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Second River Basin Management Plans – Member State: Portugal

Accompanying the document

REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

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

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Acronyms and definitions

EQS Directive	Environmental Quality Standards Directive
FD	Floods Directive
Km	Kilometre
km^2	Kilometre squared
KTM	Key Type of Measure
PoM	Programme of Measures
RBD	River Basin District
RBMP	River Basin Management Plan
WFD	Water Framework Directive
WISE	Water Information System for Europe
Annex 0	Member States reported the structured information on the second RBMPs to WISE (Water Information System for Europe). Due to the late availability of the reporting guidance, Member States could include in the reporting an Annex 0, consisting of a short explanatory note identifying what information they were unable to report and the reasons why. This Annex was produced using a template included in the reporting guidance. If Member States reported all the required information, this explanatory note was not necessary.

Foreword

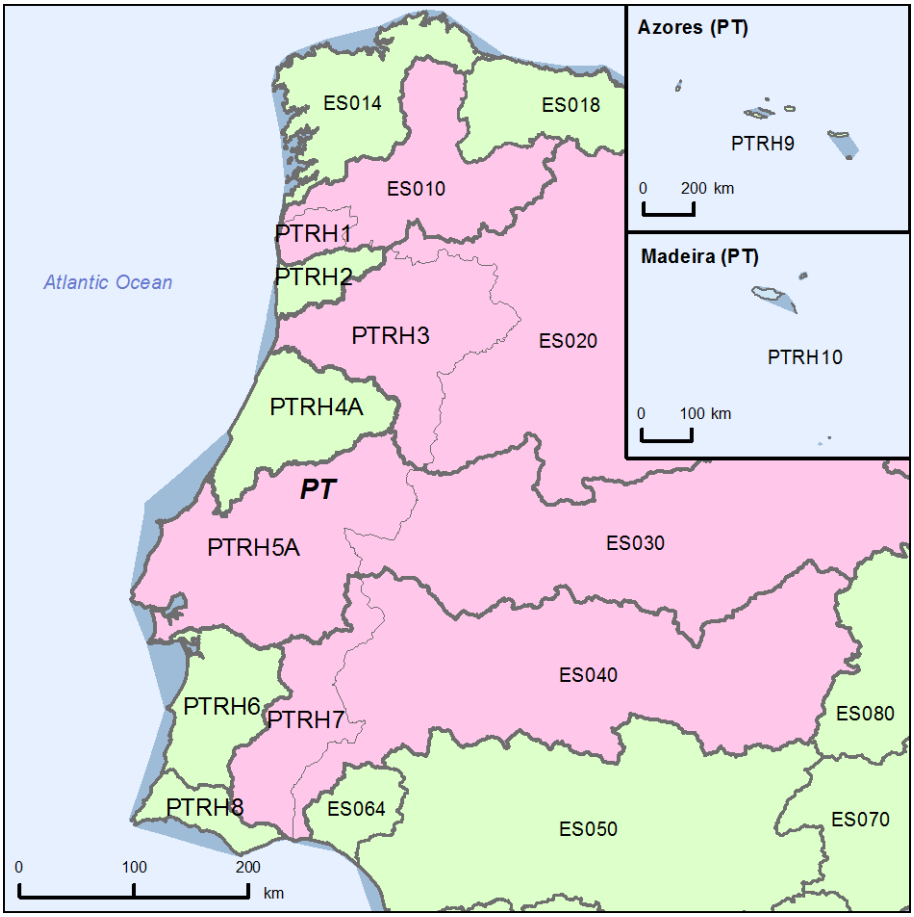
The Water Framework Directive (WFD) (2000/60/EC) requires in its Article 18 that each Member State reports its River Basin Management Plan(s) (RBMPs) to the European Commission. The second RBMPs were due to be adopted by the Member States in December 2015 and reported to the European Commission in March 2016.

This Member State Assessment report was drafted on the basis of information that was reported by Member States through the Water Information System for Europe (WISE) electronic reporting.

The Member State Reports reflect the situation as reported by each Member State to the European Commission in 2016 or 2017 and with reference to RBMPs prepared earlier. The situation in the Member States may have changed since then.

General Information

Map A ***Map of RBDs***



Source: WISE, Eurostat (country borders)

International RBDs (within European Union)
International RBDs (outside European Union)
National RBDs (within European Union)
Countries (outside European Union)
Coastal Waters

Portugal is a republic comprised of a continental part and two autonomous regions. The total area of Portugal is 92 072 km², with an economic exclusive zone of 1 727 408 km². The population is about 10.6 million.

The information on areas of the national RBDs including sharing countries is provided in Table A:

Table A: Overview of Portugal's RBDs

RBD	Name	Size (km^2)	Countries sharing RBD
PTRH1	Minho and Lima	2464	ES
PTRH2	Cavado, Ave and Leca	3585	-
PTRH3	Douro	19218	ES
PTRH4A	Vouga, Mondego and Lis	12144	-
PTRH5A	Tagus and West Rivers	30502	ES
PTRH6	Sado and Mira	12149 (12144)	-
PTRH7	Guadiana	11611	ES
PTRH8	Algarve Rivers	5511	-
PTRH9	Azores	10047	-
PTRH10	Madeira	2248	-

Source: RBMPs reported to WISE. Values in brackets were subsequently provided by Portugal.

The share of Portugal in the respective international RBDs is 5.0 % (Minho), 47.1 % (Lima), 21.7 % (Tejo), 17.3 % (Guadiana) and 19.3 % (Douro).[1]

Table B: Transboundary river basins by category and % share in Portugal

Name international river basin	National RBD	Countries sharing RBD	Co-ordination category	
			2	
			km²	%
Miño/Minho	PTRH1 (Minho-Lima)	ES	854 (814)	5.0 (9.0)
Lima/Limia	PTRH1 (Minho-Lima)	ES	1180 (1199)	47.1 (47.6)
Duero/Douro	PTRH3 (Douro)	ES	18855 (18588)	19.3 (19.1)
Tajo/Tejo	PTRH5A (Tagus and West Rivers)	ES	15415 (25016)	21.7 (31.0)
Guadiana	PTRH7 (Guadiana)	ES	11598 (11534)	17.3 (17.2)

Source: WISE electronic reports. Values in brackets were subsequently provided by Portugal.

Category 1: International agreement, permanent co-operation body and international RBMP in place.
Category 2: International agreement and permanent co-operation body in place.
Category 3: International agreement in place.
Category 4: No co-operation formalised.

[1] Portugal subsequently noted that the share of Portugal in the respective international RBDs is 9.0% (Minho), 47.6% (Lima), 31.1% (Tejo), 17.2% (Guadiana) and 19.1% (Douro).

Status of the second river basin management plan reporting

A total of ten RBMPs of Portugal (Minho and Lima, Cavado, Ave and Leca, Douro, Vouga, Mondego and Lis, Tagus and West Rivers, Sado and Mira, Guadiana, Algarve Rivers, Azores, Madeira) were published between 29 January and 15 December 2016. Documents are available from the European Environment Agency EIONET Central Data Repository https://cdr.eionet.europa.eu/.

Key strengths, improvements and weaknesses of the second River Basin Management Plan(s)

The main strengths and shortcomings of the second RBMP of Portugal are as follows:

- **Governance and public consultation**

- Portugal and Spain ensured coordination on a broad range of issues in the international RBDs they share.
- A broad range of stakeholders were actively involved in Portugal's RBDs, in nine of them via advisory councils.
- Portugal did not adopt and publish the RBMPs in accordance with the timetable in the WFD.
- **Characterisation of the RBD**

- The delineation of transboundary water bodies has been coordinated by the Commission for the Implementation and Development of the Albufeira Convention.

- A number of the national Portuguese types do not have corresponding intercalibration types: this equates to 58 % of coastal water bodies in Portugal as a whole (41 % of these are in the Azores and Madeira). For natural lakes (all in the Azores RBD) there are no common intercalibration types. For rivers and transitional waters are 33 % and 67 %, respectively, without a common intercalibration type.

- There are still significant gaps in the development of reference conditions for all types in all categories of surface waters for all the relevant quality elements. This casts doubts on the robustness of the subsequent classification of ecological status/potential in Portugal. There was an improvement since the first cycle, but several tasks remain to be completed. National authorities have reported work underway, to be concluded in 2019, which will further advance the subsequent classification of ecological status/potential in Portugal.

- Further characterisation work of groundwater bodies has been undertaken since the first cycle by describing the geological formation and whether they are layered or not. Portugal has also included an assessment of linkages with surface water bodies and terrestrial ecosystems.

- In most Portuguese RBDs, the significance of pressures on both surface and groundwater has not been defined in terms of thresholds, but on failure to reach good status.

- Portugal has established inventories of emissions for all RBDs except for the Minho. Not all priority substances are included in these inventories, according to the information reported. Tier 1 of the methodology was implemented for all substances included in the inventories (while the Guidance Document recommends to implement at least Tier 1 + 2 for substances relevant at RBD level). The data quality was not reported.

- **Monitoring, assessment and classification of ecological status**

- The total number of monitoring sites reported by Portugal increased by 36 % since the first RBMPs. There were no reported operational monitoring sites in coastal waters in any of the RBDs even though there are significant pressures reported. Portugal subsequently explained that sites reported for surveillance monitoring were in fact also used for the classification of ecological status.

- Hydromorphological quality elements are monitored in only one lake and in around half of river and transitional water bodies used for surveillance monitoring.

- Portugal identified River Basin Specific Pollutants on the basis of a previous list of River Basin Specific Pollutants and their presence in water in the period 2004-2012. Concerning pesticides, Portugal also took into account whether or not they were authorised.

- Environmental Quality Standards are reported for 26 River Basin Specific Pollutants in water. All of them were derived according to Technical Guidance n. 27. The analytical method used for each substance meets the minimum performance criteria laid down in Article 4(1) of the Directive 2009/90/EC for the strictest standard applied.

- Monitoring was reported for 16 chemical substances that are not Priority Substances. These were generally assumed to be River Basin Specific Pollutants, but for Portugal they are different from the substances for which Environmental Quality Standards were derived.

- For some river, transitional and coastal water bodies, classification of ecological status/potential was based on none of the required biological quality elements.

- Although 43 surface water bodies were classified in high status, only four of these were classified using the required hydromorphological quality elements.

- Hydromorphological quality elements were not used in the classification of lakes, even though these elements were reported to be monitored in lakes.

- Compared to the first RBMPs, the classification of ecological status/potential was based on more comprehensive classification methods, which consider more of the relevant biological quality elements and some hydromorphological and physicochemical quality elements (mainly nutrients). There is therefore a decrease in the proportion of water bodies with unknown ecological status/potential. However, the overall ecological status/potential of surface water bodies has not improved significantly since the first RBMPs.

- The one-out all-out principle has been used in all RBD, except in Madeira, to establish the overall ecological status.

- **Monitoring, assessment and classification of chemical status in surface water bodies**

- The proportion of water bodies in unknown status has increased since the first RBMPs (from 58 to 74 %). The proportion in good status has consequently decreased, while the proportion of water bodies failing to achieve good status remained stable. Portugal also reports improvements for three Priority Substances.
- 63 % of classified surface water bodies were classified with high confidence, and 34 % with low confidence.
- 20 %, 87 % and 70 % of river, transitional and coastal water bodies were monitored.
- 33 Priority Substances were monitored for status assessment; most were monitored in less than 10 water bodies. Not all substances reported as discharged were monitored, however Portugal mentioned that some of the substances reported as discharged were actually not found in the effluents, but half of the limit of quantification was used as a basis to calculate the loads reported to the E-PRTR. Monitoring frequencies were below the recommended minimum frequencies for surveillance and operational monitoring.

- Hexachlorobenzene, mercury and hexabutadiene were not monitored in biota.

- For trend assessment, Portugal reported no data on monitoring of Priority Substances in sediment and/or biota. However, Portugal subsequently clarified that since 2013 11 of

the 14 substances have been monitored in sediment in the mainland RBDs, in what appears to be a limited number of sites. According to the Portuguese legislation, monitoring should be carried out in the future at or above the recommended minimum frequency.

- For the assessment of chemical status, the one-out, all-out principle was used in all RBDs, except in Madeira.

- **Monitoring, assessment and classification of quantitative status of groundwater bodies**

  - The number of monitored groundwater bodies increased from 70 to 80. In mainland Portugal grouping of groundwater bodies was reported for monitoring purposes. No monitoring was reported for two river basin districts (Azores and Madeira).

  - The confidence in status varies among RBDs, and only 20 % of groundwater bodies results have high confidence.

- **Monitoring, assessment and classification of chemical status of groundwater bodies**

  - Overall, the monitoring situation deteriorated since the first RBMPs, as 43 % of the groundwater bodies have no surveillance monitoring and not all groundwater bodies at risk are subject to operational monitoring. According to the information subsequently provided by Portugal, the coverage of chemical monitoring in mainland Portugal is almost complete and grouping of groundwater bodies has been done for monitoring purposes.

  - According to a clarification subsequently provided by Portugal, all WFD core parameters are monitored in all RBDs of mainland Portugal.

  - As regards status assessment, the situation improved, with 2.7 % of the total groundwater body area failing good status, instead of 4.9 % previously.

- **Designation of Heavily Modified and Artificial Water Bodies and definition of Good Ecological Potential**

  - The designation of several heavily modified water bodies has been reviewed since the first RBMPs, to take account of Common Implementation Strategy guidance and improved characterisation. However, the designations of some HMWBs is still pending.

For example, in the Azores RBD some areas, namely ports, have been identified as having heavily modified water bodies' characteristics, but a procedure for their designation is still ongoing. Some information is provided on how the significant adverse effects of restoration measures on the use and the wider environment have been defined.

- No explicit description of improvements made to the method for good ecological potential definition since the first cycle could be found in the RBMPs, but according to information subsequently provided by Portugal some improvements have taken place due to: 1) the revision/refinement of some BQE assessment methods; 2) the intercalibration and adoption of new methods for other BQEs; and 3) the adoption of a hybrid CIS Guidance/Prague Approach to the definition of ecological potential.

- Good ecological potential is defined in terms of biology and, in general, this is done using the same assessment methods and metrics as for the ecological status (e.g. for HMWB downstream weirs/dams or other kind of inland lotic HMWB). The only difference is for reservoirs, where specific metrics are used for phytoplankton. For the reservoirs of northern type, the Mediterranean Reservoir Phytoplankton Evaluation Index is used. For the reservoirs of southern type and main flow type reservoirs, chlorophyll a is used for classification. According to information subsequently provided by Portugal, other biological quality elements are considered as "not applicable" in Portuguese reservoirs, based on the intercalibration of ecological status methods.

- Mitigation measures for defining good ecological potential have been reported: the ecological changes expected due to the mitigation measures are described in a qualitative way. According to information subsequently provided by Portugal, besides reinforcing the implementation of these measures, studies are being developed to improve the mitigation measures on hydromorphological conditions, environmental flows in particular.

- **Environmental objectives and exemptions**

- Environmental objectives for surface water ecological and chemical status have been reported in all RBDs, and the same applies for quantitative and chemical status of groundwater. Information is provided on by when water bodies are expected to achieve the WFD objectives.

- Drivers, pressures and pollutants leading to exemptions are reported, although some gaps and uncertainties remain in some RBDs.

- Justifications for exemptions have been provided at water body level. Criteria have been developed for the application of exemptions with regard to technical feasibility and disproportionate costs. However, the reasoning for the exemptions and the timeframes to achieve environmental objectives might be better developed and reflected in the RBMPs.

- **Programme of Measures**

- In general the amount and quality of information has improved since the first RBMPs, in particular by clearly identifying the gaps to good status for most significant pressures and designing the Programmes of Measures (PoM) to close the gaps. However, cost-effectiveness analyses have only been carried out in one of the ten RBDs. Portugal subsequently clarified that the cost-effectiveness analysis of the measures in the eight mainland RBMPs will occur during the process of evaluating the implementation of the measures in 2018. This will allow for an evaluation of the effectiveness of the measures against the state of the bodies of water.

- A clear financial commitment is generally in place for the Programmes of Measures in all ten RBDs. On a sectoral basis, financial commitments do not seem to be in place for a small number of relevant sectors in three RBDs. Portugal subsequently clarified that the mid-term review will allow the necessary changes to be made, in particular those of a financial nature.

- New legislation or regulations to implement the Programmes of Measures in the first cycle was required in eight RBDs (not required in two RBDs) and is still in progress. There is so far no clear distinction between mandatory and voluntary measures. Portugal subsequently clarified that all basic measures were mandatory as they were in place to comply with existing Directives, whereas the supplementary measures may be mandatory or voluntary.

- As to coordination with the Floods Directive, the design and new and existing structural measures have been adapted to take account of WFD environmental objectives, and financial commitments have been secured for the implementation of the Programmes of Measures in the flood protection sector in all RBDs. Portugal indicated that Natural Water Retention Measures have been included in the Programmes of Measures of all RBDs and KTM 23 has been mapped to national measures, but there is no evidence that

such measures have been made operational. Portugal subsequently clarified that these measures are being integrated into the Rural Development Programme of mainland Portugal and are being made operational when funding is awarded to relevant farmers.

- **Measures related to abstractions and water scarcity**

- Water abstraction pressure in Portugal has been reported as relevant for all RBDs except the Azores.

- The Water Exploitation Index + is calculated and has been reported for all RBDs. No trend data have been reported to WISE, but such trends are included for groundwater bodies in the RBMPs.

- In the Algarve Rivers groundwater consumption pressures have increased in the recent past.

- Overall data are presented for almost all RBDs regarding the main purposes for water consumption. Agricultural abstraction data are based on estimations, rather than being backed by metering.

- No detailed data on water consumption was reported for Madeira, although, according to information subsequently provided by Portugal, information on sector characterisation is publicly available.

- Licenses and permits for abstractions and flow regulations are being updated.

- **Measures related to pollution from agriculture**

  - There is a clear link between agricultural pressures and agricultural measures.

  - A gap assessment was missing in the first cycle but has been carried out in the second cycle. It addresses diffuse chemical pollution and nutrients.

  - The implementation of Article 11(3)(h) basic measures for the control of diffuse pollution from agriculture at source is required in all RBDs.

  - Portugal has established mandatory safeguard zones around drinking water protection areas.

  - Financing of the agricultural measures is secured in all RBDs.

- **Measures related to pollution from sectors other than agriculture**

- Portugal has made progress in identifying where improvements to urban waste water treatment can help to reduce pollution by Priority Substances from industry in particular.

- There is limited information on the substance-specificity or potential effectiveness of measures.

- It appears that in the island RBDs in particular, more information is needed on the concentrations of Priority Substances in water to inform the decisions on measures.

- **Measures related to hydromorphology**

- For the definition of ecological flows, the national water authority is in charge of the elaboration of a methodological guide to be applied in different regions of mainland Portugal. At the time of publishing the RBMPs and the Programmes of Measures, the methodological guide was still under development. Overall, work is still in progress concerning the definition of ecological flow regimes. According to information subsequently provided by Portugal, all dams built after 2000 have a definition of ecological flows. A significant number of dams, however, still do not have ecological flows defined (particularly older ones) and monitoring programmes have been and are being developed to define ecological flow regimes.

- Specific measures mentioned in some of the RBMPs indicate relevance for Natural Water Retention Measures and green infrastructure, e.g. maintenance of permanent prairies and pastures and areas of ecologic interest as well as sustainable forestry. There is no national or regional strategy that prioritises the implementation of Natural Water Retention Measures and green infrastructure measures per se. However, the National Climate Change Adaptation Plan includes these types of measures. Also the Common Agriculture Programme with green payments and the Rural Development Programme of mainland Portugal promote Natural Water Retention Measures, which are reflected in some of the RBMPs.

- **Economic analysis and water pricing policies**

- A rather broad definition of water services is applied in the Portuguese RBDs, but they still differ from RBD to RBD.

- Environmental and resource costs are regarded as internalised through the existing legislation, but they are still not explicitly calculated.

- **Considerations specific to Protected Areas (identification, monitoring, objectives and measures)**

  - There was no evidence of a differentiated approach to setting additional objectives for Habitats and Birds Directives Protected Areas. This is because all these areas were deemed to be adequately protected by the objectives of good status under the Water Framework Directive.

  - No information was reported to WISE on a monitoring programme in surface waters and groundwater for water bodies associated with Protected Areas. This however seems to be a mere error in the information reported to WISE, as the River Basin Management Plans actually include a table summarizing the number of monitoring stations per protected area type.

- **Adaptation to drought and climate change**

  - Climate change was considered in various ways in all RBDs, on the basis of the Common Implementation Strategy guidance document on how to adapt to climate change.

  - Droughts have been reported to be 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 already been applied in the first RBMPs. According to the information provided by Portugal, Article 4(6) only referred to water bodies potentially affected. Furthermore, Prevention, Monitoring and Contingency Plans for Droughts Situations are in place.

Recommendations

- Portugal should ensure that the preparation of the next cycle of RBMPs is carried out in accordance with the WFD timetable, to ensure the timely adoption of the third RBMPs.

- Clear information should be included in the national RBMPs about international coordination efforts, in order to increase transparency.

- Portugal should continue to improve international cooperation, including coordinated assessments of the technical aspects of the WFD such as applying a harmonised approach for status assessment and coordinated Programmes of Measures in order to ensure the timely achievement of the WFD objectives.

- Further work is needed in the establishment of reference conditions for some types of Quality Elements and in the review of assessment methodologies, in particular for transitional and coastal waters.

- Portugal should complete the development of methods for the status assessment of water bodies and should determine the reference conditions and apply them through the implementation of robust monitoring programmes.

- Portugal should improve monitoring of surface water by covering all relevant quality elements in all water categories, as there has been some deterioration in the monitoring of some biological and hydromorphological quality elements since the first RBMPs. Operational monitoring needs to include all water bodies which are subject to significant pressures, including in coastal waters.

- Portugal should complete the development of assessment methods that are WFD compliant for all relevant quality elements and provide a complete assessment of ecological status for all water bodies, including all relevant quality elements.

- The number of water bodies with unknown status should be reduced, and confidence in the assessment of surface water chemical status improved. For this, monitoring should be performed in the relevant matrix in a way that ensures sufficient spatial coverage and temporal resolution to reach sufficient confidence in the assessment for all water bodies, if necessary in combination with robust grouping/extrapolation methods. In particular all discharged substances should be monitored. If reduced frequencies or a different matrix are used, the corresponding explanations should be provided, as required by the Directives.

- Trend monitoring should be further improved for all relevant substances, in a way that provides sufficient temporal resolution and spatial coverage.

- Efforts should be kept up to further improve the methodology for the designation of Heavily Modified Water Bodies: clear criteria should be elaborated for the assessment of significant adverse effects of mitigation measures on their use or the wider environment, and the lack of significantly better environmental options. This will improve the transparency of the designation process. As for the definition of ecological potential, a consistent methodology needs to be elaborated and applied for all RBDs, taking into account all relevant biological quality elements.

- Portugal should continue to strengthen the assessments for the justification of Article 4(4) exemptions by closing still remaining data gaps on drivers, pressures and the necessary measures for the timely achievement of the WFD objectives.

- Justifications of Article 4(7) exemptions should be further strengthened by ensuring that each project is assessed at water body level, in addition to the performed strategic level assessments.

- Cost-effectiveness analysis should be applied to support the selection of measures for all RBDs.

- Portugal should continue updating licenses and permits for all abstractions and flow regulations, and ensure that they are compatible with the WFD objectives.

- Portugal should continue to develop measures in the third RMBPs, in cooperation with the farming community, to address agricultural phosphorus pressures, so as to facilitate the achievement of the WFD objectives, and ensure that support structures (advice, inspections, funding etc.) are in place to facilitate compliance with the measures.

- Clearer links should be made between measures and individual pollutants, partly to improve assessment of the need for supplementary measures.

- The island RBDs should ensure that they gather more information on the pressures from Priority Substances and (potential) River Basin Specific Pollutants, in order to determine the measures needed to combat them.

- Portugal should ensure that ecological flows are derived and implemented during this second cycle in all RBDs.

- Portugal should continue prioritising the use of green infrastructure and/or Natural Water Retention Measures that provide a range of environmental (improvements in water quality, flood protection, habitat conservation etc.), social and economic benefits, and which can be in many cases more cost-effective than grey infrastructure.

- Cost recovery should be applied for water use activities having a significant impact on water bodies. Any exemption should be justified using Article 9(4). Portugal should also present in a transparent manner how financial, environmental and resource costs have been calculated and how the adequate contribution of the different users is ensured. The water-pricing policy should be set out in a transparent fashion and a clear overview of estimated investments and investment needs should be provided.

- Portugal should ensure that the specific objectives for Shellfish Protected Areas, including the guidance values for microbiological standards, are consistent with the repealed Shellfish Waters Directive.

Topic 1 Governance and public participation

1.1 Assessment of implementation and compliance with WFD requirements in the second cycle

1.1.1 Administrative arrangements – RBDs

Portugal designated 10 RBDs. Eight of these are located in mainland Portugal, and the remaining two are for its autonomous island regions, the Azores and Madeira.

There has been a minor change in the RBDs since the first cycle: the West Rivers, previously included with the Vouga, Mondego and Lis (PTRH4 then, now PTRH4A), are now part of the Tagus and West Rivers RBD (PTRH5A).

1.1.2 Administrative arrangements – competent authorities

The WISE reporting includes three competent authorities: the Portuguese Environment Agency (for mainland Portugal RBDs), and two regional secretariats for environment for the RBDs of the Azores and Madeira.

1.1.3 RBMPs – structure and Strategic Environmental Assessment

While Portugal did not report sub-plans to WISE, the RBMPs identify several national plans and strategies, covering issues including water scarcity and droughts, adaptation to climate change, rural planning and waste water treatment (Figure 1.1).

All of the RBMPs in Portugal were subject to a Strategic Environmental Assessment.

Figure 1.1 Issues, sectors, sub-basins or water categories in Portugal supplemented by more detailed sub-plans for the second cycle

RBD	Agriculture	Chemical industry	Hydropower	Transport	Water Scarcity and droughts	Climate change	Coastal erosion	Rural planning	Urban planning	Nutrient enrichment	Chemical pollution	Other *
PTRH1					✓	✓		✓				✓
PTRH2					✓	✓		✓				✓
PTRH3					✓	✓		✓				✓
PTRH4A					✓	✓		✓				✓
PTRH5A					✓	✓		✓				✓
PTRH6					✓	✓		✓				✓
PTRH7					✓	✓		✓				✓
PTRH8					✓	✓		✓				✓
PTRH9					✓	✓		✓				✓
PTRH10					✓	✓		✓				✓

Source: WISE electronic reports

Note: Other plans include: water supply, sewerage and waste water treatment; rural development; energy; the sea; waste; resource efficiency; tourism; biodiversity; forests; aquaculture

✓	Covered by sub-plans

1.1.4 Public consultation

Draft documents for all RBMPs were available for the requisite six months. In all 10 RBDs, the public and interested parties were informed by: direct mailing, Internet, invitations to stakeholders, local authorities, media (papers, TV, radio), meetings, printed material and written consultation. Additionally, documents were available for download. In the Azores, there was also a direct mailing via email and paper copies were available at exhibitions and at meetings of the official committee of interest parties. In Madeira, there was a direct emailing of documents in addition to their being available for download.

