland
Portugal	Measures are included in the RBMPs	Droughts are relevant for a major part of Portugal. It is unclear if proper drought management planning and actions are in place to justify the Article 4(6) exemptions which have been applied.
Sweden		No Drought Management Plans have been reported for Sweden
Slovenia	Preparation of selection of drought indicators (as measure)	No Drought Management Plan is established
United Kingdom	Changes in recognising drought risk for several RBDs. Drought Management Plans are in place for	

	some RBDs.	

Source: WISE reporting 2016 and second RBMPs.

Furthermore, it should be noted that a few Member States have applied Article 4(6) exemptions due to prolonged droughts in the second cycle. No information has been reported on other effects of droughts than the applied exemptions.

Main changes in implementation and compliance since 1st cycle

Out of the list of Member States for which drought is considered as a relevant topic, only three Member States have made progress since the first RBMPs.

No change or improvement has been identified for seven Member States since the first cycle, whilst the information reported does not allow drawing conclusions regarding the remaining Member States due to the few relevant elements reported.

5.16.2 Conclusions

The assessment of the second RBMPs clearly shows that climate change has been integrated into water management across Europe. While in the first cycle not all RBDs had considered climate change, in the second cycle almost all Member States followed the CIS agreement that from the second planning cycle onwards climate-related threats and adaptation planning should be incorporated in their RBMPs. Thereby, the CIS Guidance on climate change has been used by most countries. Climate change is mostly considered in relation to flooding, followed by the assessment of pressures from climate change. In one third of the Member States, specific measure to adapt to climate change are applied.

The consideration of drought as a relevant water management feature follows an inconsistent geographical pattern: in 14 assessed Member States, droughts are considered as relevant (including at sub-basin level), whilst in another 11 Member States they are not relevant.

The development of Drought Management Plans is the key management measure for mitigating the impact of droughts but is not yet fully adopted in all drought-facing river basin districts. The adoption of elements within the RBMPs that address clearly the key elements for drought mitigation (indicators, measures, organisational set-up) can provide a step-wise approach, but their implementation has not been assessed in detail for the purpose.

Most Member States have reported that they have used the Common Implementation Guidance number 24, River Basin Management in a changing climate, have done a climate proofing of the POMs and have a national Climate Change Strategy or Plan. However, the assessment has not allowed to determine the effectiveness of the climate proofing methodologies, and in general green infrastructures and water retention measures are underused.

At least two Member States have applied Article 4(6) exemptions due to prolonged droughts during the first planning cycle. Drought Management Plans, and their indicators and measures can provide proper elements for a justification.

At least two Member States have progressed in their drought management since the first planning cycle by developing drought indicators and extending the number of RBDs with Drought Management Plans.

5.16.3 Recommendations

- To further improve climate proofing, technical measures and planned infrastructures should take due account of climate change predictions, especially for the occurrence of extreme phenomena and changes in river flows.
- A national Strategy for Adaptation to Climate Change should be developed and taken into account in the design of the PoM in the relevant Member States.
- Regarding drought management, Member States are encouraged to develop Drought Management Plans where appropriate and monitor drought events and their severity with specific indicators.
- When applying exemptions under article 4(6) for prolonged droughts, Member States should be fully transparent when providing information on the methodologies applied and all possible measures considered to avoid deterioration.

6. International cooperation under the EU Directive 2000/60/EC establishing a framework for the Community action in the field of water policy[132]

6.1 Introduction

The 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 iRBD shall be established by the Member States. Member States shall ensure that the environmental objectives of the Directive are met in iRBDs. To this end, Member States shall coordinate at the international level on a POMs.

In the case of an iRBD falling entirely within the EU, 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 RBMPs covering at least those parts of the iRBD falling within their territory to achieve the objectives of the Directive.

International coordination by the EU Member States was assessed for the second river basin management cycle. The following sections reflect the situation described by the River Commissions in their iRBMPs, reported by each Member State in 2016 or 2017 and information on international coordination described in the national RBMPs. The circumstance in the River Commissions or the situation in the Member States may have further developed since then. More detailed information on individual international basins can be obtained from the accompanying document compiling iRBMP assessments.

6.1.1 International river basin districts and their coordination mechanisms

There are 75 iRBDs and 30 sub-basins in the EU. International coordination mechanisms (agreements, working groups etc.) under the WFD 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 6.