In all ten Portuguese RBDs, stakeholders were actively involved. All RBDs but one (Madeira being the exception) had advisory councils. Five of the RBDs used regular exhibitions (Sado and Mira, Guadiana, Algarve Rivers, Azores and Madeira). The Tagus and West Rivers RBD referred to the formation of alliances and the Azores RBD to the involvement of stakeholders in drafting. The stakeholders that were actively involved varied across the 10 RBDs;

nonetheless, in all, agriculture/farmers and local/regional authorities were involved. Water supply/sanitation stakeholders were actively involved in all RBD[2]; energy/hydropower industry and NGOs/nature protection stakeholders were involved in six RBMPs. Other stakeholders involved in at least one RBMP were: consumer groups such as fisheries/aquaculture, industry and navigation/ports.

Public consultation had the following impacts on the RBMPs: addition of new information (in all RBDs except Tagus and West Rivers); adjustment to specific measures (all RBDs); changes to selection of measures (all RBDs except Vouga, Mondego and Lis and the Azores); commitment to action in the next cycle (all RBDs); and commitment to further research (all RBDs except Vouga, Mondego and Lis, Sado and Mira, Guadiana and the Azores).

The European Commission's 2015 recommendations called for the promotion of 'good coordination between public administration and other stakeholders (...) to improve the planning and implementation of PoM and to monitor their effectiveness'. The information reported to WISE indicates that Portugal established good coordination with stakeholders; it is not clear, however, if coordination has strengthened since the first RBMPs, when stakeholders were also actively involved in the preparation of RBMPs, including via advisory councils.

1.1.5 Integration with the Floods Directive and the Marine Strategy Framework Directive

A single plan including the RBMP and Floods Risk Management Plan was prepared in the Azores and Madeira RBDs. Joint consultation for both the WFD and Floods Directive[3] was made in all Portugal's 10 RBDs except Guadiana (because floods risk zones were not identified in Guadiana)[4]. Further information on integration with respect to the Programmes of Measures is provided in Chapter 9.

[2] WISE reporting showed that water supply/sanitation stakeholders were not involved in Cavado, Ave and Leca RBD but Portugal subsequently communicated that there was the same level of involvement in all the RBDs in the mainland.

[3] Directive 2007/60/EC on the assessment and management of flood risks entered into force on 26 November 2007 http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32007L0060

[4] WISE reporting showed that joint consultation for the WFD and Floods Directive was reported in 8 of Portugal's 10 RBDs but Portugal subsequently informed that there had also been a join consultation for the WFD and Floods Directive for the Minho and Lima RBD.

None of Portugal's RBDs had joint consultations with the Marine Strategy Framework Directive[5].

1.1.6 International coordination

Four Portuguese RBDs are part of international RBDs shared with Spain: Minho and Lima, Douro, Tagus and West Rivers and Guadiana. Portugal reports that an international agreement and permanent cooperation body are in place (designated as category 2 cooperation). Cooperation takes place via the Commission for the implementation and development of the Albufeira Convention, which governs water issues between Portugal and Spain.

For all four RBDs, Portugal reports that there was international co-ordination of public participation.

According to a document on the joint planning process under the Albufeira Convention for the second RBMPs[6], cooperation between Portugal and Spain covered: identification and delimitation of transboundary bodies of water, identification of heavily modified water bodies, typology of water bodies, protected areas, significant pressures, monitoring, assessment of the status of water bodies, Programmes of Measures, environmental objectives and their exceptions, public participation, Strategic Environmental Assessment and the monitoring and implementation of plans. In the Guadiana international RBD, for example, seven meetings were held to promote coordination on the development of the respective RBMPs in Portugal and Spain; the two Member States moreover made a commitment to strengthen cooperation in the third cycle (see the fact sheet on the Guadiana international RBD for further information).

1.2 Main changes in implementation and compliance since first cycle

No major changes are apparent from the information reported to WISE.

1.3 Progress with Commission recommendations

The Commission's recommendations based on the first RBMPs and Programmes of Measures requested action on the following:

[5] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0056

[6] http://www.apambiente.pt/_zdata/Politicas/Agua/PlaneamentoeGestao/PGRH/2016-2021/DocumentoCoordenacaoInternacional_2016_2021_ES_PT.pdf

- Recommendation: *Promote good coordination between public administration and other stakeholders, in particular involving the existing River Basin Councils, to improve the planning and implementation of the Programme of Measures and to monitor their effectiveness.*

- Assessment: Information reported to WISE refers to advisory groups in nearly all RBDs (the exception being Madeira). However, the recommendations refer to the role of RBD Councils as advisory bodies for the RBMPs in the first cycle. Consequently, the information available is not sufficient to draw a conclusion as to whether the planning and implementation of the Programmes of Measures and monitoring of their effectiveness has improved vis-a-vis the first cycle.

- Recommendation: *Develop the RBMPs for international RBDs in close cooperation with Spain, in particular for as regards the identification of pressures and impacts, design of monitoring networks, methodologies used to assess status and development of PoMs.*

  The 2015 recommendations state that in the first cycle, there was 'coordination between Portugal and Spain for the international RBDs, although no joint plans or actions have been devised', and it calls for the development of the RBMPs for international RBDs 'in close cooperation with Spain'. Joint RBMPs and Programmes of Measures were not developed in the second cycle. Nonetheless, it appears that Portugal and Spain continued and deepened coordination in the second cycle. This recommendation has been partially fulfilled.

Topic 2 Characterisation of the River Basin District

2.1 Assessment of implementation and compliance with the WFD requirements in the second cycle

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

The total number of surface water bodies identified in Portugal increased by 5 % from the first to the second cycle (Table 2.1). The largest increase, by 194, was in rivers, while there was a decrease of 99 in the number of lake water bodies. Lakes were reported by eight of the nine RBDs in the first cycle, but only by one of them in the second cycle. This is because the previous lake water bodies are reservoirs: these were reported as lake water bodies in the first cycle, but as river water bodies in the second cycle, given that they were river water bodies before they were dammed to form reservoirs. There was a small increase (2) in coastal waters and a small decrease (1) in transitional water bodies between the two periods.

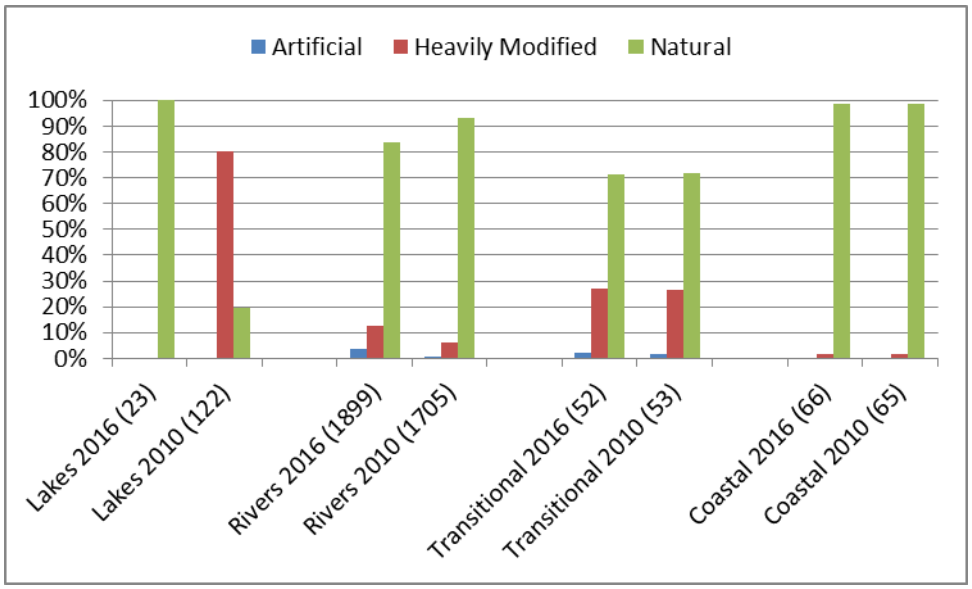
There were only small changes in the numbers of natural surface water bodies between the two cycles, for example a reduction from 24 natural lake water bodies in the first cycle to 23 in the second cycle. However, within the RBDs there were some big changes. In particular, there was a decrease of 30 natural river water bodies in the Vouga, Mondego and Lis RBD and an increase of 32 in the Tagus and West Rivers RBD, reflecting the changes in the RBD boundaries. The biggest change in the designation of heavily modified water bodies was in the reporting of reservoirs as rivers, when in the first cycle they had been considered as lakes. There were no changes in the numbers of heavily modified coastal and transitional water bodies. In terms of the total number of designated heavily modified water bodies, there was an increase of 40 (19 %) between the two cycles (Figure 2.1). 12.5 % of surface water bodies in Portugal were designated as heavily modified in the second cycle, compared to 11 % in the first cycle. Artificial water bodies represented 3.5 % of surface water bodies in Portugal and were identified in rivers and coastal waters. There was no change in the numbers of artificial coastal waters between the two cycles but there was an increase of 43 artificial river water bodies (an 80 % increase). Much of this increase occurred in the Madeira RBD, where numbers increased from zero in the first cycle to 43 in the second cycle. The reason for this is that "levadas", which are man-made channels used for irrigation, were delineated as artificial water bodies for the second cycle in the Madeira RBD.

Table 2.1 Number and area/length of delineated surface water bodies in Portugal for the second and first cycles

Year	RBD	Rivers		Lakes		Transitional		Coastal	
		Number of water bodies	Total length of water body (km)	Number of water bodies	Total area (km^2) of water bodies	Number of water bodies	Total area (km^2) of water bodies	Number of water bodies	Total area (km^2) of water bodies
2016	PTRH1	61	530			8	29	2	58
2016	PTRH2	76	722			6	7	1	222
2016	PTRH3	387	5,068			3	7	2	362
2016	PTRH4A	215	3,189			10	130	5	609
2016	PTRH5A	457	7,223			4	399	6	2,870
2016	PTRH6	226	2,515			9	217	3	2,063
2016	PTRH7	261	3,046			5	36	2	17
2016	PTRH8	69	863			4	10	10	1,763
2016	PTRH9	10	57	23	9	3	0	27	7,719 (7,909)
2016	PTRH10	137	888					8	1,447
2016	Total	1,899	24,100	23	9	52	835	66	17,129 (17,323)
2010	PTRH1	56	501	3	16	10	39	2	58
2010	PTRH2	69	723	7	41	6	7	1	222
2010	PTRH3	361	37,046	17	86	3	7	2	362
2010	PTRH4	236	3,779	9	26	10	130	8	3,099
2010	PTRH5	395	6,757	24	148	4	368	2	382
2010	PTRH6	195	2,193	19	93	9	217	3	2,064
2010	PTRH7	222	3,006	16	315	5	36	2	17
2010	PTRH8	64	901	3	7	3	9	10	1,764
2010	PTRH9	13	819	24	9	3	0	27	7,722
2010	PTRH10	94	542,851					8	1,447
2010	Total	1,705	598,576	122	742	53	813	65	17,137

Source: WISE electronic reports. For the sake of consistency with other Member States, the values indicated were calculated from the geometries reported in spatial data. Values in brackets were subsequently provided by Portugal and are directly extracted from tables in the RBMPs.

Figure 2.1 ***Proportion of surface water bodies in Portugal designated as artificial, heavily modified and natural for the second and first cycles. NB - the numbers in parenthesis are the numbers of water bodies in each water category.***



Source: WISE electronic reports

The number of groundwater bodies in Portugal increased by two (1.3 %) in the second cycle (Table 2.2). This comprised no change in five of the ten RBDs, small changes in some others and relatively large changes in the Vouga, Mondego and Lis (-8) and Tagus and West Rivers (+8) RBDs, due to the changed boundary between the two RBDs. In the Guadiana RBMP, one groundwater body was deleted. Its status was classified as "unknown" in the first cycle. This results in all groundwater bodies being classified as in "good status" for the second cycle.

Table 2.2 ***Number and area of delineated groundwater bodies in Portugal for the second and first cycles***

Year	RBD	Number	Area (km^2)		
			Minimum	Maximum	Average
2016	PTRH1	2	939.08 (939.12)	1,445.54 (1,445.58)	1,192.31 (1,192.35)
2016	PTRH2	4	202.3 (202.31)	1,498.86 (1,498.88)	844.9 (844.92)
2016	PTRH3	3	15.18	18,732.98 (18,735.92)	6,272.37 (6,273.35)
2016	PTRH4A	22	15.23	4,825.90 (4,826.04)	563 (563.02)
2016	PTRH5A	20	5.06	14,267.28 (14,268.05)	1,490.32 (1,490.43)
2016	PTRH6	9	18.42	2,711.24 (2,711.25)	933.65 (933.67)
2016	PTRH7	8	9.62	6,267.47 (6,268.05)	1,463.15 (1,463.26)
2016	PTRH8	25	1.78	819.26 (819.32)	149.67 (149.68)

Year	RBD	Number	Area (km^2)		
			Minimum	Maximum	Average
2016	PTRH9	54	0.42	262.17 (262.99)	42.99 (43.22)
2016	PTRH10	4	24.15	417.87	195.66 (195.67)
2016	Total	151			
2010	PTRH1	2	(939.12)	(1445.58)	(1192.35)
2010	PTRH2	4	(202.31)	(1498.88)	(844.92)
2010	PTRH3	3	(15.18)	(18735.92)	(6273.35)
2010	PTRH4	30	5.06	4,826.28 (4,826.04)	510.35 (510.33)
2010	PTRH5	12	7.7 (7.70)	14,268.13 (14,268.15)	2,236.50 (2,236.51)
2010	PTRH6	8	(18.42)	(2750.73)	(1050.38)
2010	PTRH7	9	(9.62)	(6306.43)	(1300.67)
2010	PTRH8	23	(5.34)	(812.38)	(162.69)
2010	PTRH9	54	0.42	262.06	44.32
2010	PTRH10	4	24.15	417.87	195.67
2010	Total	149			

Source: WISE electronic reports. For the sake of consistency with other Member States, the values indicated were calculated from the geometries reported in spatial data. Values in brackets were subsequently provided by Portugal and are the ones directly reported in the RBMPs.

Table 2.3 shows the differences in size distribution of surface water bodies in Portugal between the second and first cycles. It is notable that both the minimum size of rivers and the maximum size have decreased overall. The minimum size criteria reported were 10 km^2 catchment area for rivers and 0.4 km^2 surface area for lakes. However, the Azores RBD has a minimum size criterion of 0.01 km^2 surface area for lakes.

Table 2.3 Size distribution of surface water bodies in Portugal in the second and first cycles

Year	RBD	River length (km)			Lake area (km^2)			Transitional area (km^2)			Coastal area (km^2)		
		Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
2016	PTRH1	2.04 (2.03)	40.81 (40.90)	9.13 (9.14)				0.29	9.75	3.58	5.53	52.69	29.11
2016	PTRH2	1.97	53.33 (53.37)	10.47 (10.48)				0.23	2.56	1.24	221.76	221.7 (221.76)	221.7 (221.76)
2016	PTRH3	0.64	90.2 (90.36)	13.81 (13.82)				0.85	4.45	2.43	1.02	360.5 (360.57)	180.76 (180.80)
2016	PTRH4A	1.7	92.02 (91.74)	15.55 (15.56)				0.37	70.77	12.97	30.3	315.66 (315.71)	121.73 (121.75)
2016	PTRH5A	0.53 (0.52)	254.8 (254.57)	16.76				13.20	188.11 (188.15)	99.78 (99.79)	1.60	1,686.61 (1,687.01)	478.38 (478.61)
2016	PTRH6	1.18	109.91 (109.93)	12.33				0.16	107.92 (107.93)	24.11	2.17	1,393.48 (1,394.28)	687.64 (688.01)
2016	PTRH7	0.71 (0.70)	89.55 (89.66)	13.02				1.12	16.3	7.16	4.60	12.57	8.58 (8.59)
2016	PTRH8	2.03	79.21 (79.18)	13.27				0.02	8.52 (8.51)	2.58	3.52	778.81 (779.18)	176.3 (176.37)
2016	PTRH9	0.99	10.76 (10.63)	5.69	0.01	3.55 (3.64)	0.41 (0.412)	0.01	0.06	0.03	12.92 (13.44)	4,770.00 (4,870.47)	285.89 (292.92)
2016	PTRH10	0.38	61.77 (61.24)	6.48 (6.49)							29.46 (29.44)	644.37 (644.80)	180.83 (180.86)
2010	PTRH1	2.03	40.9 (40.90)	8.95	1.4 (1.40)	9.94	5.34	0.29	9.75	3.90	5.53	52.7	29.11
2010	PTRH2	1.97	53.38	10.48	1.83	21.08	5.93	0.23	2.56	1.24	221.79 (221.76)	221.79 (221.76)	221.79
2010	PTRH3	2.01	20,157.99	102.62	0.55	9.88	5.07	0.85	4.45	2.43	1.02	360.6	180.81
2010	PTRH4	1.7 (1.70)	122.03	16.01	0.4	17.02	2.92	0.37	70.78 (70.77)	12.97	2.5 (2.49)	2,002.81	387.36
2010	PTRH5	0.53 (0.523)	254.57	17.11	0.38	32.7 (32.70)	6.16	9.64	182.09	91.88	1.60	380.08	190.84
2010	PTRH6	1.18	83.98	11.25	0.42	20.02	4.90	0.16	107.93	24.11	2.17	1,394.28	688.02
2010	PTRH7	2.05	89.66	13.54	0.43	241.76 (241.75)	19.66	1.12	16.3	7.16	4.61 (4.60)	12.57	8.59

Year	RBD	River length (km)			Lake area (km^2)			Transitional area (km^2)			Coastal area (km^2)		
		Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
2010	PTRH8	2.03	79.18	14.08	1.67	3.363.37	2.43	0.02	8.52 (8.51)	2.88	3.52	779.21	176.38
2010	PTRH9	7.77	153.13 (153.12)	62.98	0.01	3.55	0.39	0.01	0.06	0.03	12.91	4,774.61	286.02
2010	PTRH10	1,003.85	27,715.00	5,775.01							29.45	644.8	180.86

Source: WISE electronic reports. For the sake of consistency with other Member States, the values indicated were calculated from the geometries reported in spatial data. Values in brackets were subsequently provided by Portugal and are the ones directly reported in the RBMPs.

Table 2.4 summarises the information provided by Portugal on how water bodies have evolved between the two cycles. The water body type with the most changes was river water bodies, with water bodies created (n = 56), split (n = 64) and deleted (n = 9). The splitting of water bodies may account for the decrease in the maximum length noted from Table 2.3.

An example of splitting and aggregation is in the Azores RBD, where the only re-delineation was for one small river that was divided into four water bodies in the first cycle and consists of two water bodies in the second cycle. No information regarding the consequences of this re-delineation was found.

Table 2.4 Type of change in delineation of groundwater and surface water bodies in Portugal between the second and first cycles

Type of water body change for second cycle (wiseEvolutionType)	Groundwater Body	River Water Body	Lake Water Body	Transitional Water Body	Coastal Water Body
aggregation	1				
change		10			
changeBothAggregationAndSplitting		4			
changeCode	1	36			2
changeExtendedArea	13	68		4	2
changeReducedArea	7	4			
creation	1	56			
deletion	1	9	1		1
noChange	124	1672	23	47	60
splitting	4	49		1	2
Total water bodies before deletion	152	1908	24	52	67
Delineated for second cycle (after deletion from first cycle)	151	1899	23	52	66

Source: WISE electronic reports.

2.1.2 Identification of transboundary water bodies in national shares of international RBDs

Portugal reported transboundary coastal water bodies in two RBDs, transboundary river water bodies in four RBDs and transboundary transitional water bodies in two RBDs. The delineation has been coordinated by the Commission for the Implementation and Development

of the Albufeira Convention, which is the platform that aims to ensure coordination of actions in the process and implementation of the WFD. A joint report was drawn up between Portugal and Spain which reflects the entire planning process for shared water bodies. No transboundary groundwater bodies were reported to WISE[7].

2.1.3 Typology of surface water bodies

Table 2.5 shows the number of surface water body types at RBD level in Portugal for the first and second cycles. 10 coastal water types were identified for the second cycle for Portugal: seven of these have the same codes as reported for the first cycle. Three types were intercalibrated with common intercalibration type CW-NEA1/26 (all Atlantic North: National types A5 A6 and A7).

Two natural lake types were reported, both only applicable to the Azores: the same two types had been reported in the first cycle. There are no appropriate common intercalibration types for lakes in the Azores.

Portugal reported 23 river types in the second cycle, with 12 types shared by more than one RBD; type "ART" was shared by six RBDs. The same 23 type codes had been reported for the first cycle. Six river types were intercalibrated against three common river intercalibration types. Three reservoir types were reported as river types (in the first cycle they had been reported as lake types): one of these was intercalibrated against one common intercalibration type for reservoirs.

Five types for transitional waters were reported and one of these was intercalibrated against common intercalibration type TW-NEA11. Two of the five types have the exact same codes of the types reported in the first cycle and the remaining three have codes that appear to have been slightly modified but are in fact the same types.

System B was applied in the definition of the typology for surface waters of mainland Portugal. Several variables were used, including climatic and morphological quantitative variables, geology and size of the catchment. Then validation was carried out with biological information from the communities of phytoplankton, benthic invertebrates, diatoms, macrophytes and fish obtained from sampling campaigns carried out at reference sites.

[7] Portugal explained that the geological formations in the border of Portugal and Spain are mainly constituted by igneous and metamorphic formations. These formations correspond to fractured media (aquifers not relevant at a national level, only of local importance), with low hydraulic conductivities and yields reduced. Portugal stated that the average flow of exploitation in this type of rock does not exceed, generally, 1 L/s, creating aquifers only with local importance and in this context, transboundary groundwater bodies between Portugal and Spain were not identified.

Table 2.5 Number of surface water body types at RBD level in Portugal for the first (2010) and second (2016) cycles

RBD	Rivers		Lakes		Transitional		Coastal	
	2010	2016	2010	2016	2010	2016	2010	2016
PTRH1	5 (4)	5	1	0	1	1	1	1
PTRH2	3	4	0 (1)	0	0 (1)	1	2	1
PTRH3	4 (6)	8	1 (2)	0	1	1	1 (2)	2
PTRH4A	6	6	2 (2)	0	1	1	2 (3)	1
PTRH5A	6 (10)	14	2 (3)	0	1	1	2	3
PTRH6	10 (4)	6	3 (1)	0	1	1	2	2
PTRH7	4	7	1 (2)	0	1	1	2 (1)	1
PTRH8	4 (5)	6 (9)	2 (1)	0	1	1	1 (3)	3
PTRH9	5 (1)	1	1 (2)	2	1 (3)	3	3	3
PTRH10	1 (3)	3	2 (0)	0	3 (0)	0	3 (2)	2
TOTAL	20	23	5	2	10	5	5 (10)	10

Source: Commission's 4th Implementation Report for the 2010 data and WISE electronic reports for the 2016 data. Note that the total is not the sum of the types in each RBD as some types are shared by RBDs.

Values in brackets are those contained in the WISE reporting done by Portugal for the first RBMPs, which were corrected before inclusion in the Commission's Implementation Report.

A number of the national Portuguese types do not have corresponding intercalibration types. This is the case for 58 % of coastal water bodies in Portugal as a whole (41 % of these are in the Azores and Madeira). For natural lakes (all in the Azores RBD) there are no common intercalibration types. For rivers and transitional waters there are 33 % (1 % in the Azores and Madeira) and 67 % (6 % in the Azores and Madeira), respectively, without a common intercalibration type. Note that the Portuguese water bodies of the archipelagos of Azores and Madeira present unique characteristics, not allowing a comparison with mainland water bodies or with the broad European Union types defined in the intercalibration exercise.

Eight RBDs reported river water bodies that are reservoirs but were originally rivers. 35 % of the 119 reservoirs have been intercalibrated against the common Mediterranean reservoir type (LW-L-M5/7). Two types associated with these reservoirs did not have reported common intercalibration types: these two types were only reported for reservoirs and represented 65 % of the reservoirs reported.

The RBMPs reported that the types established underwent the intercalibration exercise as part of the Macaronesia Region, which presents certain specificities that rendered different System B abiotic factors selection, and thus different biological validation. For some RBDs, in the

rivers category only benthic invertebrates and diatoms are relevant, and for the lakes category only phytoplankton is relevant (natural lakes occur only in the Azores). It therefore remains unclear whether the results of the intercalibration exercise have been correctly translated to national types without a common intercalibration type.

For international RBDs, the "Summary Report on the Characterization of the Hydrographic Regions provided for the WFD"[8] explained that only a preliminary reconciliation of the typologies defined by Portugal and Spain has been undertaken and it is understood that the two countries have carried out the intercalibration exercise, in the respective Geographic Intercalibration Group[9].

2.1.4 Establishment of reference conditions for surface water bodies

Table 2.6 shows the percentage of surface water body types in Portugal with reference conditions established for the first and second cycles. Only 23 natural lakes were reported for Portugal, which are all in the Azores and only had reference conditions established for some biological, hydromorphological and physicochemical quality elements. Reservoirs were reported as river water bodies. Three types were associated with the reservoirs that were originally rivers and one of the types was associated with a common intercalibration type. However, whilst this type had reference conditions established for all required biological quality elements, none had been established for hydromorphological quality elements and for only some physicochemical quality elements: this puts into doubt the comparability of the status of these reservoirs with the other equivalent types across Europe[10]. 78 % of river water bodies in Portugal were associated with types that have reference conditions for all biological quality elements, and 47 % with types that had reference conditions for all biological and hydromorphological quality elements. In terms of the physicochemical quality elements, 18 river types had reference conditions established for some quality elements, five types had no reference conditions for any physicochemical quality elements and no types had reference conditions for all physicochemical quality elements.

[8] https://www.apambiente.pt/dqa/assets/relatorio_artigo_5_pt.pdf

[9] Portugal subsequently highlighted that the document referred to was published in 2005 and several of its contents are outdated. Portugal and Spain cooperate actively on the planning and management of their transboundary river basins, considering the specifications of the WFD on this subject and the Albufeira Convention on the cooperation for the protection and the sustainable use of the waters of the Portuguese-Spanish river basins (Minho, Lima, Douro, Tagus and Guadiana). Portugal stated that recent information on the cooperation work between Portugal and Spain, for the international RBDs, can be found in the report "Documento de coordenação elaborado durante o processo de planeamento 2016-2021 para as bacias hidrográficas internacionais partilhadas por Espanha e Portugal".

[10] Portugal subsequently stated that they consider that ecological potential in reservoirs can be adequately assessed based on phytoplankton, physicochemical parameters and specific pollutants, as in these particular types of HMWB it is thought that these quality elements provide a reliable assessment of the ecological potential.

Table 2.6 ***Percentage of surface water body types in Portugal with reference conditions established for all, some and none of the biological, hydromorphological and physicochemical quality elements. Numbers in parenthesis are the number of types in each category***

Water category	Water types	Biological quality elements	Hydromorphological quality elements	Physicochemical quality elements
Rivers (23)	All	43 %	39 %	
	Some	35 %	30 %	78 %
	None	22 %	30 %	22 %
Lakes (2)	All			
	Some	100 %	100 %	100 %
	None			
Transitional (5)	All	40 %		
	Some	60 %	60 %	100 %
	None		40 %	
Coastal (10)	All	30 %		
	Some	70 %	50 %	100 %
	None		50 %	

Source: WISE electronic reports

Only three of the ten coastal water body types had reference conditions established for all biological quality elements. However, these three types did not have reference conditions for any hydromorphological quality elements and only for some physicochemical quality elements. In total 50 % of coastal water bodies did not have reference conditions established for all hydromorphological quality elements and none had reference conditions for all elements. 94 % of the transitional water bodies in Portugal were associated with two types for which there were reference conditions for all biological quality elements, for some physicochemical quality elements and for no hydromorphological quality elements.

Type-specific reference conditions were coordinated with Spain for all international RBDs. They were coordinated for biological quality elements, for all the shared types under the same category. Type-specific reference conditions were coordinated only for some physico-chemical elements, for all the shared types under the same category. Reference conditions have been coordinated with all Member States for hydromorphological quality elements, for all the shared types under the same category.

2.1.5 Characteristics of groundwater bodies

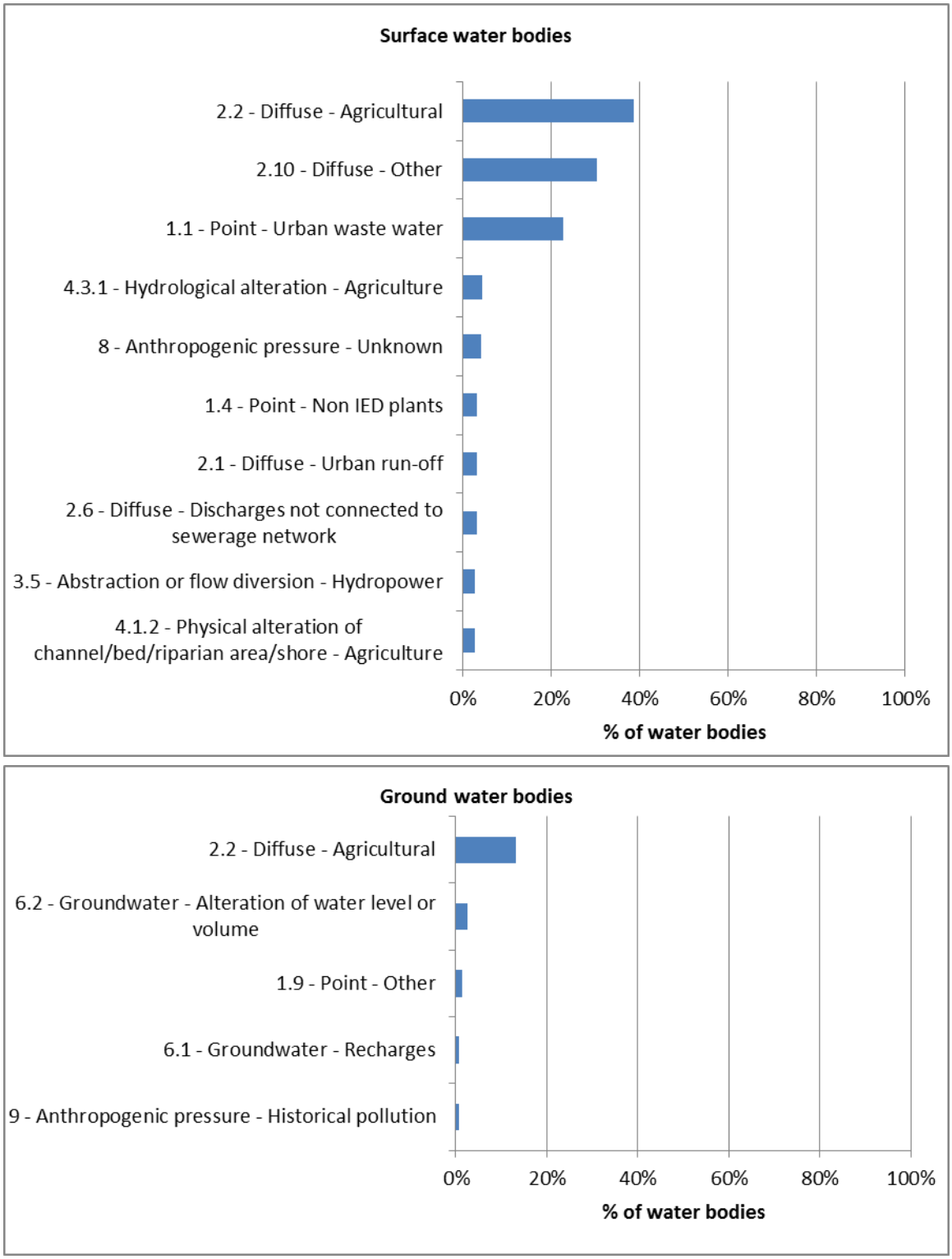
Portugal reported the requested characteristics of groundwater bodies i.e. whether they are layered, linked to a surface water body or linked to a terrestrial ecosystem and their geological formation.

2.1.6 Significant pressures on water bodies

Portugal reported the most significant pressures on surface waters were diffuse agricultural (39 % of water bodies) followed by diffuse other (30 %) as shown in Figure 2.2. It is difficult to compare pressures between the two cycles because there has been a re-delineation of water bodies and a re-definition of pressure types. However, a tentative comparison can be made for point source and diffuse source at an aggregated level. As shown in Figure 2.3., 27 % of the 1945 surface water bodies in the first cycle were affected by point source pressures whereas in the second cycle the percentage reported was 24 % of 2040 surface water bodies. The equivalent figures for diffuse source pressures were 46 % in the first cycle and 41 % in the second cycle.

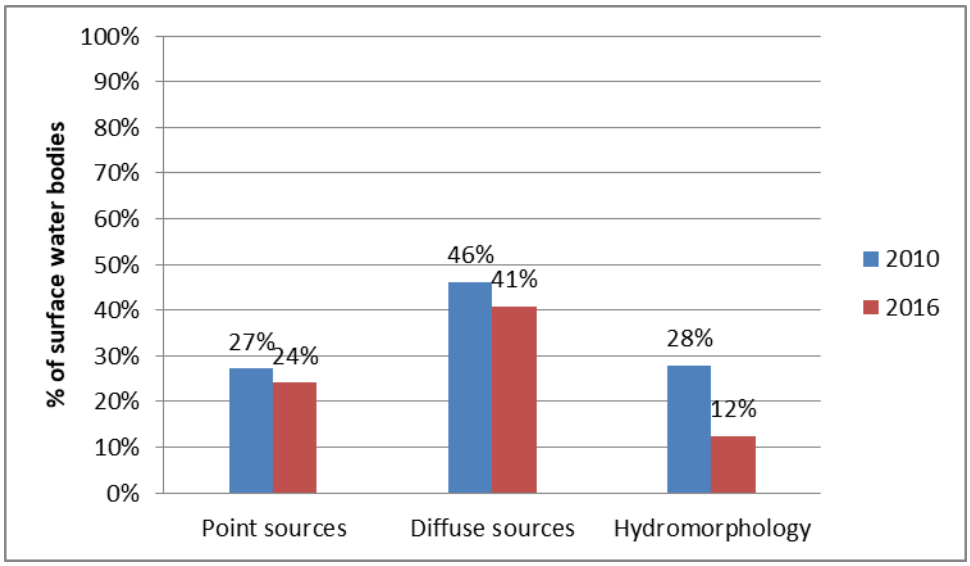
Portugal reported five different significant pressures on groundwater bodies from seven RBDs. Diffuse - agriculture affected the greatest proportion of groundwater bodies (13 % of 151 groundwater bodies), followed by alteration of water level or volume (2.6 %) and point source other (1.3 %) (Figure 2.2). The Azores RBMP also reports that saline intrusion is a pressure in some coastal groundwater bodies as a result of their overexploitation, with an ongoing comprehensive study on the subject. In the first cycle, 13 different pressure types were reported covering five RBDs. Diffuse agricultural pressures affected 17 % of the 149 groundwater bodies in Portugal: not necessarily in the same RBDs for both cycles.

Figure 2.2 ***The most significant pressures on surface water bodies and groundwater bodies in Portugal for the second cycle***



Source: WISE electronic reports

Figure 2.3 ***Comparison of pressures on surface water bodies in Portugal in the first and second cycles. Pressures presented at the aggregated level. NB - there were 2040 identified surface water bodies for the second cycle and 1945 for the first cycle.***



Source: WISE electronic reports

2.1.7 Definition and assessment of significant pressures on surface and groundwater

All 10 Portuguese RBDs reported the same types of tools for the assessment of significant pressures on surface water: a combination of numerical tools and expert judgment were used for point sources, diffuse sources and water flow pressures, whereas for water abstraction pressures numerical tools were used. Significance has not been defined in terms of thresholds in all RBDs except the Azores and the definition of significance was linked to the potential failure of objectives in all RBDs except Madeira. The RBMPs confirmed that there have been no changes in the criteria for the identification of pressures since the first cycle. For example, there is no organic load threshold (or any other kind) that can be linked to the water body status, nor to the objectives themselves. The criteria for significance are: 1) the conservation of habitats or the survival of species directly dependent on water; 2) the quality standards referred to in the specific legislation of protected areas; and 3) water bodies being able to meet the environmental objectives established.

Nine of the ten RBDs in Portugal used expert judgement for assessing the significance of point source pressures on groundwater bodies; the Azores used a combination of expert judgment and numerical tools. Significance has not been defined in terms of thresholds in all RBDs and

the definition of significance was linked to the potential failure of objectives in all RBDs except Madeira. The Azores RBD used the DRASTIC methodology to assess groundwater body vulnerability to point source pressures. A combination of both types of tools was used for assessing diffuse source pressures in all 10 RBDs. For example, the Guadiana and Madeira RBDs both estimated the pollutant loads to the underlying groundwater body from the agricultural sector as roughly 70 % of the nitrogen load and 20 % of the phosphorus load flowing to surface water bodies. These figures are estimates and no tool was used to develop them. The Azores RBD also employed the DRASTIC methodology for diffuse pressures.

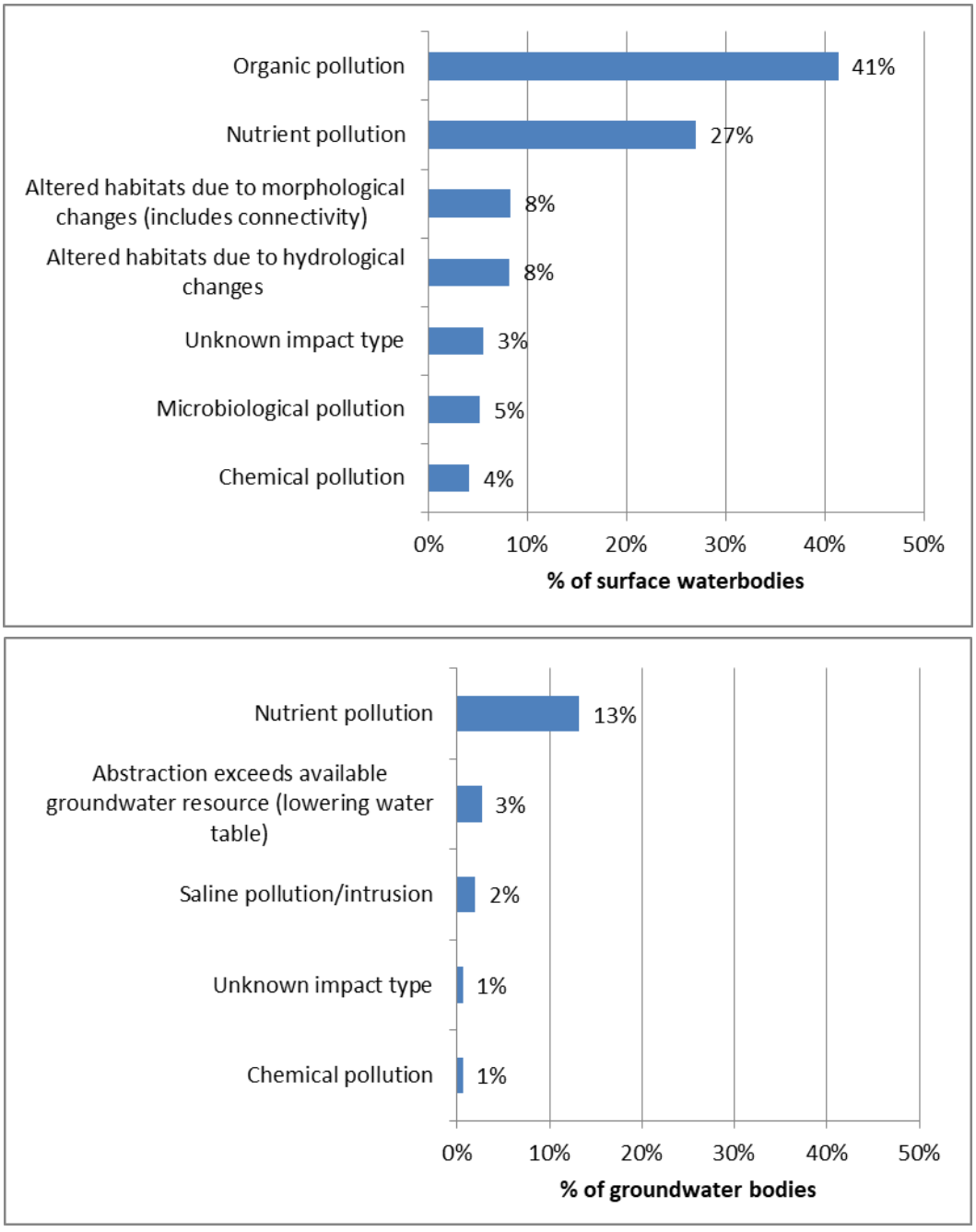
Numerical tools were reported by nine RBDs for water abstraction pressures; a combination of numerical tools and expert judgment was used in the Azores. Mainland Portugal and the Madeira and Azores RBDs have a legal definition of the significance of abstraction pressures, which is where abstractions exceed 90 % of the annual average long-term recharge and the groundwater levels recorded during the monitoring period reveal significant downward trends. Artificial recharge pressures were not assessed in Portugal, as artificial recharge is not authorised; some RBMPs mention it as a pressure but state that it is not applicable to their RBD.

2.1.8 Significant impacts on water bodies

As for pressures, a comparison of significant impacts between the two cycles may not be reliable. However, the proportion of surface water bodies in Portugal impacted by nutrient enrichment in 2010 was 27 % of 1945 surface water bodies and the proportions impacted by nutrient pollution in 2016 was 27 % of 2040 surface water bodies. The main significant impacts on surface water bodies reported for 2016 are shown in Figure 2.4.

Only one RBD reported impacts on groundwater bodies in 2010: Algarve Rivers, where four water bodies were impacted by changes in chemical composition and one by “other” impacts. Four different impact types were reported across seven RBDs in 2016, with nutrient pollution affecting the largest proportion of groundwater bodies: 13 % from five RBDs (Figure 2.4).

Figure 2.4 Significant impacts on surface water and groundwater bodies in Portugal for the second cycle. Percentages of numbers of water bodies



Source: WISE electronic reports

2.1.9 Quantification of the gap and apportionment of pressures

Five RBDs in Portugal reported gaps to good status for diffuse agricultural pressures and for nitrate pollution in groundwater: the indicators of the gaps were in both cases number of water bodies failing Environmental Quality Standards. Gaps and Key Types of Measure (KTM) were reported for all significant pressures identified at the groundwater body level.

Point source pressures on surface waters have been identified from a number of sectors/activities: urban waste water (eight RBDs); non IED plants (eight RBDs); IED plants (three RBDs); and waste disposal sites (one RBD). The indicator of the gap is in each case, expressed as number of water bodies failing Environmental Quality Standards.

The activities/sectors associated with diffuse source pressures on surface waters were: agriculture (eight RBDs); “other” (eight RBDs); urban run-off (seven RBDs); discharges not connected to sewers (six RBDs); aquaculture (four RBDs); contaminated sites (three RBDs); and mining (one RBD). The number of water bodies failing Environmental Quality Standards was again used as the indicator of the gap.

Abstraction or flow diversion for public water supply was reported by six RBDs, for industry for four RBDs and for agriculture for three RBDs. The gap indicator was "Number of bodies of water that do not meet environmental objectives due to this type of pressure". Hydrological alteration pressures have been identified from a number of sectors/activities: hydropower (six RBDs), public water supply (six RBDs) and agriculture (five RBDs).

Portugal generally reported gaps and KTMs for most significant pressures reported at the surface water body level. The exceptions were for abstraction or flow diversion - hydropower pressures in six RBD, diffuse - aquaculture in two RBDs and physical alteration of channel/bed/riparian area/shore - unknown or obsolete in two RBDs.

The quantification of gaps to be filled for chemical substances causing failure of status objectives have been defined for nitrate in groundwater in five RBDs and for petroleum hydrocarbons in one RBD. Gaps have been defined for six Priority Substances in surface waters: 4-nonylphenol (six RBDs), endosulfan (one RBD), tributyltin (one RBD), lead (two RBDs), nickel (four RBDs) and cadmium (two RBDs). There are also gaps for River Basin Specific Pollutants such as antimony (one RBD), chromium (one RBD), copper (five RBDs), zinc (two RBDs) and total cyanide (one RBD). There are a number of chemicals/determinands that might be considered as physicochemical quality elements such as nitrate, phosphate, ammonium, total phosphorus, dissolved oxygen, pH and biological oxygen demand.

2.1.10 Groundwater bodies at risk of not meeting good status

21 groundwater bodies in Portugal (14 %) were reported to be at risk of failing good chemical status. Nine pollutants were reported to be causing risk. The pollutant causing the risk in most groundwater bodies was nitrate (13 % of groundwater bodies).

Four (3 %) groundwater bodies were at risk of failing good quantitative status; water balance was reported to be the reason for the risk and the environmental objective at risk was uses or functions of groundwater.

2.1.11 Inventories of emissions, discharges and losses of chemical substances

Article 5 of the Environmental Quality Standards Directive (EQS Directive)[11] requires Member States to establish an inventory of emissions, discharges and losses of all Priority Substances and the 8 other pollutants listed in Part A of Annex I of the Directive for each RBD, or part thereof, lying within their territory. This inventory 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 (or suppressing) emissions, discharges and losses for Priority Substances (and Priority Hazardous Substances).

All RBDs except Madeira have established inventories. 24 Priority Substances appeared in at least one of these inventories. Nine RBDs had inventories for cadmium and mercury,eight8 RBDs for nickel and seven RBDs for lead. For example, the Cavado, Ave and Leca RBD included 18 Priority Substances in an inventory, and Minho and Lima only four.

It is not clear whether the two-step approach from the Common Implementation Strategy Guidance Document n°28[12] has been followed for most of the substances included in the inventories. Tier 1 of the methodology was implemented for all substances included in the inventories (while the Guidance Document recommends to implement at least Tier 1 + 2 for substances relevant at RBD level)[13]. The data quality was not reported.

2.2 Main changes in implementation and compliance since the first cycle

The total number of surface water bodies identified in Portugal increased by 5 % from the first to the second RBMPs. The largest increase, by 194, was in rivers, while there was a decrease of 99 in the number of lakes bodies. Lakes were reported by 8 of the 9 RBDs in the first RBMPs, but only in one of these in the second. This is because the previous lake water bodies

[11] Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards 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 http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0105

[12] CIS Guidance N° 28 - Preparation of Priority Substances Emissions Inventory, http://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm

[13] Portugal clarified that the two-step approach from the Common Implementation Strategy Guidance Document n°28 was in fact applied.

are reservoirs. Following the Commission guidance they were reported as river water bodies in the second RBMPs (as they were formerly river water bodies before they were dammed to form reservoirs).

There were no changes in the numbers of heavily modified coastal and transitional water bodies between the two cycles. In terms of the total number of designated heavily modified water bodies, there was an increase of 40 (19 %) between the two cycles. 12.5 % of surface water bodies in Portugal were designated as heavily modified in the second cycle, compared to 11 % in the first cycle. Artificial water bodies represented 3.5 % of surface water bodies in Portugal. Artificial water bodies were identified in rivers and coastal waters. There is no change in the numbers of artificial coastal waters between the two cycles but there was an increase of 43 artificial river water bodies (an 80 % increase). Much of this increase occurred in the Madeira RBD where numbers increased from zero in the first cycle to 43 in the second cycle. The reason for this is that "levadas", which are man-made channels used for irrigation, were delineated for the second cycle.

Other than for the significant change in how reservoirs have been reported, it appears that there has been no change in the typology used for both cycles: there are small differences in coding but these are probably due to re-coding of the same type.

It is difficult to compare pressures between the two cycles because there has been a re-delineation of water bodies and a re-definition of pressure types. However, a tentative comparison can be made for point source and diffuse source at an aggregated level. In the first cycle, 27 % of the 1945 surface water bodies in Portugal were affected by point source pressures whereas in the second cycle the percentage reported was 24 % of 2040 surface water bodies. The equivalent figures for diffuse source pressures were 46 % in the first cycle and 41 % in the second cycle.

In the second cycle, Portugal reported five different significant pressures on groundwater bodies from seven RBDs. Diffuse agricultural pressures affected the greatest proportion of groundwater bodies (13 % of 151 groundwater bodies), followed by alteration of water level or volume (2.6 %) and point source other (1.3 %). In the first cycle, 13 different pressure types were reported covering five RBDs. Diffuse agricultural pressures affected 17 % of the 149 groundwater bodies in Portugal: not necessarily in the same RBDs for both cycles.

As for pressures, a comparison of significant impacts between the two cycles may not be reliable. However, the proportion of surface water bodies in Portugal impacted by nutrient enrichment in the first cycle was 27 % of 1944 surface water bodies and the proportion

impacted by nutrient pollution in the second cycle was 27 % of 2040 surface water bodies. There seems to have been an increase in surface water body affected by organic enrichment/ pollution from 12 % in the first to 41 % in the second cycle.

Only the Algarve Rivers RBD reported impacts on groundwater bodies in the first cycle, where four water bodies were impacted by changes in chemical composition and one by "other" impacts. Four different impact types were reported across seven RBDs in the second cycle, with nutrient pollution affecting the largest proportion of groundwater bodies: 13 % from five RBDs.

2.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and Programmes of Measures requested action on the following:

- Recommendation: *Complete the development of methods for the status assessment of water bodies and determination of reference conditions and apply them through the implementation of robust monitoring programmes. An adequate WFD-compliant assessment and monitoring framework is a necessary pre-requisite to design effective Programme of Measures and ultimately to achieve the WFD objectives*. [*Reference conditions for the classification of transitional and coastal waters had not yet been defined]*.

  Assessment: There are still significant gaps in the reference conditions for some types of quality elements in all water categories. For example, only three of the ten coastal water body types had reference conditions established for all biological quality elements. However, these three types did not have reference conditions for any hydromorphological quality elements and only for some physicochemical quality elements. In total, 50 % of coastal water bodies did not have reference conditions established for all hydromorphological quality elements and none had reference conditions for all elements. 94 % of the transitional water bodies in Portugal were associated with two types for which there were reference conditions for all biological quality elements, for some physicochemical quality elements and for no hydromorphological quality elements. In summary, there has been some progress in

establishing reference conditions in coastal waters and transitional waters but there are still some gaps, therefore this recommendation has been partially fulfilled[14].

[14] Portugal subsequently explained that significant progress has been made on this issue in the framework of the third phase of the Intercalibration exercise, which led to the Commission Decision 2018/229/EU. Portugal also stated that work is ongoing to review methodologies and define reference conditions for transitional and coastal waters, in parallel with the ongoing work within the CIS.

Topic 3 Monitoring, assessment and classification of ecological status in surface water bodies

3.1 Assessment of implementation and compliance with WFD requirements in the second RBMPs

3.1.1 Monitoring of ecological status/potential

Article 8.1 of the WFD requires Member States to establish monitoring programmes for the assessment of the status of surface water and of groundwater in order to provide a coherent and comprehensive overview of water status within each RBD. 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.

Monitoring programmes

Portugal reported monitoring programmes covering the surveillance and operational monitoring of surface water and groundwater, and also quantitative monitoring for groundwater. No programmes to monitor chemical status were reported for territorial waters. However there were differences between RBDs in terms of the type of programme in relation to the water categories identified in each RBD. In the Cávado, Ave and Leça, Douro, Vouga, Mondego and Lis, Tagus and West Rivers, Sado and Mira and Algarve Rivers RBDs there are surveillance programmes for each identified water category but no operational monitoring for transitional and coastal waters. In the Guadiana RBD there were no monitoring programmes for coastal waters even though coastal waters have been designated in this RBD. In the Azores RBD there was only an operational programme for lakes but no surveillance programme, even though there was a surveillance programme for the other three water categories. There were surveillance programmes only for groundwater and coastal waters in the Madeira RBD even though rivers were also defined[15].

Monitoring sites

The total number of monitoring sites reported by Portugal increased by 36 % between the first and second RBMPs. Table 3.1 compares the number of monitoring sites used for surveillance and operational purposes in the first and second RBMPs, and Table 3.2 gives the number of sites used for different purposes for the second RBMPs.

[15] Portugal subsequently stated that in the Azores RBD the surveillance monitoring of lakes was included in a surface water surveillance monitoring programme; a surveillance programme exists also for rivers in the Madeira RBD, albeit not reported in WISE.

Table 3.1 Number of sites reported to be used for surveillance and operational monitoring in Portugal for the second and first RBMPs. Note that for reasons of comparability with data reported in the first RBMPs, the data for the second RBMPs does not take into account whether sites are used for ecological and/or chemical monitoring.