Table 6 Different types of international coordination in relation to the WFD

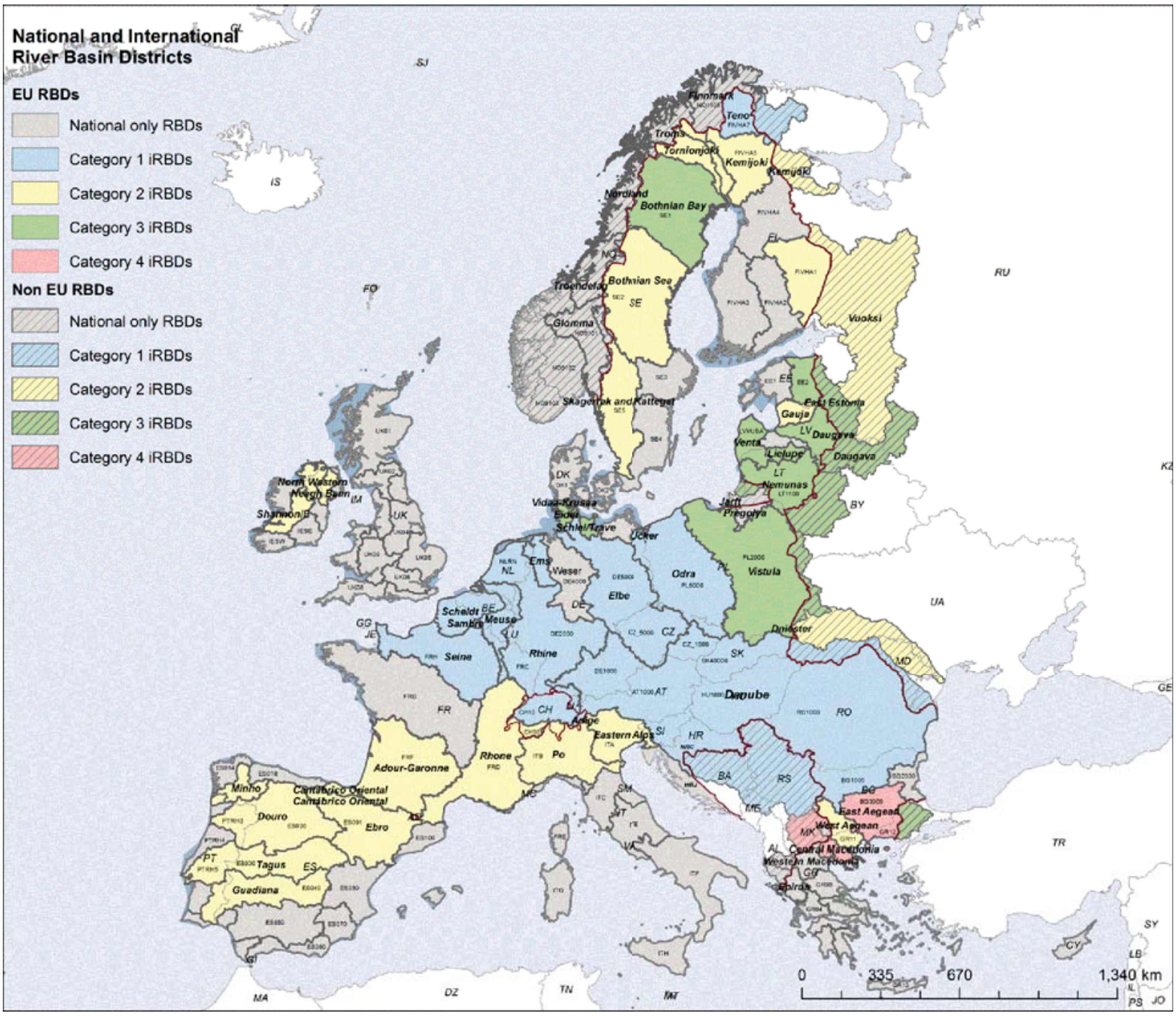
Category	Formal international agreement	International coordinating body	iRBMP produced
1	Yes	Yes	Yes
2	Yes	Yes	No
3	Yes	No	No
4	No	No	No

[132] This document reflects the situation as described by the River Commissions in their iRBMPs, or as reported by each Member State to the European Commission in 2016 or 2017 and with reference to national RBMPs prepared earlier. The circumstance in the River Commissions or the situation in the Member State may have further developed since then.

EU Member States were requested to report to WISE the iRBD in their territory and the level of international coordination taking place in these iRBDs. The categories of these iRBDs were taken from the assessment of international coordination in the first cycle[133].

The map below shows the iRBDs and their level of international coordination.

Figure 16 Overview map of iRBDs



[133] 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

6.1.2 Selection of iRBDs for the assessment

Twenty-one iRBDs were chosen for the assessment (see Table 7). The selection was based on the following criteria:

- All iRBDs with iRBMPs were selected.
- In cases where EU Member States/third countries share several iRBDs (e.g. there are 4 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.