	Rivers		**Lakes**		**Transitional**		**Coastal**	
	Surv.	**Op**	**Surv.**	**Op**	**Surv.**	**Op**	**Surv.**	**Op**
Second RBMPs								
PTRH1	17	28	2	0	17	0	0	0
PTRH2	8	49	6	2	10	0	2	0
PTRH3	76	91	21	3	5	0	3	0
PTRH4A	49	49	6	1	35	0	7	0
PTRH5B	43	164	13	10	10	0	22	0
PTRH6	36	44	12	0	14	0	15	0
PTRH7	45	44	29	0	15	0	0	0
PTRH8	16	26	4	1	5	0	17	0
PTRH9	20 (22)	0	1 (23)	22 (15)	0 (3)	3(0)	42 (38)	0
PTRH10	0 (22)	0	0	0	0	0	0 (14)	0
Total by type of site	*310 (334)*	*495*	*94 (116)*	*39 (32)*	*111 (114)*	*3*	*108 (118)*	*0*
Total number of monitoring sites	*805 (819)*		*133 (148)*		*114 (117)*		*108 (118)*	
First RBMPs								
PTRH1	19	7	1	0	1	0	0	0
PTRH2	16	23	6	2	7	0	1	0
PTRH3	58	62	4	12	3	0	1	0
PTRH4	65	62	4	5	9	0	3	0
PTRH5	83	85	10	13	4	0	1	0
PTRH6	21	31	2	7	3	0	2	0
PTRH7	16	41	3	9	3	0	42	0
PTRH8	23	10	3	0	9	0	3	2
PTRH9	23	0	23	15	3	5(0)	1(38_	2(0)
PTRH10	22	0	0	0	0	0	0	0
Total by type of site	*346*	*321*	*56*	*63*	*42*	*5(0)*	*54(91)*	*4(2)*
Total number of monitoring sites	*667*		*119*		*47(42)*		*58(93)*	

Sources: Member States electronic reports to WISE. Numbers in parentheses were subsequently provided by Portugal.

Table 3.2 Number of monitoring sites in relevant water categories used for different purposes in Portugal

Monitoring Purpose	Rivers	Lakes	Transitional	Coastal
CHE - Chemical status	20	23	3	56
ECO - Ecological status	20	23	3	56
OPE - Operational monitoring	495	39	3	
SUR - Surveillance monitoring	310	94	111	108
Total sites irrespective of purpose	**805**	**133**	**114**	**122**

Source: WISE electronic reports

There were no reported operational monitoring sites in coastal waters in any of the RBDs in Portugal: significant point source, diffuse source and hydromorphological pressures are reported for coastal waters. Surveillance sites were reported in coastal waters in seven of the ten RBDs that designated this category of water bodies: Portugal subsequently indicated that additionally there were unreported surveillance monitoring sites in the Madeira RBD. Lakes were only designated in one RBD (the Azores), but all RBDs reported surveillance sites in lakes and six RBDs reported operational sites in lakes .

Member States were asked to report for heavily modified river or lake water bodies whether the water body is a reservoir that has been created by damming a river ("Yes, it is a reservoir and the water body was originally a river") or an existing lake ("No, it is a reservoir but the water body was originally a lake"). Portugal reported 119 reservoirs where the water body was originally a river: these reservoirs may be monitored as lakes and the sites reported to be in lakes. Portugal subsequently confirmed that these water bodies were reported as rivers, but in every other aspect (namely classification systems) were reported as lakes.

Surveillance sites were reported in all RBDs with transitional waters except for the Azores RBD where they were only monitored operationally. All RBDs with rivers reported surveillance sites and all except the Azores RBD also reported operational monitoring sites. The Madeira RBD designated coastal waters and rivers but reported no operational or surveillances sites: instead they reported the (14) sites in coastal waters to be for monitoring of chemical and/or ecological status and there were no sites in rivers.

Portugal subsequently indicated that a surface water surveillance monitoring programme in the Azores RBD had not been reported to WISE: it included 23 sites in lakes, 10 sites in rivers, 3 sites in transitional waters and 27 sites in coastal waters. Similarly for the Madeira RBD, 22

surveillance sites in rivers and 14 surveillance sites in coastal waters had not been reported to WISE.

Compared to the first RBMPs there was an increase in the number of surveillance sites in six RBDs, a decrease in one RBD and no changes in the other three RBDs. In rivers, there was a decrease in the number of surveillance sites in seven RBDs and an increase in three. Overall, there was a 100 % increase in numbers of surveillance sites in coastal waters, a 68 % increase in lakes, a 10 % decrease in rivers and a 164 % increase in transitional water sites from the first to the second RBMPs. In terms of operational monitoring there was a decrease in the numbers of sites in two RBDs from the first to the second RBMPs and no change in the others. For rivers, there was an increase in the numbers of operational sites from the first to the second RBMPs in seven RBDs, a decrease in one and no change in the other two. Overall, there was a 100 % decrease in the number of operational sites in coastal waters, a 39 % decrease in lakes, a 54 % increase in rivers and a 40 % decrease in transitional waters from the first to the second RBMPs.

Monitored quality elements

Table 3.3 illustrates the quality elements used for the monitoring of lakes and rivers for the second RBMPs: no differentiation is made between purposes of monitoring.

Table 3.3 Quality elements monitored for the second RBMPs in Portugal (excluding River Basin Specific Pollutants). Note: quality elements may be used for surveillance and/or operational monitoring

	Biological quality elements										**Hydromorphological quality elements**		
	Phytoplankton	**Macrophytes**	**Phytobenthos**	**Benthic invertebrates**	**Fish**	**Angiosperms**	**Macroalgae**	**Other aquatic flora**	**Other species**		**Hydrological or tidal regime**	**Continuity conditions**	**Morphological conditions**
Lakes	Yes	Yes	Yes	Yes	No		Yes	No			Yes		Yes
Rivers	Yes	Yes	Yes	Yes	Yes			No			Yes	Yes	Yes
Transitional	Yes	Yes		Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
Coastal	Yes	Yes		Yes		Yes	Yes	Yes			Yes	Yes	Yes

General physicochemical quality elements									
	Transparency conditions	Thermal conditions	Oxygenation conditions	Salinity conditions	Acidification status	Nitrogen conditions	Phosphorus Conditions	Silicate	Other determinand for nutrient conditions
Lakes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rivers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Transitional	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Coastal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No

Source: WISE electronic reports

For Portugal as a whole, in terms of the biological quality elements used for the surveillance monitoring of coastal waters, lakes and transitional waters, phytoplankton was the most commonly used (in around 95 % of water bodies included in surveillance monitoring). The other expected quality elements for coastal waters were monitored in 81 % of water bodies for macroalgae, and 88 % of water bodies for benthic invertebrates. In transitional waters, 91 % of water bodies are monitored for benthic invertebrates and 84 % for fish but the proportion monitored for macroalgae is much lower i.e. 27 % of water bodies included in surveillance monitoring.

In lakes, phytoplankton is virtually the only biological quality element used in surveillance monitoring with one water body also monitored for macrophytes and benthic invertebrates. Regarding reservoirs, Portugal explained that it considers that phytoplankton is the only biological quality element applicable.

In rivers, benthic invertebrates is the biological quality element mainly included in surveillance monitoring (73 % of river water bodies included in surveillance monitoring), followed by phytobenthos (58 % of river water bodies), fish (18 %) macrophytes (17 %) and phytoplankton (2 %): phytoplankton is not a relevant quality element for rivers but is relevant in reservoirs. A number of biological quality elements are also unrepresentatively monitored in rivers.

The two hydromorphological quality elements required to be monitored for surveillance purpose in coastal waters were monitored in 90 % of water bodies included in surveillance monitoring. However, the required elements in rivers and transitional water were monitored in around 50 % of water bodies included in surveillance monitoring. Hydromorphological quality elements are only monitored for surveillance purposes in one lake water body.

The expected physicochemical quality elements are monitored in a relatively high proportion (around 90 %) of water bodies included in surveillance monitoring.

In coastal waters, all the required biological quality elements were monitored in 71 % of water bodies included in surveillance monitoring, all the required hydromorphological quality elements in 88 % of water bodies and all required physicochemical quality elements in 24 % of water bodies.

In rivers, all the required biological quality element were monitored in 11 % of water bodies included in surveillance monitoring.

In transitional waters, all the required biological quality elements were monitored in 24 % of water bodies included in surveillance monitoring, all the required hydromorphological quality elements in 49 % of water bodies and all required physicochemical quality elements in 87 % of water bodies.

Three transitional water bodies were operationally monitored in Portugal and all the expected quality elements were monitored in all of them. A full range of biological quality elements and other relevant quality elements were included in the operational monitoring of river and lake water bodies. 97 % of lake water bodies included in operational monitoring were monitored for phytoplankton, and a higher proportion of lake water bodies were monitored for the other biological quality elements than was the case for surveillance purposes: for example, 59 % of lake water bodies monitored for benthic invertebrates for operational purposes and only 1 % for surveillance purposes. The most commonly monitored biological quality element in rivers for operational purposes was benthic invertebrates, which were monitored in 83 % of river water bodies included in operational monitoring.

Annex V of the Water Framework Directive 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.

Of the five biological quality elements used for surveillance monitoring of coastal waters, two were sampled at least at the minimum recommended frequency: the lowest rate was for macroalgae, for which 43 % of sites met the minimum recommended frequency. Overwhelmingly, phytoplankton was used for the monitoring of lakes for surveillance

purposes and 99 % of sites were sampled at least at the minimum recommended frequency. The other three reported biological quality elements were only sampled at one site, all with a lower than recommended frequency. Only one of the five relevant biological quality elements reported for the surveillance monitoring of rivers (fish) was sampled at the minimum recommended frequency at all sites. Macrophytes had the lowest rate (73 % of sites). All of the biological quality elements used for surveillance monitoring of transitional waters were sampled at least at the minimum recommended frequency at all sites.

Coastal waters were not operationally monitored. There was a very low rate of alignment with the minimum recommended sampling frequency for four biological quality elements included in the operational monitoring of lakes: no sites for three of the four and only 16 % of sites for phytoplankton. In contrast to surveillance monitoring, fish were only sampled at least at the minimum frequency at 7 % of sites. Macrophytes were sampled at least at the minimum recommended frequency at none of the sites and phytobenthos and benthic invertebrates at all sites. Again in contrast to surveillance monitoring, there were few sites used for the operational monitoring of transitional waters and none was sampled at the minimum recommended frequency for any of the five reported biological quality elements.

River Basin Specific Pollutants and matrices monitored

Portugal reported that 16 substances/determinands that are not Priority Substances were being monitored. According to the Reporting Guidance for the second RBMPs it was expected that these would be River Basin Specific Pollutants. However, all might also be defined as general physicochemical quality elements. None of these substances match the River Basin Specific Pollutants reported in the context of setting Environmental Quality Standards.

This may however be a reporting issue, as River Basin Specific Pollutants were reported to be monitored at the generic quality element level in all four water categories and the results of monitoring were subsequently reported to be used in the classification of the ecological status/potential in rivers and lakes. In addition, Portugal subsequently clarified that in mainland Portugal, several River Basin Specific Pollutants were defined, including both metals and synthetic substances: Antimony, Arsenic, Barium, Copper, Chromium, Zinc, Bentazone, Cyanide, 2,4-D (2,4-dichlorophenoxyacetic acid), 2,4-dichlorophenol, 3,4-Dichloroaniline, Dimethoate, Ethylbenzene, Tributyl phosphate, Linuron, Mecoprop (MCPP), Xylene, Toluene, Terbuthylazine, Desethylterbuthylazine, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol.

Table 3.4 shows the number of sites used to monitor River Basin Specific Pollutants (reported at the level of the quality element) in Portugal in the first and second RBMPs.

Table 3.4 ***Number of sites used to monitor River Basin Specific Pollutants for the second RBMPs and non-priority specific pollutants and/or other national pollutants for the first RBMPs in Portugal. Note that the data from both cycles may not be fully comparable as different definitions were used and also not all Member State reported information at the site level, meaning that there were no equivalent data for the first RBMPs.***

RBMP		Rivers	Lakes	Transitional	Coastal
first	Sites used to monitor non-priority specific pollutants and/or other national pollutants	92	49	44	16
second	Sites used to monitor River Basin Specific Pollutants	294	27	3	42

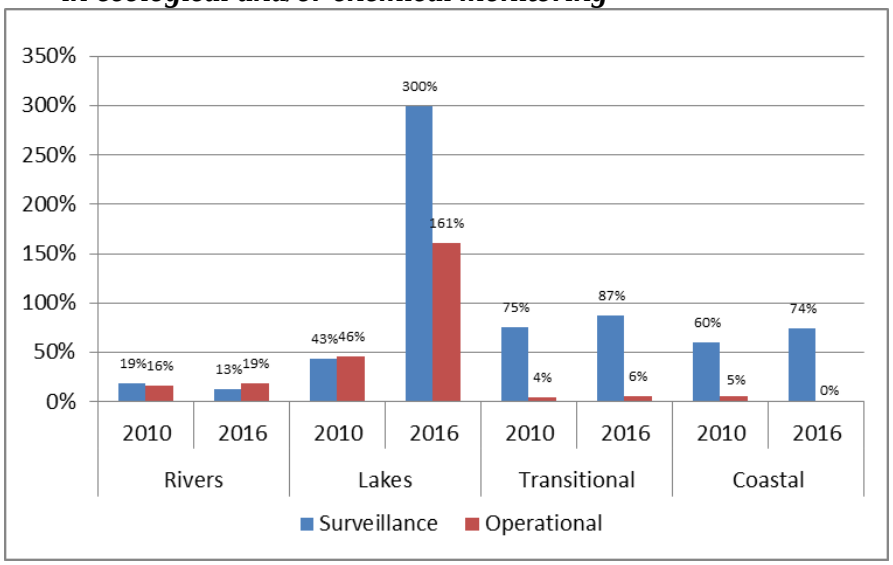
Sources: WISE electronic reports

Surveillance and operational monitoring of surface water bodies

Figure 3.1 shows the proportion of water bodies subject to surveillance and operational monitoring.

20 % of surface water bodies in Portugal are included in surveillance monitoring compared to 19 % for operational monitoring. It is difficult to compare the relative proportion of lake and river water bodies included in the different types of monitoring because of how reservoirs have been reported: as river water bodies in the surface water body schema and as lakes in the monitoring schema. However, a striking observation is that no coastal water bodies are included in operational monitoring, while 73 % are included in surveillance monitoring. 87 % of transitional water bodies (in eight RBDs) are included in surveillance monitoring. Operational monitoring of transitional waters is only undertaken in the Azores RBD but these are not included in surveillance monitoring. Even though there is monitoring of coastal waters in the Madeira RBD, this was reported not to be for surveillance or operational purposes but for ecological and chemical status purposes. There was no comparable information available for the first RBMPs.

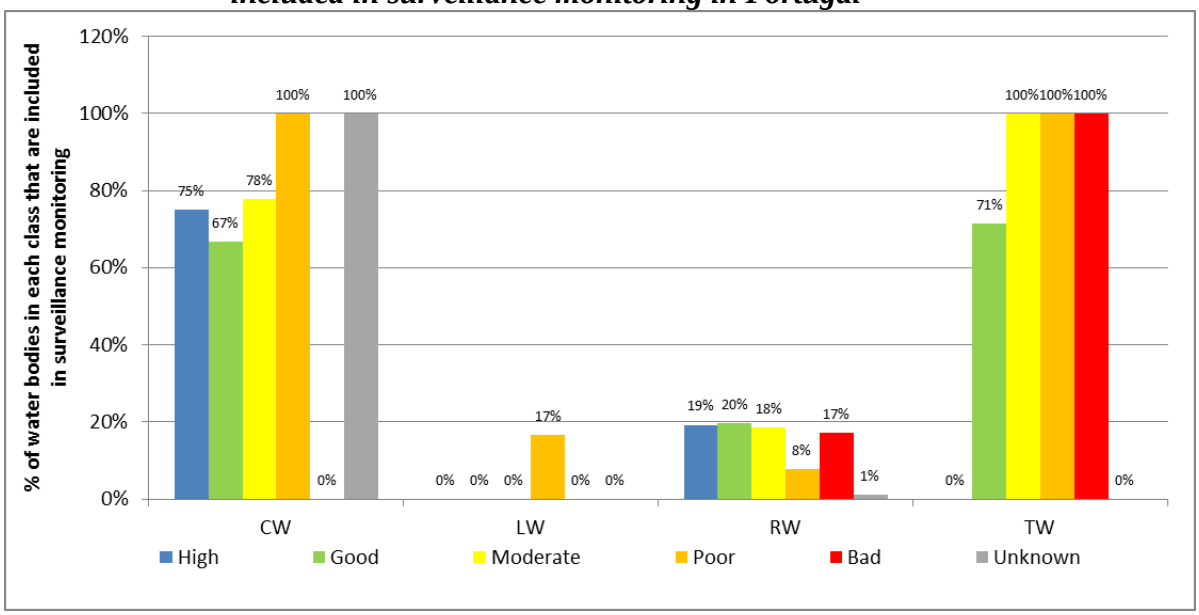
Figure 3.1 ***Percentage of water bodies included in surveillance and operational monitoring in Portugal for the first RMPs (2010) and second RBMPs (2016). Note that no differentiation is made between water bodies included in ecological and/or chemical monitoring***



Source: WISE electronic reports

Figure 3.2 shows the proportion of water bodies in each ecological status/potential class that is subject to surveillance monitoring.

Figure 3.2 ***Proportion of water bodies in each ecological status/potential class that is included in surveillance monitoring in Portugal***



Source: WISE electronic reports. A differentiated presentation between ecological status and potential and including all types of quality element can be viewed here - https://tableau.discomap.eea.europa.eu/t/Wateronline/views/WISE_SOW_QualityElement_Status_Compare/SWB_QualityElement_Group?iframeSizedToWindow=true&:embed=y&:display_count=no&:showAppBanner=false&:showVizHome=no

Transboundary surface water body monitoring

Portugal reported transboundary coastal water bodies in two RBDs, transboundary river water bodies in four RBDs and transboundary transitional water bodies in two RBDs. However, no monitoring sites were reported to be part of or contributing to international monitoring networks.[16]

3.2 Assessment and classification of ecological status/potential of surface water

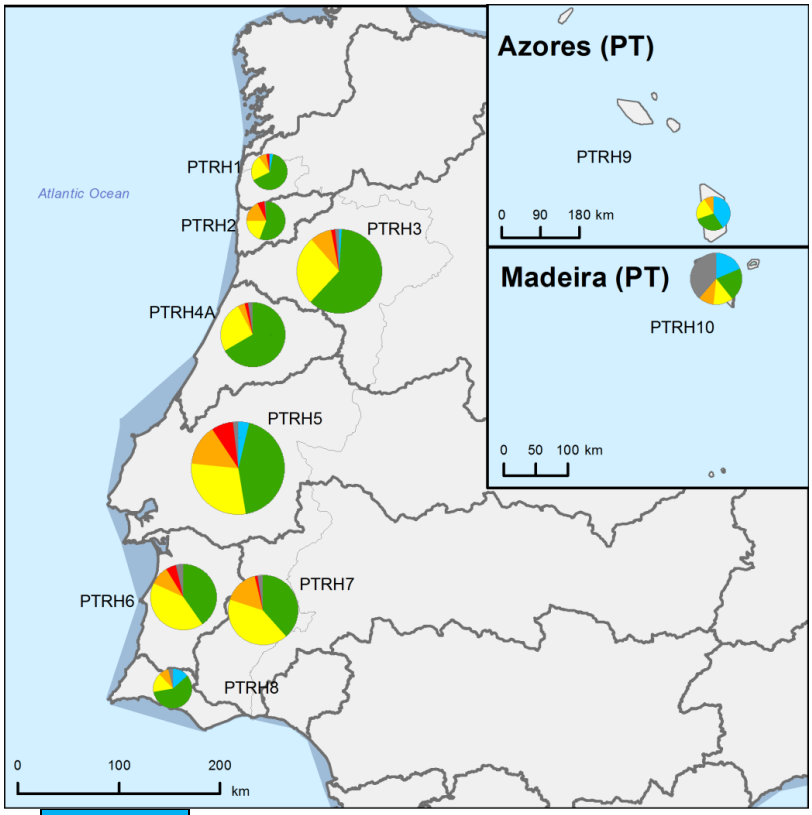
3.2.1 Ecological status or potential of surface water bodies

The ecological status/potential of surface water bodies in Portugal for the second RBMPs is illustrated in Map 3.1. This is based on the most recent assessment of status. The number of delineated surface water bodies for the first RBMPs was 1945, this increased by around 5 % to 2040 for the second. Overall ecological status has been reported for almost all delineated water bodies, except artificial rivers and 33 % of coastal and transitional water bodies.

[16] Portugal subsequently clarified that the international monitoring network is described in a joint report written by Portugal and Spain. However, this report was published after Portugal reported to WISE and was therefore not considered in this assessment.

Map 3.1 Ecological status or potential of surface water bodies in Portugal based on the most recently assessed status/potential of the surface water bodies

Note: Standard colours based on WFD Annex V, Article 1.4.2(i).



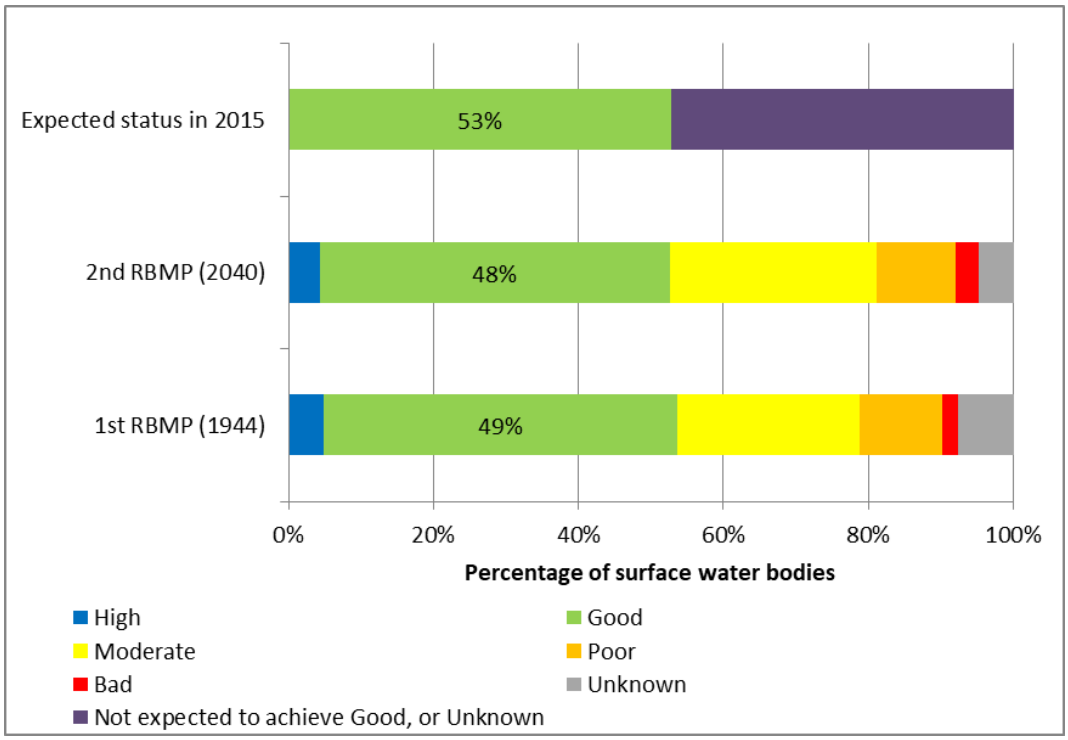
Note: Standard colours based on WFD Annex V, Article 1.4.2(i).
Source: WISE, Eurostat (country borders)

A differentiated presentation of this data between ecological status and potential and including all types of quality elements can be viewed here - https://tableau.discomap.eea.europa.eu/t/Wateronline/views/WISE_SOW_QualityElement_Status_Compare/SWB_QualityElement_Group?iframeSizedToWindow=true&:embed=y&:display_count=no&:showAppBanner=false&:showVizHome=no

Figure 3.3 compares the ecological status of surface water bodies in Portugal for the first RBMPs with that for the second (based on the most recent assessment of status/potential) and that expected by 2015. The overall ecological status/potential has not improved significantly since the first RBMPs. Overall for Portugal there was a 4 % decrease in the proportion of high

status and an increase of 4 % of surface water bodies in good status/potential from the first to the second RBMPs. Whilst there was little change in the proportion of surface water bodies in poor status/potential, there was an increase in the proportions of moderate (19 %) and bad (63 %) status/potential.

Figure 3.3 ***Ecological status or potential of surface water bodies in Portugal for the second RBMPs, for the first RBMPs and expected in 2015. The numbers in the parenthesis are the number of surface water bodies for each cycle. Note that the period of the assessment of status for the second RBMPs was 2008 to 2016. The year of the assessment of status for first RBMPs is not known***

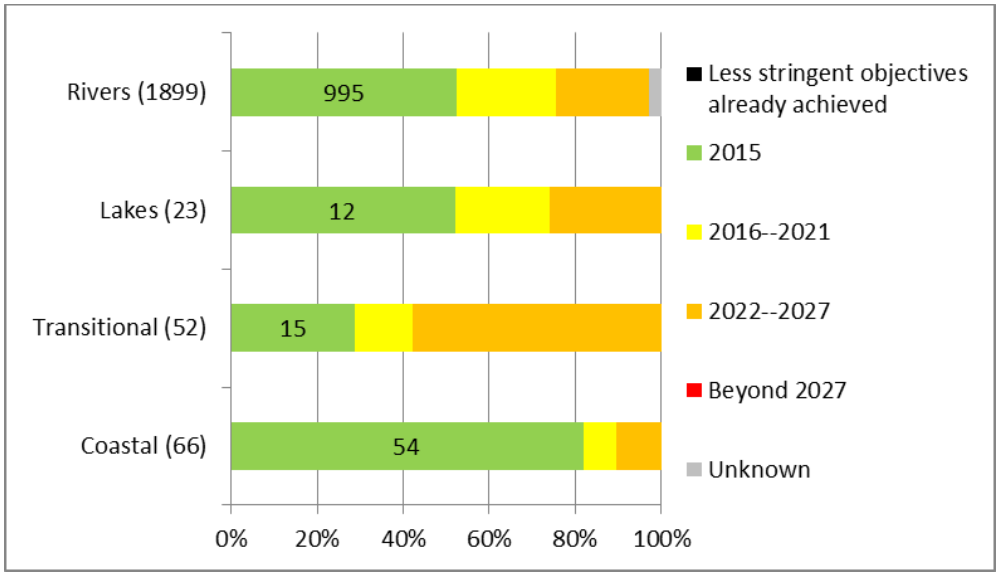


Source: WISE electronic reports

3 % of coastal water bodies, zero lakes, 5 % of river water bodies and 4 % of transitional water bodies were reported to have unknown ecological status/potential for the second RBMPs. The corresponding figures for the first RBMPs were 5 %, 3 %, 7 % and 47 %, respectively. This indicates some improvement in the assessment and classification of surface waters for the second RBMPs.

Member States were asked to report the expected date for the achievement of good ecological status/potential. The information for Portugal is shown in Figure 3.4.