Table 7 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
	Teno/Tana	Finland[134] *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

[134] 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.

Category	International River Basin	EU Member States/Non-EU countries
	Guadiana	Spain, Portugal
	Gauja/Koiva	Estonia, Latvia[135]
	Isonzo/Soca	Italy, Slovenia
	Rhone	France, Italy *Non-EU: Switzerland*
	Torneälven/Tornionjok	Sweden, Finland *Non-EU: Norway*
	Eider	Germany, Denmark
Category 3	Narva	Estonia, Latvia[136] *Non-EU: Russia*
	Schlei Trave	Germany, Denmark
	Vistula	Poland, Slovakia, Lithuania *Non-EU: Ukraine, Belarus*
	Luleälven, Umeälven, Piteälven	Sweden Non-EU: Norway

6.2 Overview of International Cooperation

6.2.1 International coordination mechanisms

The foundation for international cooperation on water management are agreements or conventions to which EU Member States and third countries are party to. These agreements or conventions set the objectives, topics for cooperation and coordination mechanisms within the iRBD. They can be bilateral, i.e. between two countries, or multi-lateral, addressing in a number of cases cooperation among all the riparian countries.

All Category 1 basins have **agreements or conventions** in place. For about ½ of the Category 1 basin, the agreement or convention is signed by all the iRBD sharing countries. In four iRBDs – the Danube, the Elbe, the Rhine and the Sava - the international agreements are signed by those countries whose national territory represents a meaningful share of the basin. However, in the Rhine, a Coordinating Committee was established that expands international coordination to include the iRBD sharing countries not party to the convention. The EU is a contracting party to these agreements in the Danube and the Rhine.

The Category 2-3 basins included in the assessment have bilateral agreements in place.

Permanent commissions, working groups or other forms of cooperation bodies can be found in all Category 1 and 2 basins. They are responsible for the coordinated implementation of the WFD in the basins. In the two out of the four Category 3 basins, meetings were held to discuss

[135] 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.

[136] 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

various aspects of WFD implementation but a permanent body is not in place. All the permanent commissions of the Category 1 basins allow external observers to participate in meetings. The observers come from sectors like hydropower, public and private water services, dredging, navigation, industry, local governmental agencies, other international river commissions, research, tourism and environmental non-governmental organisations.

For most of the basins assessed, the coordination mechanisms have not changed since the 1st river basin management cycle. In most cases the agreements have stayed the same with no new additions. However, in some cases international coordination has expanded through the ratification of new agreements and work carried out under cooperation projects:

- Two iRBDs developed international RBMPs or joint management documents for the first time. In the Sava iRBD[137], which is a sub-basin of the Danube, an international RBMP was developed for the first time. Following the signing of a new agreement between Finland and Norway in 2014, the two countries produced a "joint roof report in the form of a comprehensive "executive summary" of the two national RBMPs".
- In the Rhône International RBD, France and Switzerland negotiated a new agreement for integrated management and established in 2016 the Franco-Swiss dialogue to discuss, among others, water management during water scarcity periods, river water levels, drinking water from surface water and groundwater, inter-basin transfers, floods, etc. In addition, France and Italy signed a protocol in 2013 for cooperation on the shared Roya River sub-basin with the goal to develop a transboundary river contract to support common actions for the attainment of WFD's objectives.
- A new agreement between Sweden and Norway in 2014 now clearly sets out the coordination of Swedish and Norwegian river basins.
- A project in the Gauja/Koiva iRBD – shared between Estonia and Latvia - led to increase coordination on a number of WFD topics, such as delineation, typology, monitoring, assessment and classification.
- A long-term project in the Dniester iRBD between the Ukraine and Moldova has led to improved data-sharing and monitoring.

Public consultation was coordinated by the Category 1 basins. All of the basins published the iRBMPs online for consultation. In addition, some iRBDs held public events (e.g. the Elbe Forum and workshops in the Sava) and in the Odra working groups were established to enable participation. The Category 1 basin iRBMPs mention that further public consultation outreach was done at the national level.

[137] The Sava iRBD sharing countries are: Bosnia and Herzegovina, Croatia, Montenegro, Serbia and Slovenia.

Basin-wide strategies or plans have been jointly developed in some iRBDs (mainly Category 1). Joint climate change strategies (see section 6.2.5) were developed in five iRBDs. They define common principles and provide guidance on selecting adaptation measures. In addition, a few basins have jointly developed programmes to support fish migration (see section 0).