Figure 3.4 ***Expected date of achievement of good ecological status/potential of surface water bodies in Portugal. The numbers in parenthesis are the number of water bodies in each category***

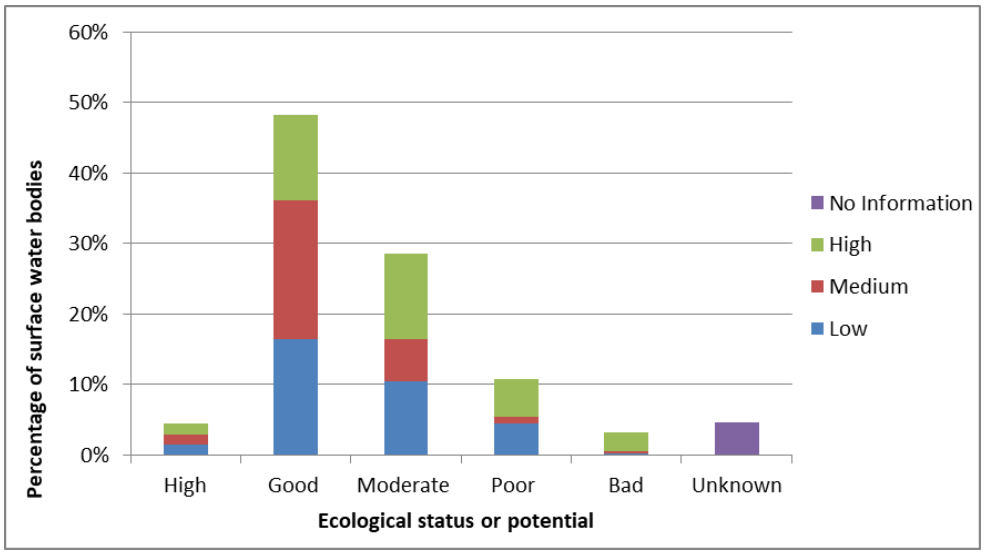


Source: WISE electronic reports

Confidence in ecological status/potential assessment

Figure 3.5 shows the confidence in the classification of ecological status/potential.

Figure 3.5 ***Confidence in the classification of ecological status or potential of surface water bodies in Portugal based on the most recently assessed status/potential***



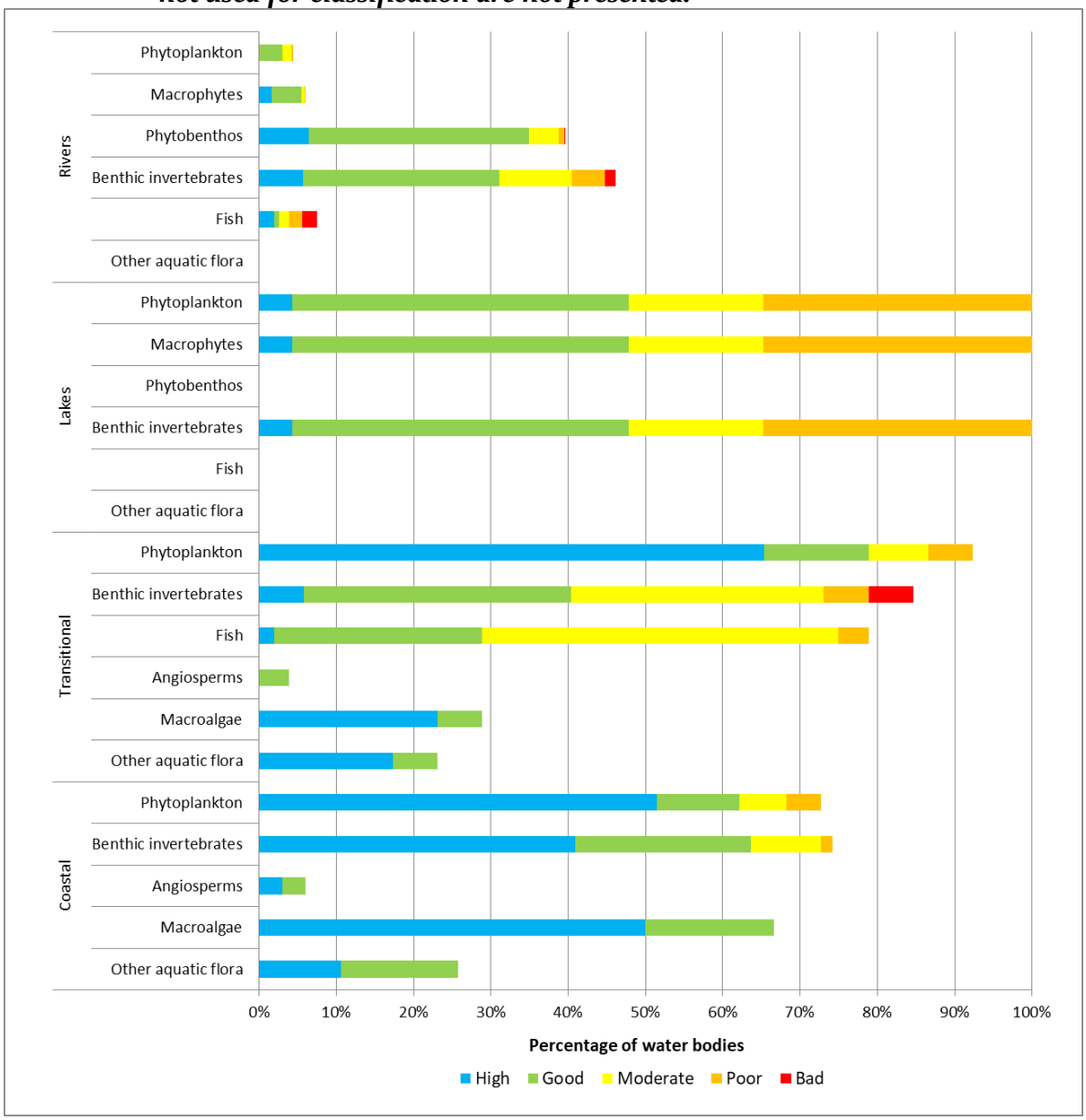
Source: WISE electronic reports

95 % of surface water bodies were classified in terms of ecological status/potential. 36 % of these were classified with high confidence; the classification with the highest confidence was for transitional waters, for which 92 % of water bodies were classified with high confidence.

Classification of ecological status at the quality element level

Figure 3.6 shows the percentage of water bodies in terms of the biological quality element used for classification.

Figure 3.6 Ecological status/potential of the biological quality elements used in the classification of lakes (including reservoirs), rivers, transitional and coastal waters in Portugal. Note that water bodies with unknown status/potential or where the quality element was reported as not applicable or as monitored but not used for classification are not presented.

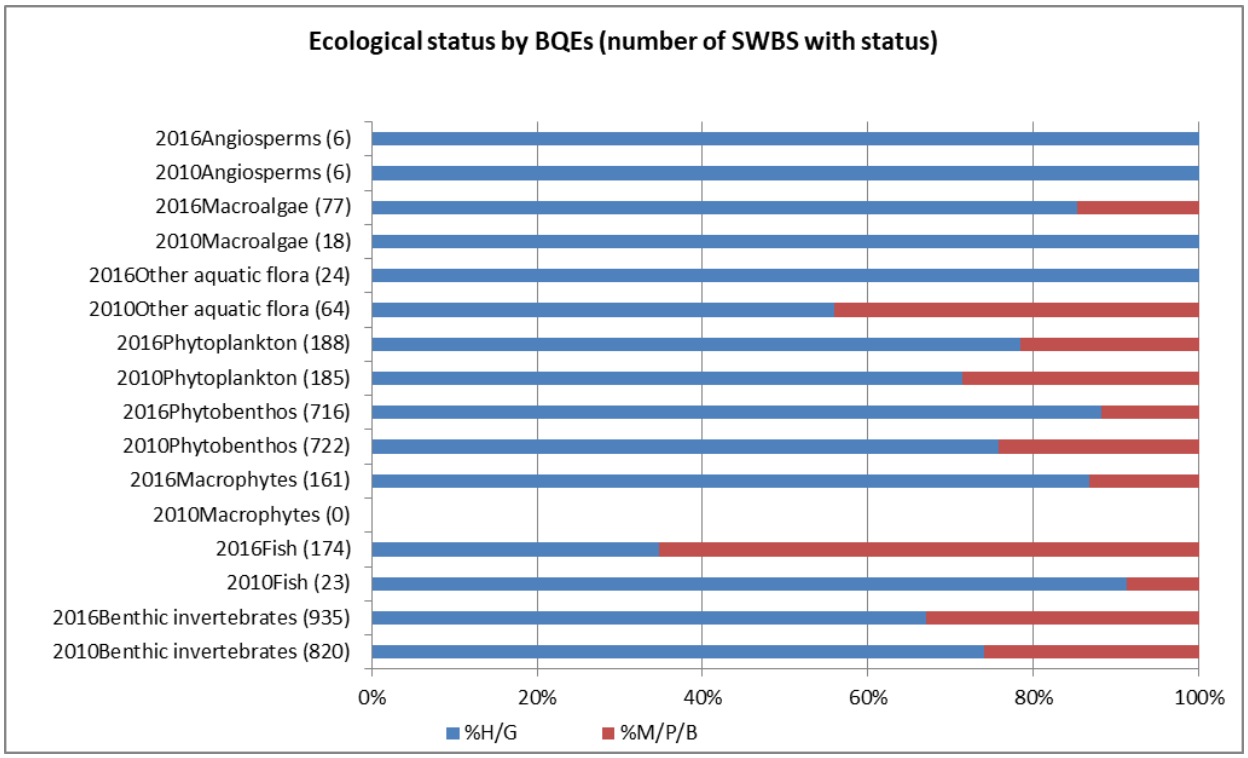


Source: WISE electronic reports. A differentiated presentation of this data between ecological status and potential and including all types of quality elements can be viewed here - https://tableau.discomap.eea.europa.eu/t/Wateronline/views/WISE_SOW_QualityElement_Status_Compare/SWB_QualityElement_Group?iframeSizedToWindow=true&:embed=y&:display_count=no&:showAppBanner=false&:showVizHome=no

The classification is more often based on several quality elements in all water categories than for the first RBMPs, although for many water bodies in lakes and coastal waters, the assessment is still based on phytoplankton and nutrients only.

Figure 3.7 compares the classification of biological quality elements in terms of ecological status/potential for the first and second RBMPs. It should be noted that this comparison should be treated with some caution as there are differences between the numbers of surface water bodies classified for individual elements between the first and second RBMPs

Figure 3.7 Comparison of ecological status/potential in Portugal according to classified biological quality elements in surface water bodies between the first and second RBMPs



Source: Surface water bodies: Quality element status
https://tableau.discomap.eea.europa.eu/t/Wateronline/views/WISE_SOW_QualityElement/SWB_QualityElement?:embed=y&:display_count=no&:showAppBanner=false&:showShareOptions=true&:showVizHome=no

There are some water bodies with improved status for some quality elements, but others with deterioration of some quality elements. The reasons for this lack of improvement are not clear.

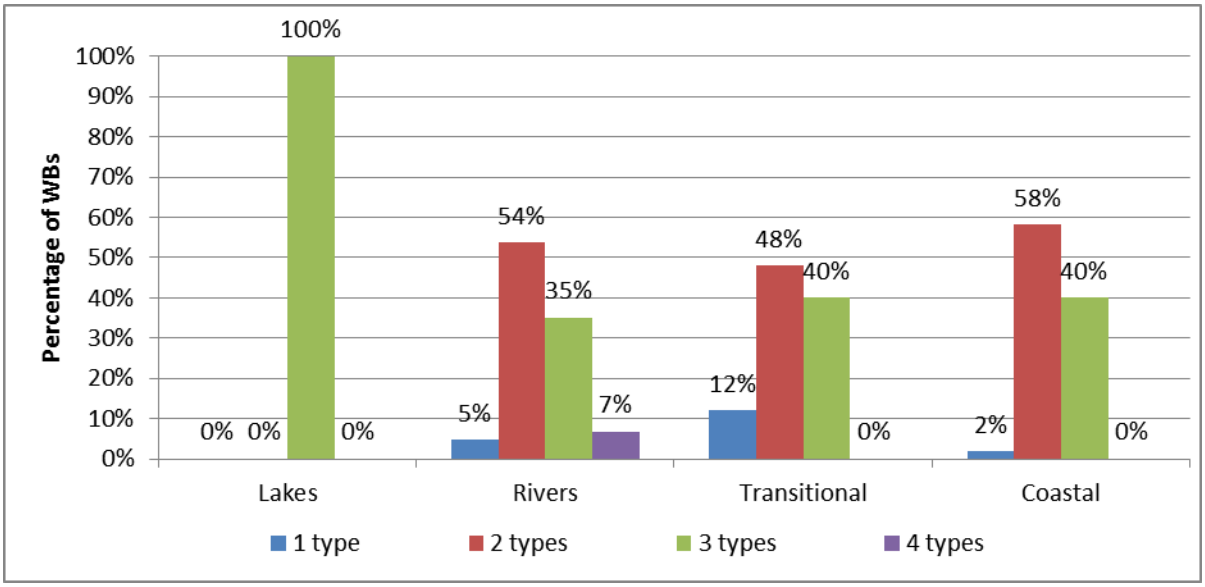
Portugal subsequently stated that at the time of publication of the first RBMPs some biological assessment methods for rivers and reservoirs were only in early stages of development. These

methods were different from those subsequently used and may have affected subsequent classifications.

Figure 3.8 illustrates the basis of the classification of ecological status/potential of surface waters in Portugal for the second RBMPs.

Figure 3.8 ***The classification of the ecological status or potential of rivers, lakes, transitional and coastal waters in Portugal using 1, 2, 3 or 4 types of quality element.***

Note: The four types are: biological; hydromorphological, general physicochemical and River Basin Specific Pollutants.



Source: WISE electronic reports

Assessment methods for the biological quality elements

There are now biological quality element methods developed for all relevant biological quality elements, which were missing for the first RBMPs, including macrophytes in rivers. However, the biological quality element methods are not used in the Madeira RBD, except phytobenthos and benthic invertebrates in rivers.

No assessment methods for fish in lakes or angiosperms in coastal waters were reported: there were methods for all other relevant biological quality elements in the four water categories. Regarding reservoirs, Portugal explained that it considers that phytoplankton is the only biological quality element applicable. The sensitivity of the assessment methods to different impacts have been reported, and seem logical.

Intercalibration of biological quality element methods

Many Portuguese national types are linked to common intercalibration types, but it is not clear which biological quality element methods have been intercalibrated. Portugal subsequently explained that, for the national types not linked to the common intercalibration types, boundaries have been set using the methodologies that resulted from the intercalibration exercises.

Assessment of hydromorphological quality elements

Reference conditions were reported for hydromorphological quality elements only in rivers, except in the Azores RBD, where all hydromorphological methods are developed. Hydromorphological quality elements are used for the classification of ecological status/potential in coastal waters, rivers and transitional waters mainly based on monitoring results. Expert judgement is only used in rivers in around 17 % of classified water bodies: the basis for this expert judgement is not clear. They are not used in lakes. The classification boundaries for these supporting quality elements in rivers and transitional waters are reported to be related to the class boundaries for the sensitive biological quality elements.

Classification methods for general physicochemical quality elements

All the relevant supporting general physicochemical quality elements were reported to be assessed in terms of ecological status/potential in all four water categories and the classification boundaries are related to the class boundaries for the sensitive biological quality elements.

Standards for nutrient conditions and most other relevant general physicochemical quality elements were reported for each of the four water categories. The only gap was for standards for water temperature in rivers and lakes. Most of the general physicochemical standards are reported to be consistent with the good-moderate status boundary of the relevant sensitive biological quality elements.

Portugal subsequently stated that the definition of a classification system for temperature is in progress.

Selection of River Basin Specific Pollutants and use of Environmental Quality Standards

The selection of River Basin Specific Pollutants was based on the previous list, used for the first RBMPs, considering as a criteria their presence in water in the period 2004-2012. Concerning pesticides, Portugal also took into account whether or not they were authorised.

Environmental Quality Standards are reported for 26 different River Basin Specific Pollutants for water only including both specific synthetic substances and metals, and the 2011 Technical Guidance Document No 27[17] has been used to set the values. Environmental Quality Standards were set for 24 River Basin Specific Pollutants in rivers, 25 in lakes, 12 in coastal waters and 12 in transitional waters.

In addition, the analytical method used for each substance meets the minimum performance criteria laid down in Article 4(1) of the Directive 2009/90/EC[18] for the strictest standard applied.

River Basin Specific Pollutants were used in the classification of all 23 natural lake water bodies, all based on monitoring results, and of 11 % of river water bodies, overwhelmingly based on monitoring results (1 water body was classified by expert judgment and another by grouping). They were not used in the classification of coastal and transitional waters, even though they are reported to be monitored in these two water categories.

Portugal further clarified that they faced difficulties in analysing these substances in saline waters, and that no PNEC[19] had been derived in saline waters yet (which seems in contradiction with the reporting in WISE, where EQSs are set for coastal and transitional waters). Portugal also mentioned that the list of substances, their environmental quality standards and the analytical methods are under review for coastal and transitional waters, as part of the larger review of the monitoring programmes for these categories of water.

Use of monitoring results for classification

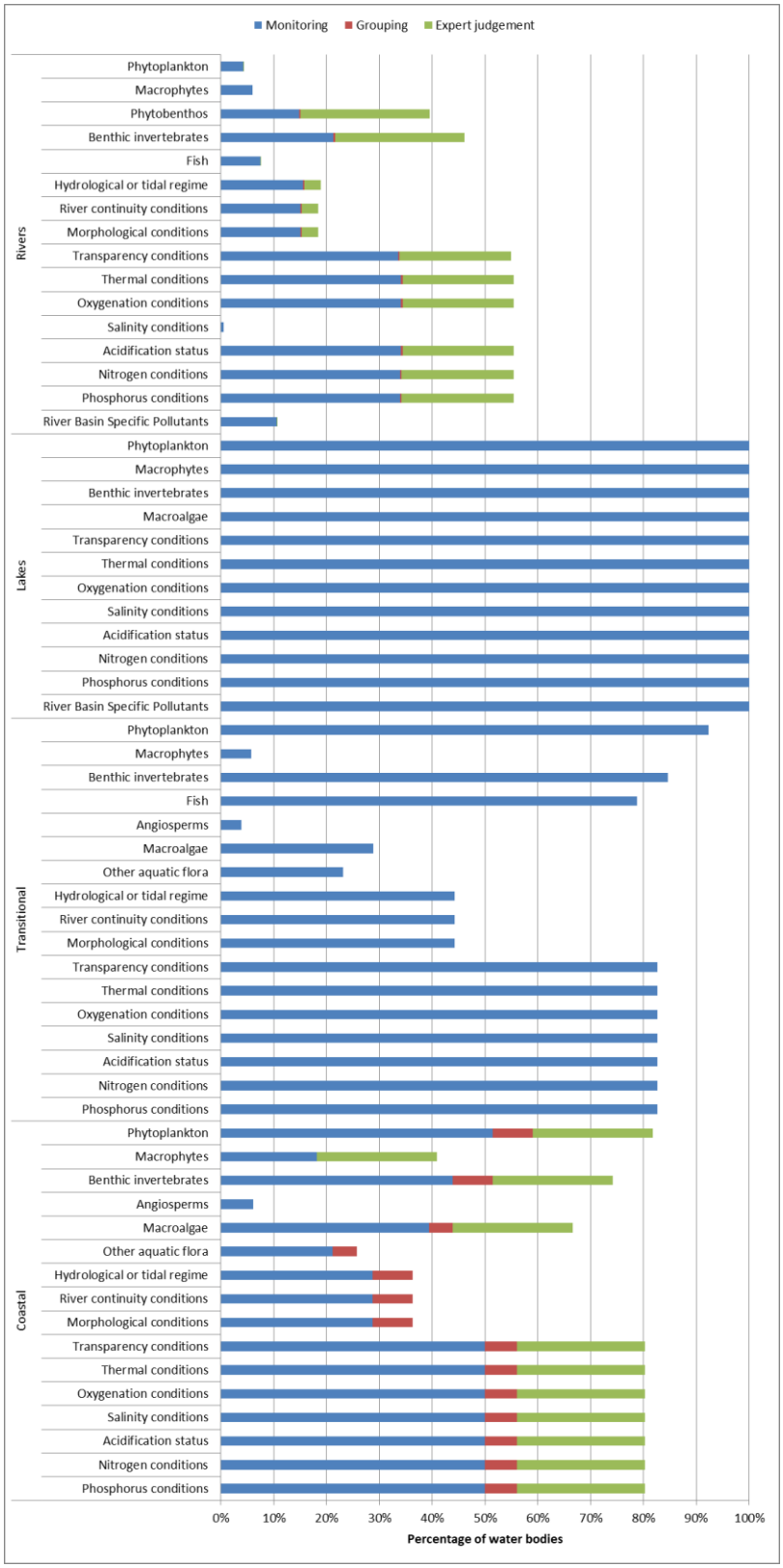
The classification of the individual quality elements is illustrated in Figure 3.9.

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

[18] Directive 2009/90/EC of 31 July 2009 laying down, pursuant to Directive 2000/60/EC of the European Parliament and of the Council, technical specifications for chemical analysis and monitoring of water status http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1524565750309&uri=CELEX:32009L0090

[19] Predicted-No-Effect-Concentration: concentration below which no effect is expected.

Figure 3.9 ***Basis of the classification of ecological status/potential in Portugal. The percentages are in terms of all waterbodies in each category.***



Source: WISE electronic reports

The majority of water bodies are reported to be classified based on monitoring results at the quality element level, which is a huge improvement since the first RBMPs.

Physicochemical quality elements and phytoplankton were most commonly used to classify coastal waters, with around 50 % of the water bodies being classified by monitoring results, 25 % by expert judgement and 6 % by grouping (note that values do not add up to 100 % because not all elements were used to classify all water bodies).

All 23 lakes (all natural) were classified by four biological quality elements (excluding fish), seven physicochemical quality elements and River Basin Specific Pollutants, in all cases just using monitoring results. Hydromorphological quality elements were not classified.

For rivers, physicochemical quality elements were the most commonly used in classification (around 58 % of river water bodies) with monitoring results being used for 36 % of river water bodies and expert judgment for 22 %. Benthic invertebrates was the most commonly used biological quality element for classification (48 %) with expert judgment being used for 26 % of water bodies and 22 % using monitoring results. Grouping was reported not to be used in the classification of rivers except for a very small number of water bodies. Hydromorphological quality elements were used to classify around 20 % of water bodies, predominantly using monitoring results.

96 % of transitional water bodies were classified using phytoplankton, all by using monitoring results. The other expected biological quality elements were also used to classify transitional water bodies including fish (82 % of transitional water bodies). Angiosperms were used to classify only 4 % of transitional waters and macroalgae 30 %. 86 % of transitional water bodies were classified according to seven physicochemical quality elements and 46 % to hydromorphological quality elements. Monitoring results were solely used to classify transitional water bodies.

The overall classification of 4.8 % of rivers, 4 % of transitional waters, and 1.6 % of coastal water bodies was based on none of the required biological quality elements.

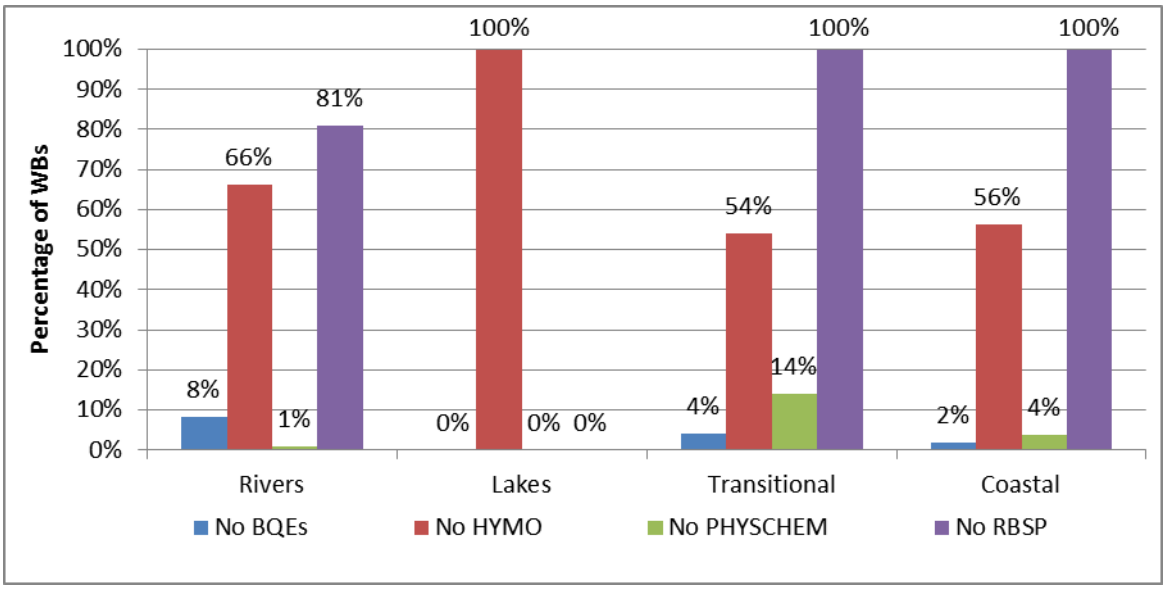
43 surface water bodies were classified as high status: only four of these were classified according to the required hydromorphological quality elements. It would be expected that the classification of high status water bodies would involve the assessment of the hydromorphological conditions of the water bodies; this appears not to have been undertaken.

619 surface water bodies were classified as in good status/potential: 25 % of these were classified according to the required hydromorphological quality elements.

Overall classification of ecological status

The one-out, all-out principle has been used in all RBDs, except Madeira. There is no information available on how the non-deterioration principle has been applied, nor on how Portugal deals with spatial variability within water bodies. Figure 3.10 shows where classification types were not used to classify surface waters.

Figure 3.10 ***The percentage of river, lake, transitional and coastal water bodies in Portugal where no biological quality element or no hydromorphological (HYMO) or no general physicochemical (PHYSCHEM) or no River Basin Specific Pollutant (RBSP) has been used in the classification of ecological status or potential***



Source: WISE electronic reports

3.2 Main changes in implementation and compliance since first RBMPs

The proportion of water bodies with unknown ecological status or potential has decreased from 5 % to 2 % for natural water bodies from the first to the second RBMPs.

The classification of ecological status/potential for the second RBMPs was based on more comprehensive classification methods, that consider more of the relevant biological quality elements and some hydromorphological and physicochemical quality elements (mainly nutrients).

The total number of monitoring sites reported by Portugal increased by 36 % from the first to the second RBMPs. Compared to the first RBMPs, there was an increase in the number of surveillance sites in 2016 in six RBDs, a decrease in one RBD and no changes in the other three RBDs. In rivers, there was a decrease in the number of surveillance sites in seven RBDs and an increase in three. Overall, there was a 100 % increase in numbers of surveillance sites in coastal waters, a 68 % increase in lakes, a 10 % decrease in rivers and a 164 % increase in transitional water sites from the first to the second RBMPs. In terms of operational monitoring there was a decrease in the numbers of sites in two RBDs from the first to the second RBMPs and no change in the others. For rivers, there was an increase in the numbers of operational sites from the first to the second RBMPs in seven RBDs, a decrease in one and no change in the other two. Overall, there was a 100 % decrease in the number of operational sites in coastal waters, a 39 % decrease in lakes, a 54 % increase in rivers and a 40 % decrease in transitional waters from the first to the second RBMPs.

Fish were monitored in rivers in eight RBDs for the first RBMPs but only in seven RBDs in the second RBMPs (not in the Algarve Rivers RBD). There was no fish monitoring in the Azores RBD for both RBMPs. Macrophytes were monitored in the Vouga, Mondego and Lis RBD for the first RBMPs but not for the second. Nine out of ten RBDs reported that hydromorphological quality elements were monitored in rivers for the first RBMPs; this was reduced to 8 RBDs for the second RBMPs.

Macrophytes, phytobenthos and benthic invertebrates were not monitored in any RBD for the first RBMPs in lakes, and for the second were only monitored in the Azores RBD, as this was the only RBD with reported lakes in the second RBMPs. Fish were reported for eight RBDs in the first RBMPs but not for any RBD for the second; fish are required to be monitored in natural, heavily modified and artificial lakes. Natural lakes were only reported for the Azores RBD in the second RBMP and it would be expected that fish would have been monitored in these lakes. For the first RBMPs reservoirs that were originally a river were reported as heavily modified lakes; for the second RBMPs reservoirs that were originally a river were reported as heavily modified rivers. Reservoirs were only monitored for phytoplankton in the first and the second RBMPs. In terms of intercalibration of biological assessment methods, Portugal considers the assessment of fish in reservoirs as being not applicable and has defended that position with the Common Implementation Strategy Working Group on Ecological Status.

Only one RBD (the Azores) reported the monitoring of hydromorphological quality elements in lakes for the second RBMP, while for the first nine of the ten RBDs did. All other lakes reported for the first RBMPs were reservoirs and were reported as rivers in the second RBMPs.

None of the reservoirs were monitored for hydromorphological quality elements for the second RBMPs: this is a significant degradation in the monitoring of lakes for the second RBMPs.

Macroalgae were reported to be monitored in transitional waters in all relevant (nine) RBDs for the first RBMPs but only in five for the second. Angiosperms were not monitored in any RBD for the first RBMPs but were monitored in two RBDs for the second RBMPs, and macrophytes were also reported for one other RBD. Benthic invertebrates were monitored in all relevant RBDs for both the first and second RBMPs. Seven RBDs did not monitor fish in transitional waters for the first RBMPs, all nine RBDs reported some fish monitoring for the second. Eight RBDs reported the monitoring of hydromorphological quality elements in transitional waters for the first RBMPs, but this was reduced to six for the second.

Nine RBDs reported that phytoplankton was monitored in coastal waters for the first RBMPs; three of these did not report phytoplankton for the second. Eight out of nine RBDs reported macroalgae for the first RBMPs, but three of these did not report macroalgae for the second. Three RBDs monitored angiosperms for the first RBMPs and one of these did not report angiosperms for the second along with the other seven RBDs. Macrophytes were monitored in one RBD for the second RBMP. Eight RBDs reported benthic invertebrates to be monitored for the first RBMPs, but this had decreased to six RBDs for the second. Seven out of ten RBDs reported the monitoring of hydromorphological quality element for the first RBMPs and this was reduced to six for the second.

There were no changes in the monitoring of the physicochemical quality elements in rivers, lakes and transitional waters However, eight of the ten RBDs reported the monitoring of physicochemical quality elements in coastal waters for the first RBMPs, but this was reduced to six for the second.

3.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and first PoM requested action on the following:

- Recommendation 3: *Complete the development of methods for the status assessment of water bodies and determination of reference conditions and apply them through the implementation of robust monitoring programmes. An adequate WFD-compliant assessment and monitoring framework is a necessary pre-requisite to design effective Programme of Measures and ultimately to achieve the WFD objectives.* •

Assessment: Portugal reported a smaller proportion of water bodies with unknown ecological status/potential than in the first RBMPs: coastal waters, 5 % in the first RBMPs, 2 % in the second; rivers, 7 % in the first RBMPs and 5 % in the second; transitional waters, 47 % in the first RBMPs, 4 % in the second. This improvement may reflect improvements in the monitoring and assessment methods, particularly for some biological quality elements such as fish in transitional waters: seven RBDs did not monitor fish in transitional waters for the first RBMPs, all nine RBDs reported some fish monitoring for the second.

However, there has also been some deterioration in the monitoring reported for the second RBMPs compared to the first. There are examples where biological quality elements reported to be monitored for the first RBMPs were not reported for the second. This is particularly so for the monitoring of lakes/reservoirs, where phytoplankton is the only biological quality element monitored and hydromorphological quality elements are not monitored at all, so that the focus of the monitoring and assessment is on phytoplankton and on the physicochemical quality elements. The number of RBDs reporting the monitoring of hydromorphological elements in coastal waters, rivers and transitional waters also decreased for the second RBMPs. In general, the focus of monitoring in terms of the numbers of water bodies monitored and the number of different elements used in all water categories appears to be on the physicochemical quality elements.

The assessment of ecological status for single quality elements is based on direct monitoring for a fairly large proportion of water bodies classified for that quality element in most water categories and RBDs, but not for hydromorphological quality elements.

Reference conditions have now been set for most biological quality elements, physicochemical quality elements for all or some types in lakes, coastal and transitional waters in the RBDs. In the Azores RBD, reference conditions have also been set for hydromorphological quality elements for some types in all water categories.

The class boundaries for biological quality element methods have also been set for most biological quality elements in all RBDs except Madeira, where only methods for phytobenthos and benthic invertebrates in rivers were developed.

The sensitivity of the biological quality element methods to impacts seems logical for all the biological quality elements, with most biological quality elements being sensitive to nutrients and organic enrichment, and fish and the benthic flora biological quality elements (except phytobenthos in rivers) in all water categories being sensitive to hydromorphological alterations.

Environmental Quality Standards have been reported for 26 River Basin Specific Pollutants and developed according to the technical guidance. However, River Basin Specific Pollutants were not classified in coastal and transitional waters, and Portugal clarified that the Environmental Quality Standards for salt waters are currently being revised.

In conclusion, whilst there has been progress in monitoring and assessment methods since the first RBMPs, there has been some deterioration in some aspects and there still remain significant gaps in the monitoring of ecological status/potential in Portugal.

The recommendation has been partially fulfilled.

Topic 4 Monitoring, assessment and classification of chemical status in surface water bodies

4.1 Assessment of implementation and compliance with WFD requirements in the second cycle

4.1.1 Monitoring of chemical status in surface waters

Monitoring sites and monitored water bodies used for monitoring of chemical status

Member States have to implement surveillance and operational monitoring programmes in accordance with the requirements of the WFD and of the EQS Directive, for the assessment of ecological status/potential and chemical status.

Surveillance monitoring programmes should allow Member States to supplement and validate the impact assessment procedure, to efficiently and effectively review the design of their monitoring programmes, and to assess the long-term changes in natural conditions and those resulting from widespread anthropogenic activity. For operational purposes, monitoring is required to establish the status of waterbodies identified as being at risk of failing to meet their environmental objectives, and to assess any changes in the status of such waterbodies resulting from the Programmes of Measures.

Section 4.1.1 of this report summarises the characteristics of the surveillance and operational monitoring programmes in Portugal for the second RBMPs.

Figure 4.1 summarises the proportion of sites used for the monitoring of chemical status in rivers, lakes, transitional and coastal waters for the second RBMPs (territorial waters have not been identified for Portugal). In this figure, no distinction is made between sites used for surveillance and/or operational purposes. More detailed information can be found on the website of the European Environment Agency[20].

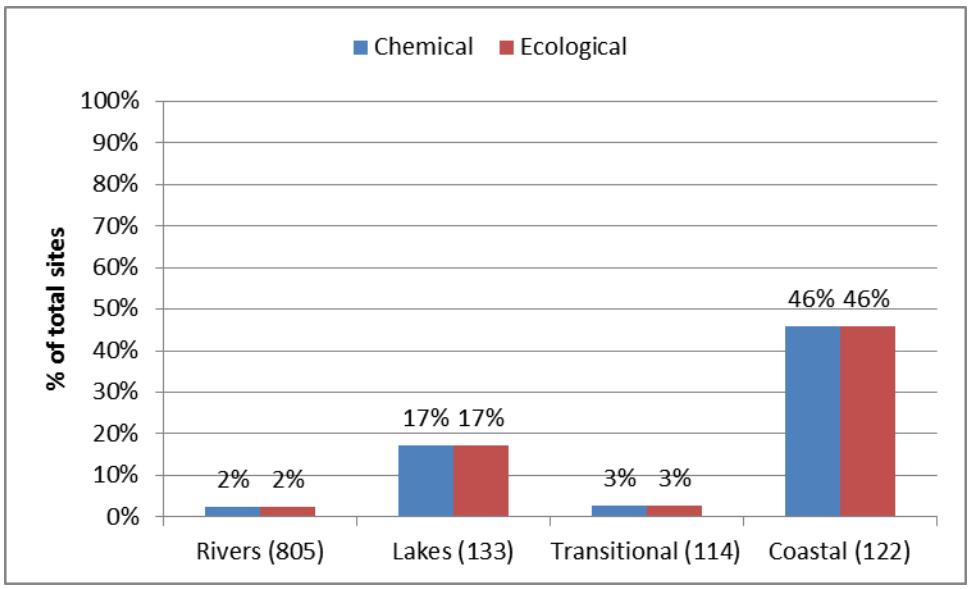
Figure 4.1 shows that only a small proportion of monitoring sites are reported to be used for monitoring of chemical (and ecological) status for river water bodies and transitional water bodies (2 % and 3 % respectively). More sites are monitored for lakes (17 %) and better coverage is achieved for coastal waters (46 %). It should be noted that considerably more sites are reported to be used for operational and surveillance monitoring purposes than reported for chemical status and that it is possible that some of these may be used for monitoring of chemical status but not reported.

[20] https://www.eea.europa.eu/publications/state-of-water

Portugal clarified that for the WISE reporting only 'surveillance' and 'operational' were selected without providing details on the specific objectives such as ecological, chemical, drinking water etc. Portugal stated that 16 % of sites and 22 % of water bodies were monitored for chemical status in rivers and that financial constraints limited the level of monitoring that could be implemented at the time.

Furthermore, Portugal stated that for transitional and coastal waters, monitoring for the determination of chemical status was performed at the same stations as monitoring for the determination of ecological status, that is, chemical status stations were the same as defined in the surveillance sub-programme for transitional and coastal waters. Portugal stated that the low percentages presented in Figure 4.1 were due to misunderstandings or errors in reporting and that 87 % of transitional waters and 70 % of coastal waters were monitored for classification of chemical (and ecological) status.

Figure 4.1 ***Proportion of sites used for monitoring of chemical status and, for comparison, ecological status, in Portugal. The number in parenthesis next to the category is the total number of monitoring sites irrespective of their purpose***

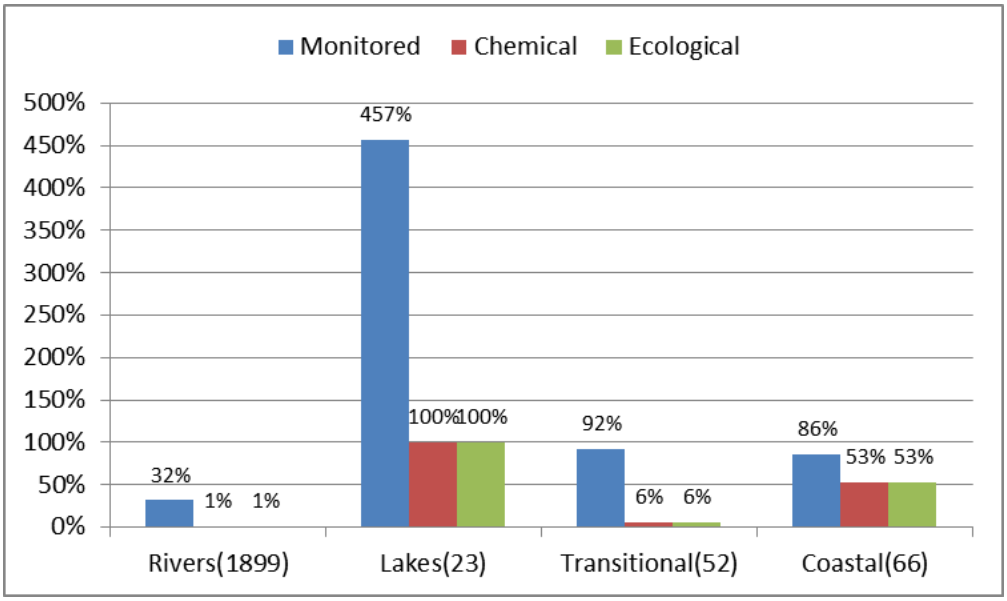


Source: WISE electronic reports

Figure 4.2 summarises the proportion of water bodies monitored for chemical status in surface waters for the second RBMPs. In this figure, no distinction is made between water bodies monitored for surveillance and/or operational purposes. Also given is the proportion of water bodies monitored for any purpose and, for comparative purpose, those for ecological status.

The data reported for lakes stated that 105 lake water bodies were monitored; however, there are only 23 lake water bodies in Portugal reported in the second RBMPs. As stated in Section 2.1.1 reservoirs were reported as lake water bodies in the first RBMPs but as river water bodies in the second RBMPs as they were formerly river water bodies that were dammed to form reservoirs. This needs to be taken into account when interpreting the monitoring data reported in the first and second RBMPs.

Figure 4.2 ***Proportion of total surface water bodies in each category which are monitored, monitored for chemical status and monitored for ecological status, in Portugal. The number in parenthesis next to the category is the total number of water bodies in that category***



Source: WISE electronic reports

All water bodies failing to achieve good chemical status are reported to be monitored (for operational purposes) in six of the ten RBDs in Portugal. In the Guadiana RBD, two river water bodies are reported to be failing to achieve good chemical status but only one of these is reported to be monitored. In the Azores RBD, two coastal water bodies are reported to be failing to achieve good chemical status but only one of these is monitored. For the Azores and Madeira RBDs, all surface water bodies are classified as being either in good chemical status or unknown status.

Long-term trend monitoring and monitoring of Priority Substances in water, sediment and biota for status assessment

Monitoring for status assessment

Requirements

Article 8.1 of the WFD requires Member States to establish monitoring programmes in order to provide, *inter alia*, a coherent and comprehensive overview of water status within each RBD. The amount of monitoring undertaken in terms of priority substances, frequency and number of sites should be sufficient to obtain a reliable and robust assessment of status. According to the EQS 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.

Spatial coverage

33 of the 41 Priority substances are monitored at sites across the RBDs in Portugal for status assessment. The number of Priority Substances monitored at the water body level varies, from 33 in the Guadiana RBD to 12 in the Minho and Lima RBD and the Vouga, Mondego and Lis RBD. All of these substances are reported to be monitored in water only with no indication of monitoring in sediments or biota.

Most Priority Substances are monitored in less than 10 water bodies in each RBD, with the maximum number of river water bodies being monitored for a Priority Substance (Nickel and its compounds) being 22 for river water bodies in the Douro RBD (out of 1899 river water bodies in Portugal). The RBMPs stated that a risk based approach to monitoring is taken, with only those substances considered to be presenting a risk being monitored. However, the inventories of emissions reported in WISE include some but not all Priority Substances (and Madeira did not report any inventory), and only point sources are considered, so it is unclear how far all relevant pressures and emissions have been identified for all substances. In addition, it seems that the monitoring data did not allow classification of all water bodies, even in combination with grouping / extrapolation (see section below on chemical status of surface waters).

No monitoring in biota /sediment was reported to WISE. Portugal subsequently clarified that a monitoring network has been implemented to assess compliance with the biota standards. Monitoring was performed in mussels in coastal waters and in freshwater fish (mussels: nine sampling stations covering the eight RBDs in the mainland; freshwater fish: seven sampling

areas in seven RBDs). Portugal mentioned that the monitoring results will be reported with the next RBMPs.

Frequencies

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 EQS Directive. In all cases greater intervals can be applied by Member States if justified on the basis of technical knowledge and expert judgement.

Monitoring frequencies in water never exceed twice a year for any substance and either once or three times per cycle. 12 substances are monitored only once a year and these are monitored once in the monitoring cycle. These are below the recommended minimum frequencies for surveillance and operational monitoring.

Monitoring for long-term trend assessment

Requirements

Article 3.3 of the EQS Directive (version in force in 2009) requires Member States to monitor 14 priority substances[21] 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.

Spatial coverage

As stated above, no information was reported by Portugal to WISE with regard to monitoring of sediments and/or biota. This is at odds with the fact that Portugal have reported that, for 9 of the 10 RBDs arrangements are in place for long-term trend analysis of the required substances (information is missing for the Minho and Lima RBD). Furthermore, evidence found in Portuguese national law (transposing the requirements of the EQS Directive) states that the Portuguese Environment Agency shall define specific frequencies for monitoring programmes in sediment and/or biota, with a minimum frequency of once every three years and that this should be referred to in the RBMPs.

[21] Anthracene, brominated diphenylether, cadmium, C10-13 chloroalkanes, DEHP, fluoranthene, hexachlorobenzene, hexabutadiene, hexachlorocyclohexane, lead, mercury, pentachlorobenzene, PAH, Tributyltin.

Further clarification has been provided from Portugal: from 2013 a sampling network of 36 monitoring sites has been established in mainland Portugal in seven RBDs for the evaluation of long-term trends and this has subsequently been expanded to cover the eighth RBD in the mainland. The substances monitored include 11 of the 14 relevant ones: brominated diphenylethers, cadmium, fluoranthene, hexachlorobutadiene, hexachlorobenzene, hexachlorocyclohexane, lead, mercury, pentachlorobenzene, polyaromatic hydrocarbons (PAH), tributyltin compounds[22]. Portugal states that the results will be reported in the next RBMPs.

Frequencies

No frequencies have been reported yet. According to the Portuguese legislation, monitoring should be carried out at or above the recommended minimum frequency.

Monitoring of Priority Substances that are discharged in each RBD

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 river basin management plan 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.

No inventory was reported for the Madeira RBD. For the remaining 9 RBDs, between 4 and 18 Priority Substances were reported as being in an inventory and also discharged. However, not all of the substances reported as being discharged were monitored. Substances that were discharged but not monitored included: mercury, pentachlorobenzene, lead, cadmium, DEHP, benzo(g,h,i)-perylene, hexachlorocyclohexane, trichloromethane, diuron, dichloromethane, tetrachloroethylene, isoproturon, trichloroethylene, pentachlorophenol and brominated diphenylethers.

[22] Portugal mentioned they also monitor nickel in sediment for long term trend assessment, in addition to the substances mentioned in article 3(3) of the EQS Directive, version in force in 2009.

Portugal provided further information to explain that their inventories of discharges, emissions and losses of priority substances were mainly derived from the E-PRTR database, noting that some records were considered to be overestimated. Portugal stated that the inventories will be reviewed in light of such overestimations and that monitoring programmes will also be reviewed with a view to their improvement.

Performance of analytical methods used

In Portugal, for all Priority Substances monitored in each of the 10 RBDs, the analytical methods used meet the minimum performance criteria laid down in Article 4(1) of Directive 2009/90/EC for the strictest standard applied.

The method of dealing with measurements of Priority Substances lower than the limit of quantification is as specified in Article 5 of the Directive 2009/90/EC.

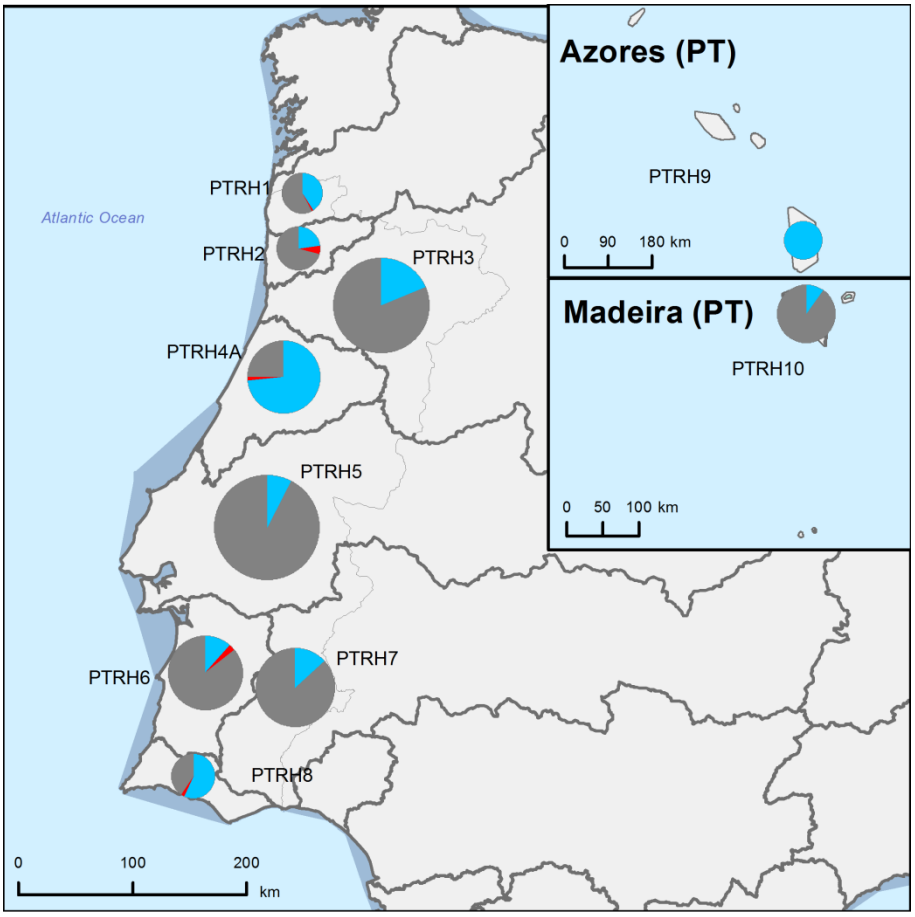
4.1.2 Chemical Status of surface water bodies

Member States are required to report the year in which the assessment of chemical status was based. This may be the year that the surface water body was monitored. In case of grouping this may be the year in which monitoring took place in the surface water bodies within a group that are used to extrapolate results to non-monitored surface water bodies within the same group. Monitoring for chemical status in Portugal was undertaken between 2010 and 2011 with most samples being taken in 2010.

The chemical status of surface water bodies in Portugal for the second RBMPs is illustrated in Map 4.1. This is based on the most recent assessment of status. Surface water bodies in good status represent around 25 % of water bodies across Portugal, with unknown status representing 74 % of water bodies. The one-out-all-out principle was applied to the assessment of the overall chemical status of surface water bodies in Portugal, except in the Madeira RBD.

Map *4.1* **Chemical status of surface water bodies in Portugal based on the most recently assessed status of the surface water bodies**

Note: Standard colours based on WFD Annex V, Article 1.4.3.



Source: WISE, Eurostat (country borders)

Good
Failing to achieve to good
Unknown
River Basin Districts
Countries outside the EU

Table 4.1 shows the chemical status of surface water bodies in the first and second RBMPs. More detailed information can be found on the website of the European Environment Agency[23].

The number of surface water bodies increased from 1945 in the first RBMPs to 2040 in the second. The proportion of surface water bodies at good status appears to have decreased from

[23] https://www.eea.europa.eu/publications/state-of-water

around 40 % to 25 %. The proportion of surface water bodies failing to achieve good chemical status remained very similar but unknown status increased from around 58 % to 74 %.

Table 4.1 ***Chemical status of surface water bodies in Portugal for the second and first RBMPs. Note: the number in parenthesis next to the water category is the number of water bodies in that category. Note: Chemical status assessment is based on the standards laid down in EQS Directive 2008/105/EC (version in force on 13 January 2009). However, Portugal clarified that all mainland RBDs used the more stringent Environmental Quality Standards in water defined in Directive 2013/39/EU. Some Member States did not implement the Directive in the first RBMPs as the transposition deadline was in July 2010, after the adoption of the first RBMPs.***

Category	**Good**		**Failing to achieve good**		**Unknown**	
	Number	**%**	**Number**	**%**	**Number**	**%**
Second RBMP						
Lakes (23)	23	100 %				
Rivers (1899)	398	21 %	15	1 %	1,486	78 %
Transitional (52)	44	85 %	3	6 %	5	10 %
Coastal (66)	47	71 %	9	14 %	10	15 %
Total (2040)	512	25 %	27	1 %	1,501	74 %
First RBMP						
Lakes (122)	91	75 %	1	1 %	30	25 %
Rivers (1705)	633	37 %	4	0.20 %	1,068	63 %
Transitional (53)	26	49 %	3	6 %	24	45 %
Coastal (65)	48	74 %	3	5 %	6	9 %
Total (1945)	798	41 %	11	1 %	1,128	58 %

Where water bodies are not monitored they are generally reported as unknown status. However, expert judgement is reported to be used to classify some water bodies, although how this has been used is not fully explained in the RBMPs. Portugal subsequently mentioned that the classification of non-monitored rivers and reservoirs was based on existing pressures, historical data, and the ecological status/potential of the waterbody. If there were no pressures from discharged substances that could be associated with chemical status, if the ecological status/ potential was good, and there was no historical contamination, then the chemical status

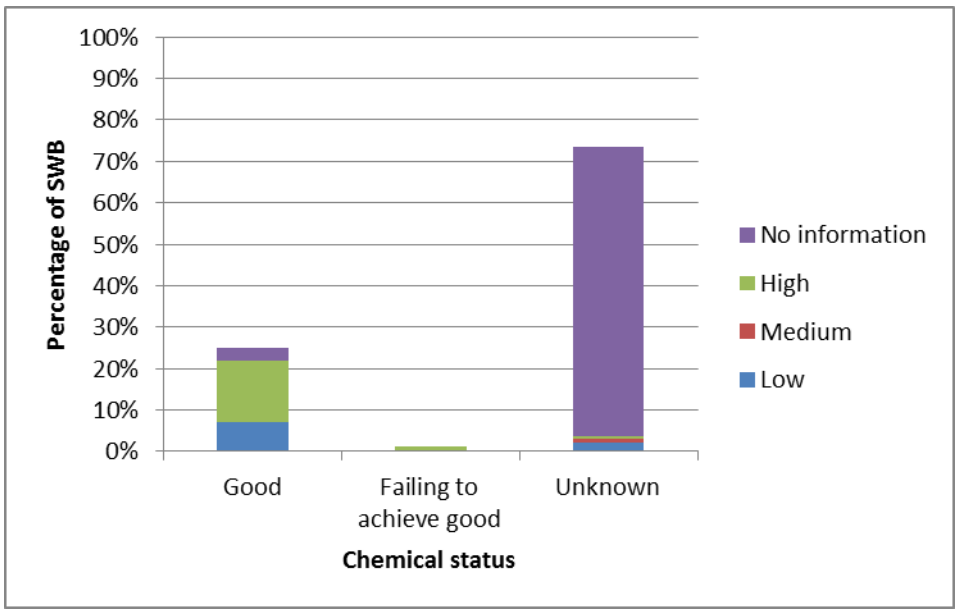
was considered to be good. In cases where doubt existed, the water body was classified as unknown.