In the Danube four documents produced by the International Commission for the Protection of the Danube River (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 & Environment;
- •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.

The Joint Statement on Navigation & Environment was launched in 2007 by the ICPDR in cooperation with the Danube Commission and the International Sava Commission.

In the Rhine, multiple basin-wide programmes are mentioned, mainly focussing on addressing hydro-morphological pressures such as the Habitat Connectivity along the Rhine programme, Salmon 2020 programme, the Lake Constance Lake Trout programme, the Eel Management Plans, the Master Plan Migratory Fish Rhine and the Rhine 2020 programme.

The Rhine (2009), the Elbe (2014) and the Sava have adopted basin-wide sediment management plans. In the Rhine and the Elbe, risk areas were classified to enable the prioritisation of management options. In the Sava, the Protocol on Sediment Management, defines the framework for developing a basin-wide sediment management plan.

6.2.2 International coordination on characterisation, monitoring and status assessment

Characterisation of iRBD

The WFD stipulates that for each river basin an analysis should be carried out of the characteristics of the RBD. This includes identifying the location and boundaries of water bodies, typologies of water bodies, establishing of type-specific reference conditions and the identification of pressures and their impacts.

All the Category 1 basins coordinated on the development of the **Article 5 assessments**, i.e. the analysis on the characterisation of the iRBD. A few Category 2 basins reported to WISE that coordination took place, for example in the Gauja/Koiva, Isonzo/Soca, and Torneälven/Tornionjok.

Most of the Category 1 basins indicated that some **coordination of the delineation** of transboundary **surface water bodies** took place. In the Danube, Sava and Rhine iRBDs (Category 1 basins), common criteria were developed for delineation that focus the iRBMP on water bodies of basin-wide importance. The countries in the Category 1 basins have used differing methodologies, which led to different results. For the most part, the results have been harmonised, which has helped surface water bodies to mostly be delineated similarly. Overall, the coordination on the delineation of rivers is further along than the delineation of lakes. Most of the Category 2-3 basins do not provide information on whether there was coordination on surface water body delineation. In some cases, information was found in the RBMPs that state coordination took place but the details are limited.

Transboundary **groundwater bodies** were delineated in the Danube, the Rhine, the Sava and the Isonzo/Soca iRBDs. In the Isonzo/Soca international river basin, a joint approach/method for a coordinated ground water body delineation (for the transboundary water bodies) has been developed and applied. The Eastern Alps RBMP, which covers the Italian part of the Isonzo/Soca, states that coordination initiatives are underway between Italy and Slovenia for the revision of the delineation of groundwater bodies on the basis of the hydrogeological structure rather than administrative boundaries, as agreed at the Italian-Slovenian Commission for Water Management.

The **designation of heavily modified and AWBs** mostly took place at national level and details on international coordination efforts are limited. In the Danube iRBD, the countries agreed on a harmonised procedure for the final designation and on specific criteria for a step by step approach on the Danube main river. The designations for the tributaries are based on national methods and respective reported information. In the Rhine, the EU Member States agreed on common steps for HMWB designation, but the iRBMP states that these steps were implemented differently within the individual sub-catchments of the Rhine. The Scheldt iRBMP states that each of the parties used different descriptors for the designation of HMWBs but that the different approaches did not lead to substantial differences in the final assessment.

Coordination on **typology** has taken place in most of the Category 1 basins as part of the intercalibration exercise, although in some cases despite coordination differences remain. The typology of the Danube River was developed in a joint activity by the basin sharing countries already in during the first management cycle. In the Danube, a harmonised typology was used by all the basin countries. In the Rhine, water bodies of basin-wide importance (i.e. those with catchments >2,500 km^2) were classified using a common approach. For each part of the river, so-called “Passports” or files were created using common criteria.

Information on the coordination of typology is not available for most of the Category 2-4 basins. In the Gauja/Koiva iRBD (Category 2), Latvia and Estonia participated in typology coordination within the 2011-2013 transboundary project. An attempt to harmonise national typologies with regard to cross-border water bodies was made in the frame of the project. In the iRBDs shared with Sweden, a revision of the typology system has recently been agreed in Sweden, attempting to further harmonize most of the typology factors and their ranges to those used in Norway and Finland. This new typology is planned to be applied for the 3rd RBMP.

Information on the coordination of **type-specific reference conditions** is limited in all international river basins. Most of the basins either did not provide information in their iRBMPs and RBMPs or specifically mentioned that the establishment of type-specific reference conditions was undertaken within the individual countries. However, in general it can be assumed that the intercalibration exercise led to a certain level of coordination. In the Danube iRBD (Category 1), countries have agreed on general criteria as a common base for the definition of reference conditions for rivers of basin-wide importance. These have then been further developed on the national level into type-specific reference conditions. In the Gauja/Koiva iRBD, the Latvian RBMP mentioned that there are differences in type-specific reference conditions between the two Member States but that they will be coordinated during the next planning period.

Joint significant water management issues were identified by the Category 1 basins. In a few of the Category 2 basins, for example in Torneälven/Tornionjok, coordination was carried out on the pressure analysis, which is a first step in identifying joint management issues in the future.

Monitoring

Surface water bodies

All of the Category 1 basins and 6 of the Category 2-3 basins were assessed regarding the monitoring of surface water bodies. Not all iRBDs were assessed as an initial screening showed that international coordination on monitoring was not taking place in all iRBDs.

Joint or coordinated monitoring of surface water bodies is taking place in most Category 1 basins. In the Danube, the Elbe, the Meuse, the Rhine, the Sava and the Scheldt there are joint or coordinated programmes for ecological and chemical monitoring. In the Category 2-3 basins, about half of the basins (e.g. Gauja/Koiva, Dniester, Tana/Tena, Vistula) mention that joint monitoring is being carried out, while the other basins mention that coordination has taken place although more detailed information on coordination efforts is limited.

In the Danube, a joint survey is carried out every 6 years, which aids in the harmonisation of monitoring methodologies; filling information gaps in monitoring networks; testing new methods; or checking the impact of “new” chemical substances in different matrices. In the Meuse and the Scheldt iRBDs, joint surveys for assessing the status of surface waters are carried out. Every three years, the commissions of the two iRBDs publish a report with the most important results of the measured parameters per measuring station or measuring location.

For seven Category 1 iRBDs[138] and the Gauja/Koiva iRBD (Category 2 basin) a more detailed assessment of the information reported to WISE was possible:

Monitoring of ecological status

In operational monitoring, **quality elements** in rivers are assessed that are most **sensitive to the prevalent pressures**. 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. The information reported to WISE by the EU Member States in each iRBD were compared[139] to determine whether the quality elements selected were the same.

In all the iRBDs assessed, there is a general agreement between iRBD sharing countries on sensitive quality elements used to assess nutrients, organic pollution and morphological pressures. In addition, there was a general agreement on quality elements for hydrological pressures in the basins except for in the Danube, the Elbe and the Odra. For chemical pollution and temperature pressures, the iRBD sharing countries used different quality elements to assess these pressures.

The **river basin specific pollutants** and their EQSs reported by the Member States to WISE were evaluated. The summary of the evaluation concern two essential aspects:

- which and how many substances have been selected for the entire basin or parts of it; and
- whether the EQSs are the same or in one or another way comparable (in the same range/order of magnitude, for the same matrix).

The analysis showed similar findings in all eight iRBDs assessed. The identification of the number of river basin specific pollutants varied widely within the iRBDs, with some Member States identifying a significantly higher number river basin specific pollutants compared to other iRBD sharing countries. This means that within the same basin Member States are using a different set of river basin specific pollutants for assessing ecological status. In addition, there were considerable differences in the number of river basin specific pollutants identified by the Member States and the number of pollutants for which EQSs had been defined. The lack of EQSs reduces the usability of the monitoring data for those pollutants in terms of assessing ecological status. In the basins with three or more iRBD sharing countries, there was not one common river basin specific pollutant with an environmental quality standard identified. In most cases, the river basin specific pollutants with an environmental quality standard were commonly identified by half the iRBD sharing countries. In the iRBDs shared by only two

[138] The Sava and the Tana/Teno could not be assessed as these basins mostly have third countries sharing the basin and information for these countries was not reported to WISE.

[139] The analysis differentiates 4 biological quality elements (or 3 biological quality elements and 2 sub- biological quality elements), 9 different pressures and 4 different water categories.

Member States, common river basin specific pollutants with an environmental quality standard were identified. Overall, there was limited agreement for the level of EQSs for river basin specific pollutants among the iRBD sharing countries. This hinders being able to compare the results of the status assessment of surface water bodies.

Monitoring of chemical status

Member States are required to report to WISE on the priority substances in their RBDs and to establish EQSs in line with the EQSs Directive. In operational monitoring, these pollutants should be monitored once a month for the duration of the river basin management cycle. In surveillance monitoring, the pollutants must be monitored once a month for one out of the six years of the management cycle. An important aspect for chemical status assessment, therefore, is whether the water samples during monitoring have been taken with the frequency outlined in the WFD. Other frequencies need a justification based on expert judgement or technical knowledge.