For transitional and coastal waters, expert judgment was reported to be carried out in consultation with universities and research groups, supported by investigative projects and historic monitoring data.

Portugal reported that classification is determined through averaging the results from multiple monitoring sites within a water body monitoring the same priority substance.

Figure 4.3 shows the confidence in the classification of chemical status for the second RBMPs. Overall, 63 % of classified surface water bodies were classified with high confidence, 3 % with medium confidence and 34 % with low confidence. (There seems to have been a reporting mistake as a level of confidence is reported for some of the water bodies in unknown status) Confidence in the classification of chemical status for the first cycle was not reported.

Figure 4.3 Confidence in the classification of chemical status of surface water bodies in Portugal based on the most recently assessed status/potential



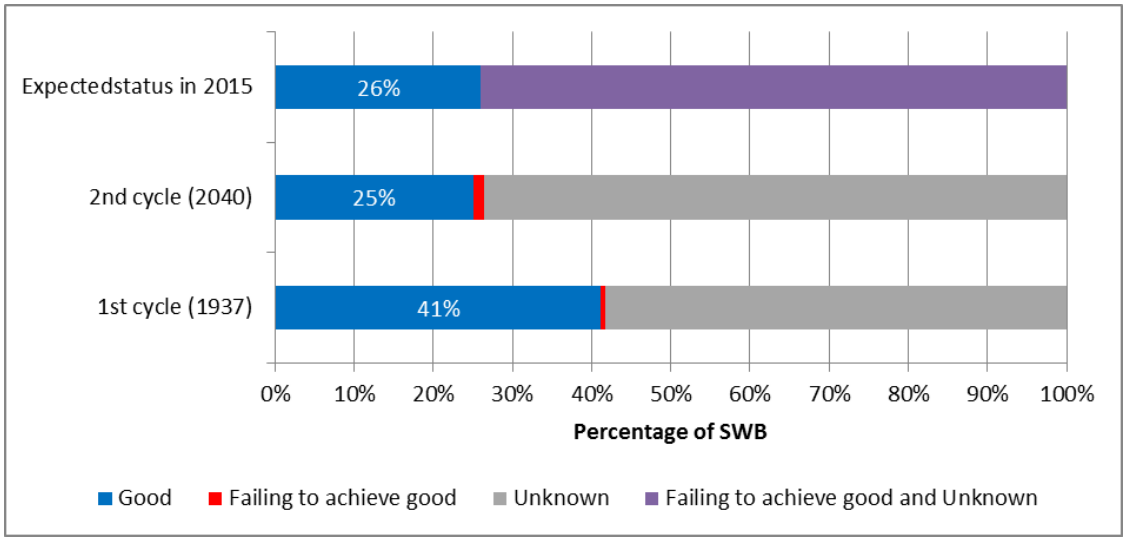
Source: WISE electronic reports

Figure 4.4 compares the chemical status of surface water bodies in Portugal for the first RBMPs with that for the second RBMPs (based on the most recent assessment of status) and

that expected in 2015. More information on the chemical status in each RBD and water category can be found on the website of the European Environment Agency[24].

The assessment of chemical status for the second RBMPs was expected to be based on the standards laid down in the EQS Directive (version in force on 13 January 2009[25]). Some Member States did not implement the Directive in the first RBMPs as the transposition deadline was in July 2010, after the adoption of the first RBMPs.

Figure 4.4 ***Chemical status of surface water bodies in Portugal for the second RBMPs, for the first RBMPs and expected in 2015. The number in the parenthesis is the number of surface water bodies for each cycle. Note that the period of assessment of status for the second RBMPs was 2008 to 2016. The year of assessment of status for the first RBMPs is not known.***



Source: WISE electronic reports

Directive 2013/39/EU amended the EQS Directive. In particular, it sets more stringent environmental quality standards for seven substances[26]. Member States were required to indicate if the new standards caused the status of the surface water body to appear to

[24] https://www.eea.europa.eu/publications/state-of-water

[25] Please note that Directive 2013/39/EU, which amended the Environmental Quality Standards Directive, introduced less stringent annual average Environmental Quality Standards for naphthalene in transitional and coastal waters. This less stringent Environmental Quality Standard should be taken into account for the determination of surface water chemical status by the 2015 deadline laid down in Article 4 of the WFD.

[26] Anthracene, Brominated diphenylether, Fluoranthene, Lead and its compounds, Naphthalene, Nickel and its compounds, Polyaromatic hydrocarbons (PAH)

deteriorate. This situation arose for only two of the seven substances, lead and nickel, in river water bodies only, in half of the RBDs and never affecting more than 4 % of river water bodies in each of these RBDs.

Good chemical status should be reached by 2021 in relation to the revised Environmental Quality Standards, unless Member States apply exemptions under WFD Article 4(4) or less stringent objectives under Article 4(5).

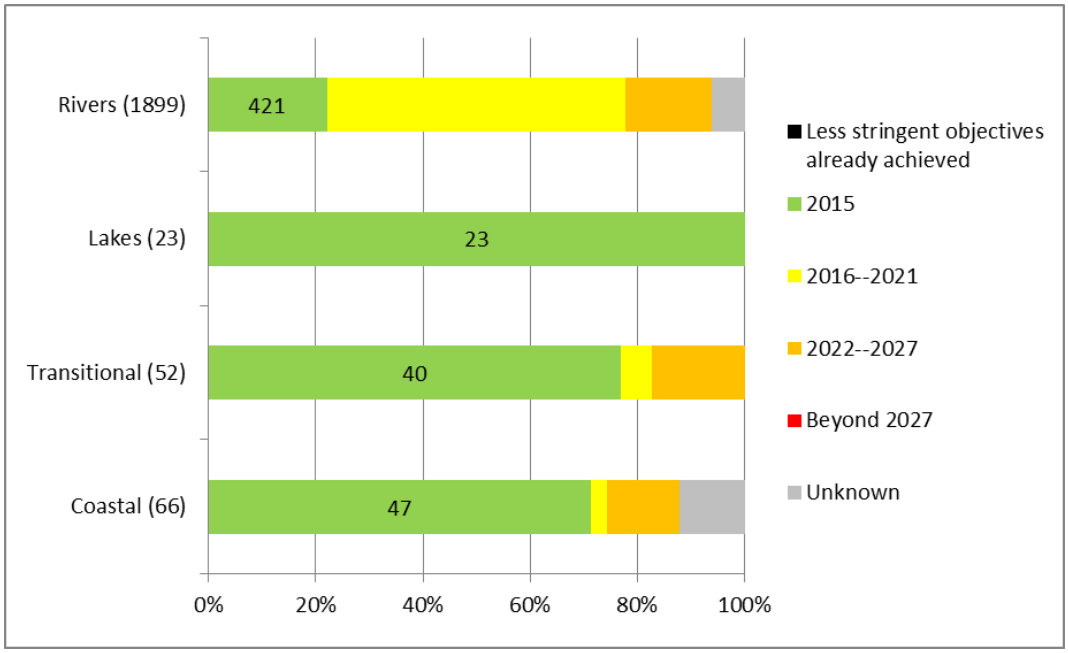
Member States were asked to report the expected date for the achievement of good chemical status. The information is shown in Figure 4.5.

For 8 of the 10 RBDs in Portugal, good chemical status of surface water bodies is expected to be achieved by the end of the third planning cycle (2027). No information was reported electronically for the Azores RBD, however Portugal clarified that all waterbodies are in good status, and this is not expected to change in the future (pesticides and other monitored Priority Substances were always below the analytical limit of quantification and the risk of their presence in Azores waters was considered insignificant). For the Madeira RBD, the date of achievement of good chemical status is unknown for 126 surface water bodies, with five river water bodies identified as achieving good chemical status by 2027. No data on the expected achievement of good status was provided in the first RBMPs.

Improvement in chemical status is reported as being greater than anticipated in the first RBMPs for the Minho and Lima, Douro, Vouga, Mondego and Lis and Algarve Rivers RBDs, less than anticipated in the first RBMPs for the Cavado, Ave and Leca, Tagus and West Rivers, Sado and Mira and Guadiana RBDs and as anticipated in the first RBMPs for the Azores and Madeira RBDs.

Portugal subsequently clarified that water bodies with unknown status and their respective environmental objectives were not reported to WISE due to an oversight. Portugal also clarified that the environmental objectives defined for each waterbody in the RBMPs takes into account the achievement of good ecological status and good chemical status and that for the mainland, 355 waterbodies are expected to achieve [overall] good status by 2021 and 284 by 2027. Portugal noted that good chemical status could be achieved before good overall status is achieved.

Figure 4.5 ***Expected date of achievement of good chemical status of surface water bodies in Portugal. The numbers in parenthesis are the total number of water bodies reported in each category.***



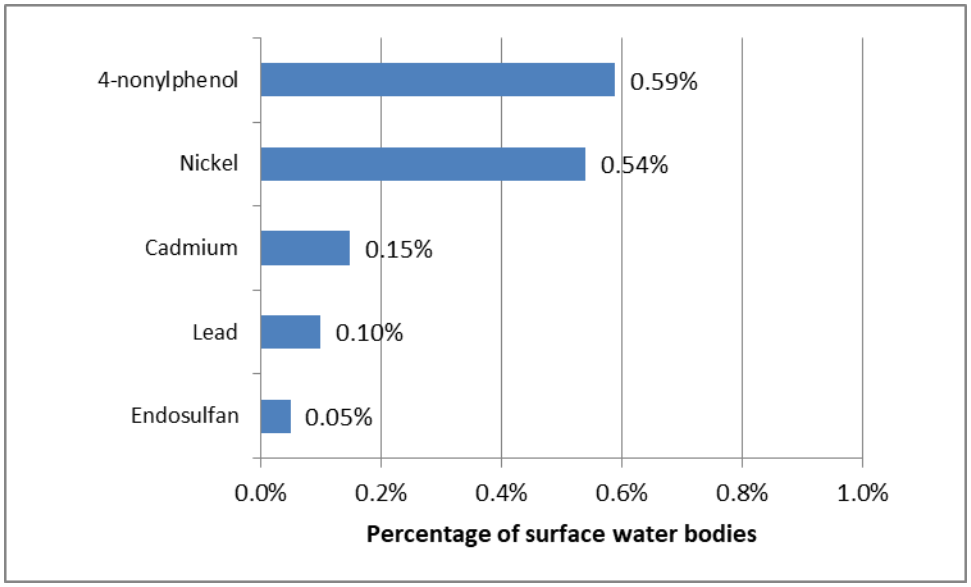
Source: WISE electronic reports

Priority Substances causing the failure of good chemical status

Member States were expected to report exceedances for individual substances on the basis of the more stringent 2013 Environmental Quality Standards when they existed (see above). Portugal clarified that all mainland RBDs used the more stringent Environmental Quality Standards in water defined in Directive 2013/39/EU.

The substances causing the greatest proportion of surface water bodies to fail good chemical status were: 4-nonylphenol (0.59 % of all water bodies) and nickel (0.54 %). The other Priority Substances reported to be causing failure of good chemical status are cadmium (0.15 %), lead (0.10 %) and endosulfan (0.05 %).

Figure 4.6 The top Priority Substances causing failure to achieve good chemical status in surface water bodies in Portugal (only five substances are causing failure)



Source: WISE electronic reports

Portugal reported no exceedance for any of the "Maximum Allowable Concentration" standards.

Ubiquitous, persistent, bioaccumulative and toxic Priority Substances

According to Article 8(a) of the EQS Directive[27], 8 Priority Substances and groups of Priority Substances are behaving like ubiquitous, persistent, bioaccamulable and toxic substances[28]. 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.

Only one ubiquitous, persistent, bioaccumulative and toxic Priority Substance (tributyltin-cation) is reported to be exceeding its Environmental Quality Standard (based on the 2013 standards, as stated in the preceding section) in one river water body, out of the 27 water bodies reported to be failing to achieve good chemical status in Portugal. Ubiquitous persistent, bioaccumulable and toxic Priority Substances are thus assessed by Portugal as having a very limited impact on chemical status. This is illustrated in the 2018 State of Water report of the

[27] Amended by Directive 2013/39/EU
[28] Brominated diphenylether, Mercury and its compounds, Polyaromatic hydrocarbons (PAH), Tributyltin, PFOS, dioxins, hexabromocyclodecane and heptachlor

European Environment Agency[29]. It should be highlighted, however, that overall 74 % of waterbodies are in unknown status. For reporting in the second RBMPs, Portugal has not used the Environmental Quality Standard in biota for mercury (although, as stated in Section 4.1.1, monitoring for mercury in biota is planned to be used for assessment in the next RBMPs) which may at least partly explain why ubiquitous, persistent, bioaccumulative and toxic Priority Substance are reported as having such a limited impact on chemical status.

Priority Substances used in the assessment of chemical status compared to those monitored

The number of Priority Substances used in the assessment varies among RBDs. In the Azores RBD only four Priority Substances are used but for six of the RBDs 22 or more Priority Substances are used (none are reported for the Madeira RBD and 12 and 13 are reported for the Vouga, Mondego and Lis RBD and Minho and Lima RBD respectively). In general, where substances are used in the assessment, they are monitored. There are, however, some examples specific to certain RBDs, where substances are reported as being used in the assessment but not monitored such as: anthracene in the Minho and Lima RBD; chlorpyrifos in the Sado and Mira RBD and in the Azores RBD; and benzene, pentachlorophenol, 1,2-dichloroethane and anthracene in the Algarve Rivers RBD.

In some of the RBDs in Portugal, the following substances are not used in the assessment of chemical status but are reported to be monitored: trichloroethylene, simazine, tetrachloroethylene, diuron, atrazine, chlorpyrifos, mercury, alachlor, isoproturon and the cyclodiene pesticides (aldrin, dieldrin, endrin, isodrin).

Application of alternative Environmental Quality Standards for water, biota and sediment

According to the EQS Directive, Member States may opt to apply Environmental Quality Standards for another matrix than the one specified in the Directive for a given substance. If they do so, they have to ensure the Environmental Quality Standard they set in the other matrix (or matrices) offers at least the same level of protection as the standard established in the Directive.

According to WISE, the standards in the EQS Directive have not been used for eight to nine substances in each of the ten RBDs. For four to five of these substances (depending on the RBDs), alternative and/or additional standards have been applied in water. Portugal

[29] https://www.eea.europa.eu/publications/state-of-water (p40-41 of the report). Also available in a more interactive format at : https://tableau.discomap.eea.europa.eu/t/Wateronline/views/WISE_SOW_SWB_Chemical_Status_Maps/SWB_Failing_Good_Chemical_Status_RBD?iframeSizedToWindow=true&:embed=y&:showAppBanner=false&:display_count=no&:showVizHome=no

subsequently clarified that the alternative standards used are the more stringent standards from Directive 2013/39/EU.

Use of mixing zones

Article 4 of the EQS Directive (2008/105/EC) provides Member States with the option of designating mixing zones adjacent to points of discharge in surface waters. Concentrations of Priority Substances may exceed the relevant Environmental Quality Standards within such mixing zones if they do not affect the compliance of the rest of the surface water body with those standards. Member States that designate mixing zones are required to include within their RBMPs a description of the approaches and methodologies applied to define such zones, and a description of the measures taken to reduce the extent of the mixing zones in the future.

Mixing zones have been designated for all river, transitional and coastal water bodies in the Algarve Rivers RBD and for all river and coastal water bodies in the Madeira RBD. The methodology for the designation of Mixing Zones follows the tiered approach as laid down in the 'Technical Background Document on Identification of Mixing Zones'[30]. Portugal reported that measures have been implemented to reduce the extent of the mixing Zones in the future.

Background Concentrations and Bioavailability

The EQS Directive stipulates that Member States have the possibility, when assessing the monitoring results against the Environmental Quality Standards, to take into account:

> (a) natural background concentrations for metals and their compounds, if they prevent compliance with the Environmental Quality Standards, and;
>
> (b) hardness, pH or other water quality parameters that affect the bioavailability of metals.

In the Azores, natural background concentrations for metals were taken into consideration where such concentrations prevent compliance with the relevant Environmental Quality Standards. Such background concentrations are not reported to be taken into consideration for the Madeira RBD. No further information is provided for any other RBD.

According to the reporting to WISE, only the Azores RBD took into account the bioavailability of metals when assessing exceedances for metals. Madeira reported not taking it into consideration, and no information was reported for the 8 other RBDs. However, Portugal

[30] https://circabc.europa.eu/sd/a/78ce94bb-6f1c-4379-87ac-88a18967c4c3/Technical%20Background%20Document%20on%20the%20Identification%20of%20Mixing%20Zones.doc

further clarified that bioavailability was taken into account in the assessment of status for nickel and lead (although it was not clear whether this was for all RBDs or for the 8 RBDs for which no information had been reported).

4.2 Main changes in implementation and compliance since the first cycle

Between the first and second RBMPs, there appears to be a net increase in monitoring sites and surface water bodies monitored for operational purposes (an increase of 144 sites and 71 water bodies), both due to a relatively large increase in river monitoring. For surveillance monitoring, the number of sites increased by 125 although the number of water bodies decreased by 35. The extent to which these monitoring sites are used for monitoring of chemical status is unclear.

There has been a re-delineation of water bodies between the first and second RBMPs and therefore a comparison of status should be treated with some caution. The number of surface water bodies increased from 1945 in the first RBMPs to 2040 in the second. The proportion of surface water bodies in good status decreased from around 40 % to 25 % between the first and second RBMPs. The proportion of surface water bodies failing to achieve good status remained very similar and unknown status increased from around 58 % to 74 % (surface water bodies in Portugal not monitored for chemical status are generally reported as in unknown status, although expert judgment was used in some cases).

Portugal did not report any monitoring data on sediment or biota in WISE. Portugal subsequently clarified that from 2013 sampling networks for sediments and biota had been implemented for the evaluation of long-term trends, and will be reported in the next RBMPs.[31]

Portugal reported that three Priority Substances which exceeded their standards in the first RBMPs have now reached concentrations below those standards in at least some of the water bodies where they were previously failing. This was the case for nickel in 0.26 % of river water bodies in the Douro RBD and in 0.44 % of river water bodies in the Sado and Mira RBD; for 4-nonylphenol in 20 % of transitional water bodies in the Vouga, Mondego and Lis RBD, and for lead in 1.45 % of river water bodies in the Algarve Rivers RBD. No information was reported for the Azores[32] and Madeira RBDs.

[31] Portugal also clarified that as part of the Operational Programme for Sustainability and Efficient Use of Resources, they also intend to reinforce the knowledge regarding Priority Substances, specific pollutants and emerging compounds (e.g. pharmaceuticals and pesticides) in water bodies, relying on instantaneous sampling (i.e. traditional sampling) but also on passive sampling.

[32] Portugal stated that the Azores RBD did not report improvements and/or exceedances because pesticides and other priority substances monitored were always below the analytical detection limit. Portugal also stated that

4.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and Programmes of Measures requested action on the following:

- Recommendation: *Complete the development of methods for the status assessment of water bodies and determination of reference conditions and apply them through the implementation of robust monitoring programmes. An adequate WFD-compliant assessment and monitoring framework is a necessary pre-requisite to design effective Programme of Measures and ultimately to achieve the WFD objectives.*

  Assessment: 33 of the 41 Priority Substances are reported to be monitored for status assessment, in water only. Monitoring frequencies are below the recommended minimum frequencies for surveillance and operational monitoring. The RBMPs state that a risk based approach to monitoring is taken, with only those substances considered to be presenting a risk being monitored. However, it seems that not all substances identified as discharged in the inventories are monitored (Portugal subsequently mentioned that the E-PRTR data was used to establish the inventories and that some of the records were considered to be overestimated). The inventories often do not include all Priority Substances, and they consider only point sources (and not diffuse sources) so it is unclear whether all discharged substances have been identified.

  The number of sites and water bodies covered by surveillance or operational monitoring increased between the first and second RBMPs, although it is unclear whether all these sites / water bodies are monitored for chemical status. The spatial coverage of the monitoring programmes still seems insufficient to allow the classification of all water bodies with sufficient certainty, as the chemical status of a significant proportion of water bodies (75 %) is still unknown. (Surface water bodies in Portugal which are not monitored for chemical status are generally reported as in unknown status, with expert judgment being applied in some cases). The proportion of water bodies in unknown status increased since the first RBMPs (this may only be partially explained by the increase in the number of water bodies). In addition, about a third of the water bodies classified are associated with a low level of confidence in the assessment.

taking into account the fact that the risk of their presence in Azores water bodies is considered to be insignificant, it was concluded that all water bodies were in good chemical status.

No monitoring in biota was reported for status assessment, although Portugal subsequently clarified that some biota monitoring has been carried out since 2013, in what appears to be a very limited number of sites.

No monitoring for trend was reported, and Portugal subsequently mentioned that monitoring started in 2013, and was then performed also in 2014 and 2015 for 11 of the 14 required Priority Substances, in what appears to be a very limited number of sites.

This recommendation is partially fulfilled.

Topic 5 Monitoring, assessment and classification of quantitative status of groundwater bodies

5.1 Assessment of implementation and compliance with the WFD requirements in the second cycle

5.1.1 Monitoring of quantitative status in groundwater

The total number of groundwater bodies in Portugal is 151 (Table 2.2). 71 groundwater bodies (47%) are not subject to monitoring for quantitative status (Table 5.1). The percentage of groundwater bodies per RBD without monitoring for quantitative status ranges between 44 % and 100 %. The number of monitored groundwater bodies increased from 70 to 80 since the first RBMPs, but there is still no quantitative monitoring in the Azores and Madeira RBDs.[33]

Further investigations found that none of the assessed RBMPs mentions grouping in the context of monitoring of groundwater bodies. For the Vouga, Mondego and Lis and Guadiana RBDs, it is stated that for water bodies that are not included in the monitoring programme, grouping was used to characterise their status, together with modelling and expert judgement. For the Azores RBD, grouping is not mentioned at all.[34]

The number of groundwater bodies increased from 149 in the first cycle to 151 in the second and the total groundwater body area remained nearly the same. 125 groundwater bodies remained unchanged since the first RBMPs. Due to a modification of the boundary between the two RBDs, in the Vouga, Mondego and Lis RBD the number of groundwater bodies decreased from 30 to 22, while in the Tagus and West Rivers RBD the number increased from 12 to20.

[33] In mainland Portugal, 80 groundwater bodies have quantitative monitoring stations, from the total of 93. In the Azores RBD there is no quantitative monitoring, but the number of wells is small (there are none in the Corvo and Flores islands). Quantitative status was determined mainly on the basis of the ratio between the available resources and the discharges through natural springs and abstraction wells. In the Madeira RBD four groundwater were delineated. In order to evaluate the quantitative and qualitative status of the groundwater bodies the data of the quantitative and qualitative monitoring carried out in the scope of the water management for human consumption were taken into account, since the origin of the water for human consumption is mostly from groundwater. Since Porto Santo is supplied by desalinated seawater, monitoring of its groundwater body is being implemented, but considering the still limited information, the status of the water body was classified as unknown. The remaining three water bodies were classified as in good status.

[34] Portugal subsequently clarified that grouping was carried out in the Douro RBD, in the Tagus and West Rivers RBD, in the Sado and Mira RBD and in the Algarve Rivers RBD, for monitoring and status assessment purposes.

The number of monitored groundwater bodies increased from 70 in the first cycle to 80 in the second. The number of monitoring sites for quantitative status is listed in Table 5.3, and shows a slight increase, from 420 in the first cycle to 430 in the second. Neither in the first cycle nor in the second were the Azores and Madeira RBDs subject to monitoring.

112 groundwater bodies, located in nine RBDs, are identified as Drinking Water Protected Areas.

Table 5.1 Number of water bodies in Portugal directly monitored and purpose of monitoring

RBD	Total groundwater bodies directly monitored	Monitoring Purpose			
		CHE - Chemical status	OPE – Operational monitoring	QUA - Quantitative status	SUR – Surveillance monitoring
PTRH1	2	0	0	2	2
PTRH2	4	0	1	3	4
PTRH3	2	0	0	2	2
PTRH4A	22	0	3	20	22
PTRH5A	20	0	7	18	20
PTRH6	8	0	0	4	7
PTRH7	7	0	3	7	7
PTRH8	25	0	4	24	22
PTRH9	33 (34)	33	0	0	0
PTRH10	0	0	0	0	0

Source: WISE electronic reporting. The numbers in parenthesis were subsequently provided by Portugal on the basis of the spatial data reported to WISE.

Table 5.2 Proportion of groundwater bodies in Portugal monitored for quantitative status

RBD	No of groundwater bodies with quantitative monitoring	Total No. groundwater bodies	% of total groundwater bodies monitored for quantitative status
PTRH1	2	2	100.00 %
PTRH2	3	4	75.00 %
PTRH3	2	3	66.67 %
PTRH4A	20	22	90.91 %
PTRH5A	18	20	90.00 %
PTRH6	4	9	44.44 %
PTRH7	7	8	87.50 %
PTRH8	24	25	96.00 %
PTRH9	0	54	0.00 %
PTRH10	0	4	0.00 %

Source: WISE electronic reporting

Table 5.3 Number of groundwater monitoring sites in Portugal and their purpose

RBD	Total groundwater monitoring sites	Monitoring Purpose			
		CHE - Chemical status	OPE - Operational monitoring	QUA - Quantitative status	SUR - Surveillance monitoring
PTRH1	8	0	0	4	6
PTRH2	31	0	23	8	9
PTRH3	28	0	0	10	21
PTRH4A	267	0	58	121	113
PTRH5A	390	0	64	133	239
PTRH6	27	0	0	7	20
PTRH7	76	0	26	19	35
PTRH8	207	0	30	128	63
PTRH9	89	89	0	0	0
PTRH10	0	0	0	0	0

Source: WISE electronic reporting.

5.1.2 Assessment and classification of quantitative status for groundwater

Map 5.1 displays the most recently assessed quantitative status of groundwater bodies. It shows that 147 of the 151 groundwater bodies (97 %) were in good quantitative status and 4 (3 %) are failing good status (Figure 5.1). In terms of area this means that about 1.5 % is failing good quantitative status.

Figure 5.2 shows the level of confidence in status classification, with only 20 % (30) having high confidence. All groundwater bodies have a clear status in the second RBMPs, compared to two groundwater bodies with unknown status in the first RBMPs. About 3 % of the groundwater bodies are at risk of failing good quantitative status.

The total number of groundwater bodies failing good quantitative status increased from one in the first RBMPs to four in the second (from 1 % to 1.5 % in terms of area).