The analysis of the frequency the Member States monitored priority substances showed variations within the iRBDs. For some Member States within an iRBD, the monitoring frequency reflected the frequency as outlined by the WFD, but for other Member States within the same basin the monitoring frequency was less than 12 times/year without providing further justification. In none of the iRBDs assessed was the monitoring sampling frequency 100% in line with the frequency suggested by the WFD for all iRBD sharing countries.

Quantitative and chemical monitoring of transboundary groundwater bodies

Transboundary groundwater bodies were delineated in 5 of the iRBDs, namely the Danube, the Isonzo/Soca, the Rhine, the Sava and the Scheldt. The Danube iRBMP states that monitoring of the 11 transboundary groundwater bodies of basin-wide importance has been integrated into the Transnational Monitoring Network of the ICPDR. In the Isonzo/Soca international river basin, cooperation efforts between Italy and Slovenia to define transboundary groundwater bodies and to put in place a transboundary monitoring network are underway. The Italian RBMP covering the Isonzo/Soca reports that the monitoring networks for transboundary groundwater bodies will be defined in 2016. This work is being carried out under the Italian-Slovenian Commission for Hydro-economy via Interreg projects supported by the EU (the Italian RBMP refers to the ASTIS and HYDROKARST projects). According to the background document on groundwater bodies, a future Sava Commission groundwater body monitoring network is planned and will be based on the existing national monitoring networks. Maps showing the status of transboundary groundwater bodies are included in the iRBMPs of the Rhine and Scheldt but joint monitoring or the coordination of monitoring of transboundary groundwater bodies is not described.

Status assessment

Surface water bodies

All of the Category 1 basins and 6 of the Category 2-3 basins were assessed regarding the monitoring of surface water bodies. Not all iRBDs were assessed as a screening showed that international coordination on status assessment was limited.

The review of the Category 1 basin iRBMPs shows that most of the iRBDs made efforts to harmonise the assessment of ecological and chemical status. Despite harmonisation efforts, differences still remain but the iRBMPs reported that progress is being made. In the Ems iRBD, to compare the credibility of the results, a three-level confidence level was introduced. In the assessment, the overwhelming majority of the results were classified in the high confidence level, since the assessment was reported to be carried out in accordance with the WFD requirements. Most of the results of the second intercalibration phase were incorporated into the national evaluation systems. In the Meuse, the iRBMP states that for transboundary water bodies bi- and trilateral coordination between the Member States took place to ensure coherence on the status of water bodies. In the Scheldt, the assessment methods are not the same throughout all iRBD shares. To aid in the harmonisation of monitoring and assessment, individual files or "flash cards" have been produced for each transboundary water body, which according to the iRBMP are used for coordination and alignment of results.

Limited information on harmonisation of status assessment is available in the 6 Category 2-3 basins assessed. The Spanish and French RBMPs of the Garonne/Eastern Cantabrian/Ebro iRBD mention that international cooperation has taken place with respect to status assessment but details are not provided.

Groundwater bodies

The Danube and the Scheldt describes in their iRBMPs how the quantitative and chemical status assessment of groundwater bodies is coordinated. Both iRBMPs highlighted the need for further cooperation efforts. In the Danube iRBD, the countries used a broad spectrum of different methodologies for the assessment of the chemical and quantitative status. Despite there being overall coordination facilitated by the ICPDR Groundwater Task Group, the need for further harmonisation of the national methodologies is mentioned. In the Scheldt, Member States have compared their assessments of quantitative status. During the international coordination within the Scheldt district, information was exchanged on the groundwater monitoring networks for surveillance monitoring, with a particular focus on the transboundary aquifers. However, chemical status has not been harmonised, and each Member State/Region has defined criteria to assess the status that are causing groundwater bodies to be designated as at risk.

Defining ecological potential of heavily modified and artificial water bodies

Approaches for the determination of GEP were defined at national level by the individual EU Member States in all the iRBDs. Some of the Category 1 basins describe harmonisation or coordination efforts to align national level approaches. According to the Rhine iRBMP, the differences in the methodologies were intensively discussed within the iRBD and are relevant with respect to the harmonisation of classification results of transboundary water bodies. According to the Odra iRBMP, each Member State has its own methodologies for determining

GEP, but the approaches were coordinated through a two-day workshop to minimize differences. The Meuse iRBMP states that bilateral coordination was undertaken to ensure coherence.

6.2.3 International coordination on exemptions and economic analysis

The Category 1 basins were assessed regarding coordination of exemptions on transboundary surface and ground water bodies and the economic analysis of water services.

Exemptions

The iRBMPs of the Rhine and Scheldt indicated that coordination took place at the international level. The Scheldt iRBMP states that Member States and Regions used different methodologies for the application of exemptions but that coordination on transboundary water bodies took place. Coordination of exemptions for groundwater bodies was not mentioned in the iRBMPs. In the Rhine iRBD, exemptions were reported to be coordinated for surface water bodies of basin-wide importance, and the iRBMP outlines the reasons for the application of exemptions. The other Category 1 basins indicated in their iRBMPs that exemptions were applied at national level but not that specific coordination took place at the international level.

Economic analysis

Half of the Category 1 basins reported coordinating on the economic analysis. In the other basins, the analysis was carried out at national level and the information was summarized in the iRBMP.

In the Danube iRBD, the economic analysis and water pricing policies summarized in the iRBMP is based on the joint work performed for the 2013 Update of the Danube Basin Analysis. To facilitate the international coordination, two questionnaires were developed and sent out in 2013 to collect information on economics from the Danube countries. The collected information was summarised in form of tables. The overview tables 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; 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.

In the Odra iRBD, the sub-working Group “Economic Analysis” of the Odra Commission has the main objective to coordinate the exchange of data and information pertaining to economic issues within the area of water management. The economic analysis in the Rhine iRBMP presents a trans-national summary of the economic analysis. The information provided is brief and summarizes the water uses and the baseline for the Rhine as whole. In the Scheldt iRBD, the countries applied a joint approach (commonly agreed indicators) regarding the economic analysis of the drivers (households, industry & agriculture). Water pricing policies were not coordinated; however, the countries analysed the differences in the approaches.

In the Gauja/Koiva iRBD (Category 2), the 2011-2013 transboundary project had as an objective to develop a cost-effectiveness assessment methodology. One of the main results of the project was the coordination of a joint economic analysis approach, which included the analysis of essential water uses, water services, potential future trends and costs. Work has been carried out to coordinate methodologies for economic analysis but methodological gaps still remain.

6.2.4 International coordination on Programme of Measures

All of the Category 1 basins cooperated on the development of a joint international Programme of Measures (iPoM). These iPoMs are all based on jointly identified significant water management issues. Management objectives were developed in each in the basins to address the significant issues. The iRBMPs present the measures included in the iPoMs, which for the most part are a summary of measures at national level. About half of the Category 1 basins mention joint measures being implemented at international level. These joint measures focus mainly on addressing pollution and overcoming hydro-morphological alterations to surface water bodies. None of the iPoMs provide detailed information on the measures included in the programme, such as timing, stakeholders involved, financing, etc., but the iRBMPs refer to the national plans for further details.

In the Scheldt, while there are no joint measures, files for each transboundary water body were developed, wherein national measures planned by the different Member States 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 help to influence other Member States and Regions regarding potential measures, for example, for new sources of pollutions or resolving existing bottlenecks.

Four of the Category 1 basins mention a prioritisation method for selecting measures to address the transboundary significant water management issues. In the Elbe, priorities at international level have been defined for measures, mainly measures to reduce hydro-morphological pressures, measures to reduce pollution from agriculture and measures to reduce pollution from chemical substances and measure related to waste water treatment. In the Ems iRBD, for the 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 prioritized for their implementation and agreed in cross-border coordinated processes. In the Odra iRBD, a Strategy was developed in 2013 that defined significant water management issues, suggested measures and prioritised action. This information influenced the development of national PoMs. In the Sava iRBMP, priorities for the effective implementation of national measures on a basin-wide scale are highlighted and are the basis of further international coordination.

Measures to address water scarcity

Water scarcity and droughts were not identified as an international significant water management issue in the Category 1 basins. As such, the iPoMs do not define joint measures or strategies to address this issue. Nonetheless, in about half of the iRBDs measures to address water scarcity and water abstraction are described. These measures are carried out at the national level.

Measures to address pollution from agriculture and other sectors

All of the Category 1 basins reported pollution from agriculture and other sectors as a significant water management issue and measures have been developed. Most of the basins refer to national level measures to address the issue.

In the Danube, future development scenarios were developed and the estimated effect of measures on the basin-wide scale were assessed. The iPoM also includes joint measures to address agriculture pollution. One joint measure mentioned is the elaboration of basin-wide management strategies with the aim to reduce nutrient loads of surface and coastal waters. A set of measures related to the concept of best agriculture practice is also suggested to be adopted in the entire Danube Basin. For pollution from sectors other than agriculture, a number of joint measures are described in the iRBMP. 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 the Scheldt, the Member States and Regions have a joint approach to address nutrient pollution. Measures to address the reduction of nitrogen pollution were compiled and compared, and the Member States and Regions jointly estimated their impact and costs.

To address point source pollution, all the Category 1 basins are implementing similar measures and strategies. All the basins have internationally coordinated accidental pollution warning and response systems in place. The focus of the measures in the iPoMs is on constructing or optimizing municipal sewage treatment plants. The implementation of the Urban Waste Water Directive is frequently mentioned. In addition, three Category 1 basins include measures to address rainwater discharges and two basins include measures to address micro-pollutants. 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. In the Meuse, the Netherlands is committed supporting drinking water companies and water boards to investigate the elimination of medicines from the water cycle.

Measure to address hydro-morphological alterations

Hydro-morphological alterations, especially interruptions in river continuity, have been identified as significant water management issues in all of the Category 1 basins. Most of the basins have identified joint measures, including joint approaches for prioritising actions within the iRBD. The Meuse, the Scheldt and the Rhine each developed a "Master Plan Migratory Fish", a strategy to identify where measures should be taken in each iRBD to improve the habitat and migratory corridors of fish species.

In the Danube iRBD, 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 has been carried out. The approach provides information on the estimated effects of national measures in relation to their ecological effectiveness at the basin-wide scale and serves as a supportive tool in the implementation of measures. In the Odra, the 2013 Strategy to address pressures in the basin details the problem analysis of river continuity issues within each Member State, focussing on the three main transboundary rivers within the basin. At the international level, rivers that act as migration corridors are especially prioritized. 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.

Similarly, in the Ems iRBD the Member States agreed to a joint approach in the prioritisation of measures to address river continuity. Habitat requirements of target species were evaluated to identify nationally significant migratory routes. In the Sava iRBD, to address morphological alterations the iRBMP differentiates between water bodies at risk, possibly at risk and not at risk.

6.2.5 International coordination on Climate change and droughts

Climate change impacts and the need to adapt to climate change was highlighted in all the Category 1 iRBMPs. A few of the Category 1 basin have developed basin-wide adaptation strategies, and some iRBMPs mention taking climate change effects into account in the selection of measures.

In the Danube, a Climate Change Adaptation Strategy was developed in 2012. The ICPDR's Climate Change Adaptation Strategy provides guidance on adaptation measures for the Danube River Basin and includes information specific for WFD implementation. The Meuse Commission is currently 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. The Rhine Commission has developed a Strategy for Adapting to Climate Change, which was published in 2015. The Adaptation Strategy includes suggestions for measures to be implemented by the Member States. Within the Scheldt, an initial exploratory climate memorandum has been developed. According to the iRBMP, the Climate memorandum 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.

According to the Elbe iRBMP, in the future adaptation strategies for climate change will play a role in the selection of measures and their implementation in the medium and long term. Initial scientific results on the impacts of climate change in the Elbe iRBD have already been taken into account in the selection of measures for the present management plan. The Ems iRBMP states that measures in the iRBD 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. According to the Sava iRBMP, the priority in dealing with climate change in this cycle of WFD implementation is to propose a set of guiding principles to assist Sava River Basin managers to establish a strategy for building adaptive capacity.

Most of the Category 2-3 basins did not mention international coordination in the context of climate change in their RBMPs. In the Dniester iRBD progress has been made regarding cooperation on adaptation to climate change between the Ukraine and Moldova. The Strategic Framework for Adaptation to Climate Change in the Dniester River Basin was published in 2015. It describes the climate change issues facing the river basin, the potential for adaptation to climate change and defines priorities and measures.

6.3 Recommendations for international cooperation under the WFD

- In basins where an iRBMP has not been developed, the national RBMPs should include a dedicated chapter in their RBMPs describing the international coordination efforts to increase transparency.
- iRBD specific information should be reported to WISE as opposed to reporting for the whole national RBD.
- Institutional arrangements in Category 3 and 4 basins should be further strengthened through increased active exchange and coordination on all aspects of WFD implementation.
- All iRBDs should strive to improve or to initiate coordination on delineation and typology of water bodies.
- Joint or coordination monitoring programme should be enhanced. To ensure that results of assessing ecological status are comparable, at least one biological quality element should be common for each pressure.
- EQSs should be harmonised for the same pollutants.
- WFD consistent monitoring of priority pollutants should be made a priority in all basins to ensure that chemical status assessment is based on appropriate data.
- Status assessment for surface and groundwater bodies should be coordinated.

- A joint methodology for setting exemptions on transboundary water bodies should be developed.
- International Programmes of Measures should strive to present more information on international mechanisms for measures implementation rather than summarizing actions within Member States. Basin-wide approaches should be emphasized.