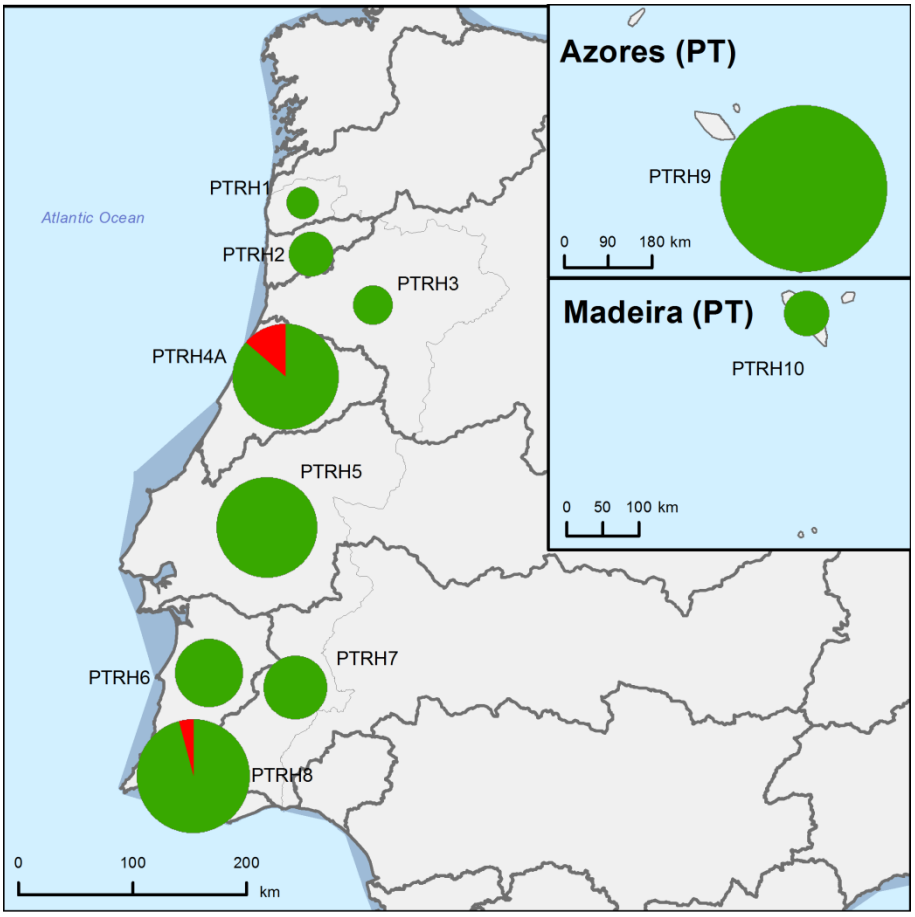
In all 10 RBDs water balance was assessed by a comparison of annual average groundwater abstraction with the ‘available groundwater resource’ for every groundwater body.

The reasons for the failure of good quantitative status of groundwater bodies are shown in Figure 5.3. All four groundwater bodies are failing good status due to failing the water balance test which means that the long-term annual average rate of groundwater abstraction is exceeding the available groundwater resource. The expected date of achievement of good

quantitative status in Portugal is shown in Figure 5.4, with all groundwater bodies expected to achieve good status by 2027.

In all 10 RBDs the criterion of 'available groundwater resource' has been applied in accordance with Article 2(27) of the WFD.

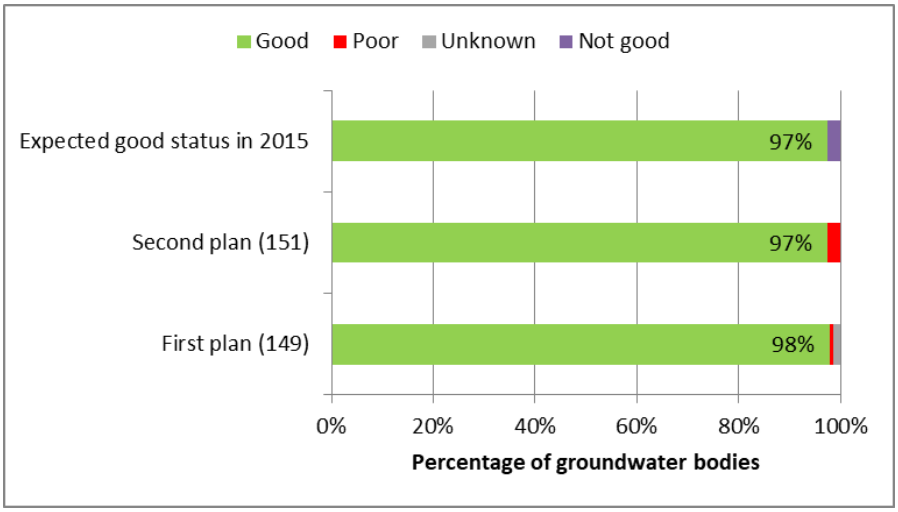
Map 5.1 Map of the most recently assessed quantitative status of groundwater bodies



Note: Standard colours based on WFD Annex V, Article 2.2.4.

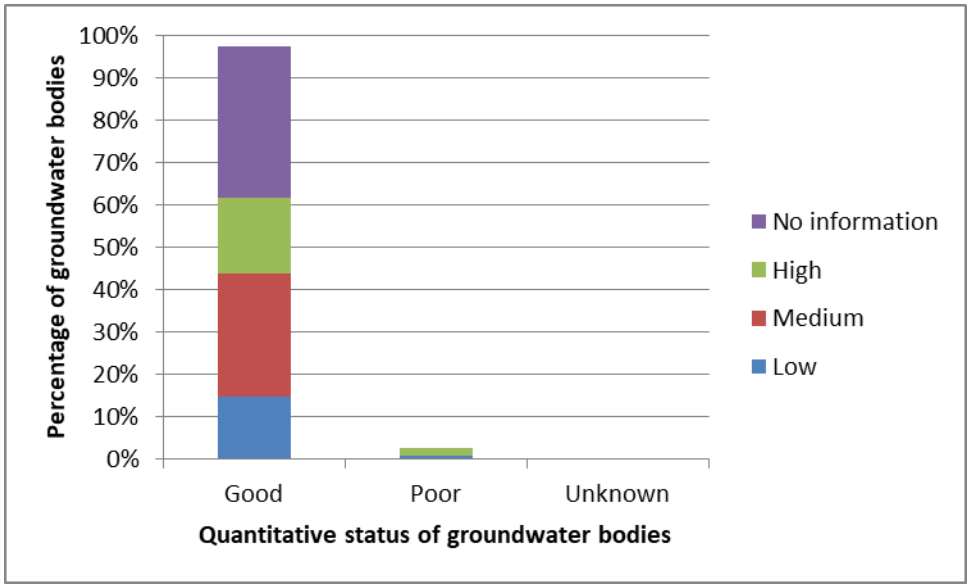
Source: WISE, Eurostat (country borders)

Figure 5.1 ***Quantitative status of groundwater bodies in Portugal for the second RBMPs, for the first RBMPs and expected in 2015. The number in parenthesis is the number of groundwater bodies for each cycle. NB - the period of the assessment of status for the second RBMPs was 2009 to 2016. The year of the assessment of status for the first RBMPs is not known.***



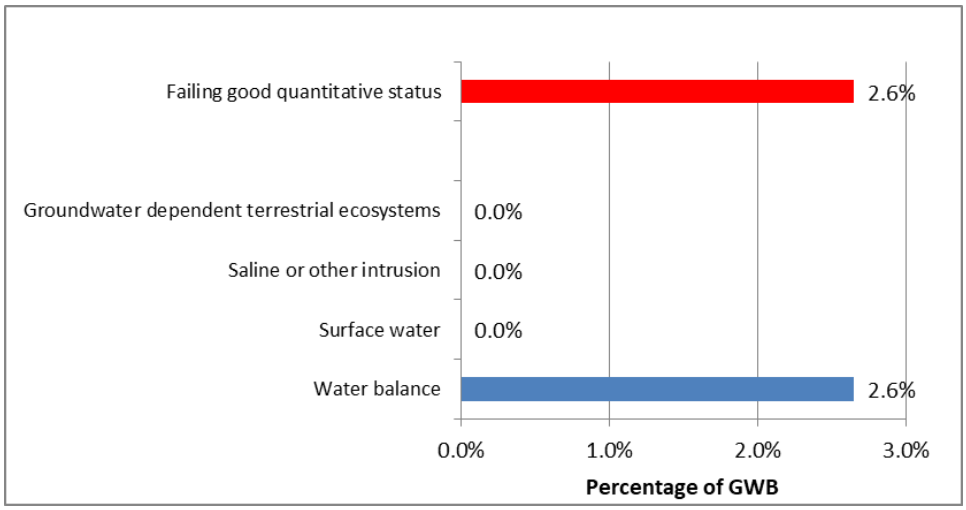
Source: WISE electronic reporting

Figure 5.2 ***Confidence in the classification of quantitative status of groundwater bodies in Portugal based on the most recent assessment of status.***



Source: WISE electronic reporting

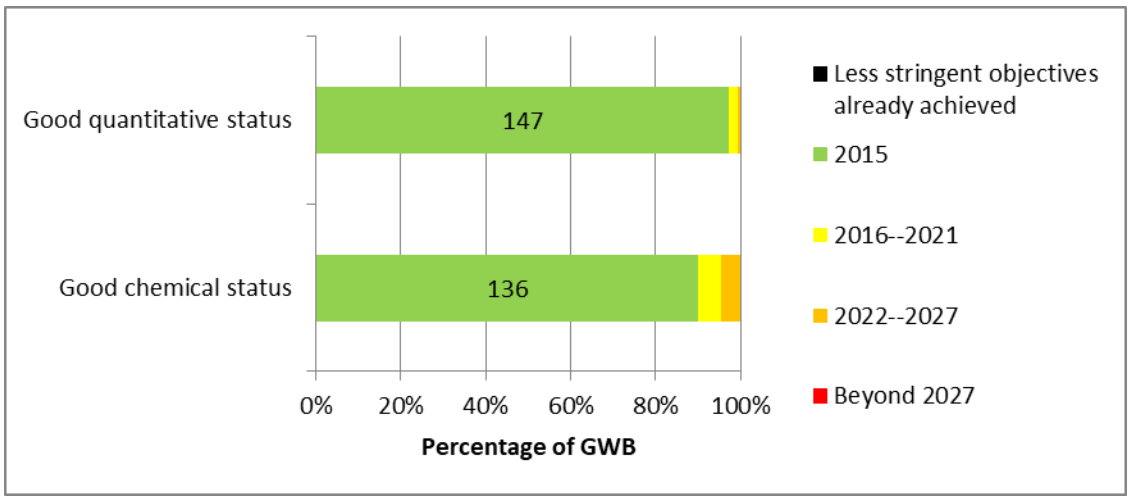
Figure 5.3 Reasons for the failure of good quantitative status of groundwater in Portugal based on the most recent assessment of status.



Source: WISE electronic reporting

Notes:
'Water balance' = long-term annual average rate of abstraction exceeds the available groundwater resource which may result in a decrease of groundwater levels.
'Surface water' = Failure to achieve Environmental Objectives (Article 4 WFD) for associated surface water bodies resulting from anthropogenic water level alteration or change in flow conditions; significant diminution of the status of surface waters resulting from anthropogenic water level alteration or change in flow conditions.
'Groundwater dependent terrestrial ecosystems' = Significant damage to groundwater dependent terrestrial ecosystems resulting from an anthropogenic water level alteration.
'Saline or other intrusion' = Regional saline or other intrusions resulting from anthropogenically induced sustained changes in flow direction.

Figure 5.4 Expected date of achievement of good quantitative and good chemical status of groundwater bodies in Portugal. 151 groundwater bodies were delineated for second RBMPs



Source: WISE electronic reporting

All relevant environmental objectives were considered in status assessment in all RBDs. Associated surface waters were not identified in three RBDs, the Cavado, Ave and Leca, the Douro and the Guadiana, and hence they were not considered in status assessment. Groundwater dependent ecosystems have not been considered in the status assessment in the Cavado, Ave and Leca RBD where no such ecosystems were identified. Saline intrusions were considered in seven of the ten RBDs (not in the Minho and Lima, Cavado, Ave and Leca and Douro RBDs).

In total, four groundwater bodies are at risk of failing good quantitative status due to harm to actual or potential legitimate uses or functions of groundwater.

5.1.3 Consideration of groundwater associated surface waters and/or groundwater dependent ecosystems

In six of ten RBDs a total of 25 groundwater bodies with groundwater associated surface waters have been reported. They are not related to any risk. In all RBDs where such ecosystems were identified, they have been considered in status assessment.

In seven RBDs a total of 19 groundwater bodies with groundwater dependent terrestrial ecosystems have been reported. They are not related to a risk. In all RBDs where such ecosystems are identified, they have been considered in status assessment. Their needs have been considered in status assessment as well.

5.2 Main changes in implementation and compliance since the first cycle

The total number of groundwater bodies slightly increased in total. 125 out of the 151 groundwater bodies remained unchanged since the first RBMPs. In the Vouga, Mondego and Lis RBD the number of groundwater bodies decreased from 30 to 22, while in the Tagus and West Rivers RBD the number of groundwater bodies increased from 12 to 20. This is explained by the fact that, in the second cycle, the Tagus and West Rivers RBD integrated the groundwater bodies of the Ribeiras do Oeste, which were part of the Vouga, Mondego, Lis and West Rivers RBD in the first cycle.

The number of groundwater bodies failing good status increased from one to four. In the Vouga, Mondego and Lis RBD the number of groundwater bodies in poor quantitative status increased from one to three For two groundwater bodies the quantitative status deteriorated from good to poor due to abstractions for agricultural purposes. There is no further explanation

in the RBMP on whether the reason is an additional pressure or a change of pressure[35]. For the Azores RBD, there continues to be a lack of a monitoring network for quantitative status. The tests performed between the estimated available resources and the known abstractions (which in general are not significant - the RBMP states that most abstractions occur in springs) conclude that all groundwater bodies are in good quantitative status.

All groundwater bodies were in good quantitative status in both cycles in the following RBDs: Minho and Lima, Cavado, Ave and Leca, Douro, Tagus and West Rivers, Sado and Mira and Guadiana.

There are no explicit summaries in the RBMPs of the changes and updates that happened since the first RBMPs.

5.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and Programmes of Measures requested action on the following:

- Recommendation: *Complete the development of methods for the status assessment of water bodies and determination of reference conditions and apply them through the implementation of robust monitoring programmes. An adequate WFD-compliant assessment and monitoring framework is a necessary pre-requisite to design effective Programmes of Measures and ultimately to achieve the WFD objectives.*

  Assessment: The recommendation is not fulfilled, although there is slight progress. The number of groundwater bodies with quantitative monitoring increased from 70 to 80. The number of monitoring sites increased from 420 to 430. However, 71 of 151 groundwater bodies are still not subject to monitoring. It was not possible within the scope of this assessment to confirm whether the methods for status assessment have been developed or improved. A water balance method has been reported for all RBDs, but the confidence in status assessment is less than high for 40 % and unknown for a third of the groundwater bodies.

[35] Portugal subsequently clarified that the increase from one to three groundwater bodies in a poor quantitative status in the Vouga, Mondego, Lis RBD is due to better knowledge and assessment of the pressures.

Topic 6 Monitoring, assessment and classification of chemical status of groundwater bodies

6.1 Assessment of implementation and compliance with the WFD requirements in the second cycle

6.1.1 Monitoring of chemical status in groundwater

The total number of groundwater bodies in Portugal is 151 (Table 2.2). In total, 65 groundwater bodies (43 %) are not subject to surveillance monitoring (Table 5.1). About 14 % of the groundwater bodies are at risk and not all groundwater bodies at risk in the Sado and Mira and in the Algarve Rivers RBDs are subject to operational monitoring: 18 of the 21 groundwater bodies at risk are covered. No surveillance monitoring was reported for the Azores and Madeira RBDs[36]. The RBMPs do not indicate that grouping of groundwater bodies was applied for monitoring and assessment of chemical status[37].

The number of groundwater bodies increased from 149 in the first cycle to 151 in the second and the total groundwater body area remained nearly the same. 125 groundwater bodies remained unchanged since the first cycle RMP. Due to a modification of the boundary between the two RBDs, in the Vouga, Mondego and Lis RBD the number of groundwater bodies decreased from 30 to 22, while in the Tagus and West Rivers RBD the number increased from 12 to 20.

The number of groundwater bodies with surveillance monitoring decreased significantly, from 116 in the first cycle to 86 in the second. The number of monitoring sites is listed in Table 5.3 and decreased significantly, from 575 in the first cycle to 506 in the second. The number of operational monitoring sites decreased since the first cycle, from 215 (in 8 groundwater bodies) to 201 (in 18 groundwater bodies).

All substances at risk of causing deterioration in chemical status are subject to surveillance monitoring in the Cavado, Ave and Leca, Vouga, Mondego and Lis, Tagus and West Rivers,

[36] Portugal subsequently clarified that in the second cycle 99% of groundwater bodies in mainland Portugal have surveillance monitoring. Only one groundwater body is not monitored but this will be covered in the third cycle. Monitoring takes place also in the Azores and the Madeira RBDs. Operational monitoring is only implemented for groundwater bodies in poor status. All groundwater bodies at risk are monitored even if this was not reported as 'operational monitoring'.

[37] Portugal clarified that grouping for the purpose of monitoring and status assessment has been applied in each RBD.

Guadiana and Algarve Rivers RBDs, but in the Sado and Mira and Azores RBDs they are not included in surveillance monitoring. All WFD core parameters, nitrates, ammonium, electrical conductivity, oxygen and pH, are monitored in only one RBD. None of them are monitored in the Madeira RBD and in the remaining eight RBDs ammonium and dissolved oxygen are not monitored[38].

6.1.2 Assessment and classification of chemical status in groundwater

Map 6.1 and Figure 6.1 display the chemical status of groundwater bodies for the most recently assessed status. It shows that 136 of 151 groundwater bodies (90 %) were in good chemical status, 14 (9 %) were failing good status and the remaining one groundwater body (1 %) was in unknown status. In terms of area this means that about 3 % are failing good chemical status. Figure 6.2 shows the confidence in status classification. The number of groundwater bodies with unknown status improved from two groundwater bodies in the first cycle to one in the second.

The total number of groundwater bodies failing good chemical status decreased since the first cycle, from 22 (15 %) to 14 (9 %) (Figure 6.1), representing a decrease from 4.9 % to 2.7 % of the total groundwater body area. The expected date of achievement of good chemical status in Portugal is shown in Figure 5.4.

The reasons for failure of good chemical status of groundwater bodies are shown in Figure 6.3.

For 11 groundwater bodies the general assessment of the chemical status for the groundwater body as a whole was failed. This assessment considers the significant environmental risk from pollutants across a groundwater body and a significant impairment of the ability to support human uses. Three groundwater bodies are failing good chemical status due to saline or other intrusion. Figure 6.4 shows the pollutants causing failure of status and Figure 6.5 shows the top pollutants causing a sustained upward trend.

In six RBDs the calculation of the extent of exceedance is based on the groundwater body area. In two RBDs the extent of exceedance of a groundwater quality standard or a groundwater threshold value was not calculated as there are no such exceedances. In the other two RBDs no

[38] Portugal subsequently clarified that all WFD core parameters are monitored in all of the mainland RBDs.

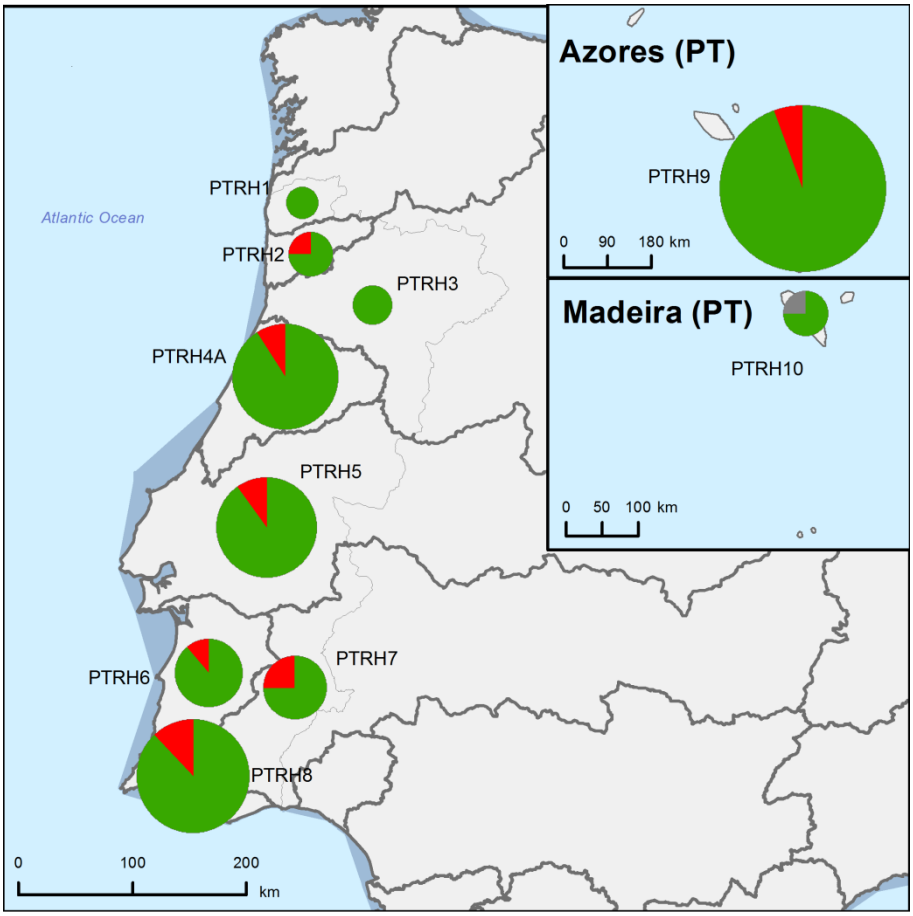
method was reported, although in the Azores RBD three groundwater bodies are in poor status. The RBMPs do not provide any explanation on how the extent of exceedance is calculated[39].

In all RBDs groundwater threshold values have been established for all pollutants or indicators of pollution causing a risk of failure of good chemical status and Groundwater Directive[40] Annex II substances have been considered. In all RBDs natural background levels have been considered in the establishment of groundwater threshold values. A trend methodology is available and assessments have been performed in six of the ten RBDs. A trend reversal methodology has only been reported in the Azores RBD.

[39] Portugal subsequently explained that the determination of the chemical status was based in particular on the following elements of analysis: hydrogeochemical data obtained in the framework of the operation of the surveillance monitoring network; information on the chemistry of groundwater bodies from other sources; information on the state of surface water bodies; information on the identification of any dependent ecosystems affected by the composition of groundwater bodies; information on threshold values.Compliance with the parameters and objectives of good chemical status of the water bodies is measured by a chain-up series of five tests. The poor status of the three water bodies in the Azores RBD is associated with saline intrusion pressures.

[40] Groundwater Directive (GWD): Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32006L0118

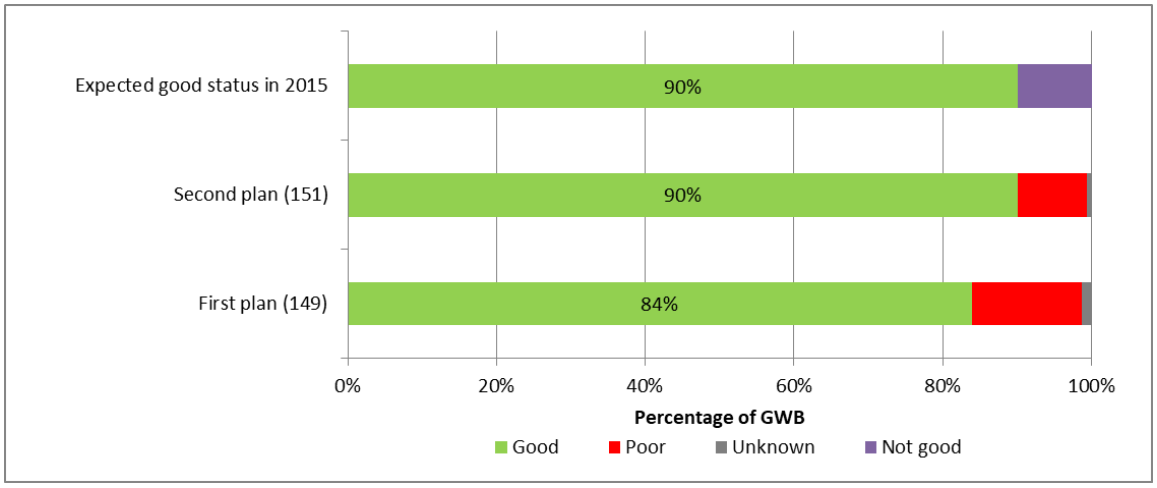
Map 6.1 ***Map of chemical status of groundwater bodies in Portugal based on the most recently assessed status***



Good
Poor
Unknown
River Basin Districts
Countries outside the EU

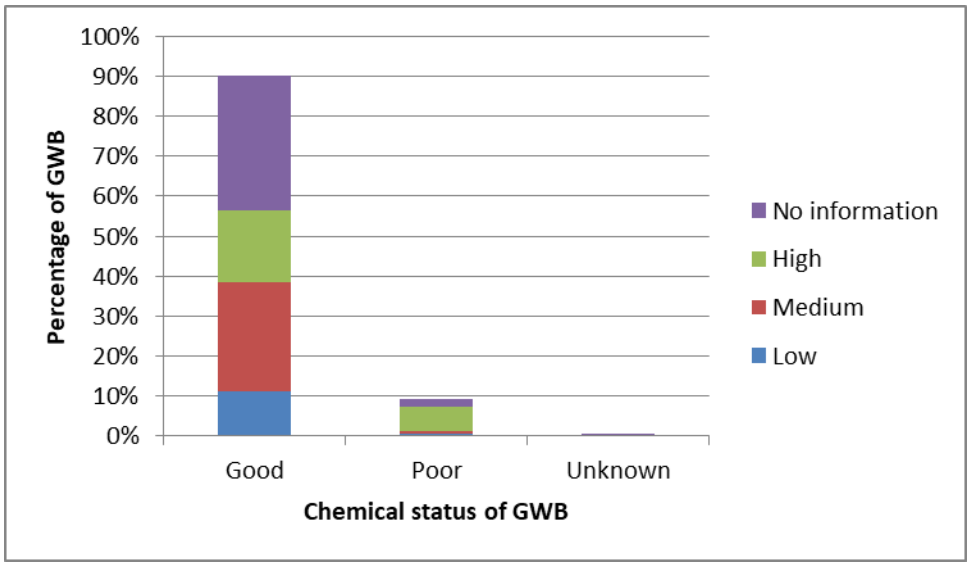
Note: Standard colours based on WFD Annex V, Article 2.4.5.
Source: WISE, Eurostat (country borders)

Figure 6.1 ***Chemical status of groundwater bodies in Portugal for the second RBMPs, for the first RBMPs and expected in 2015. The number in parenthesis is the number of groundwater bodies for each cycle. NB - the period of assessment of status for the second RBMPs was 2009 to 2016. The year of assessment of status for first RBMPs is not known.***



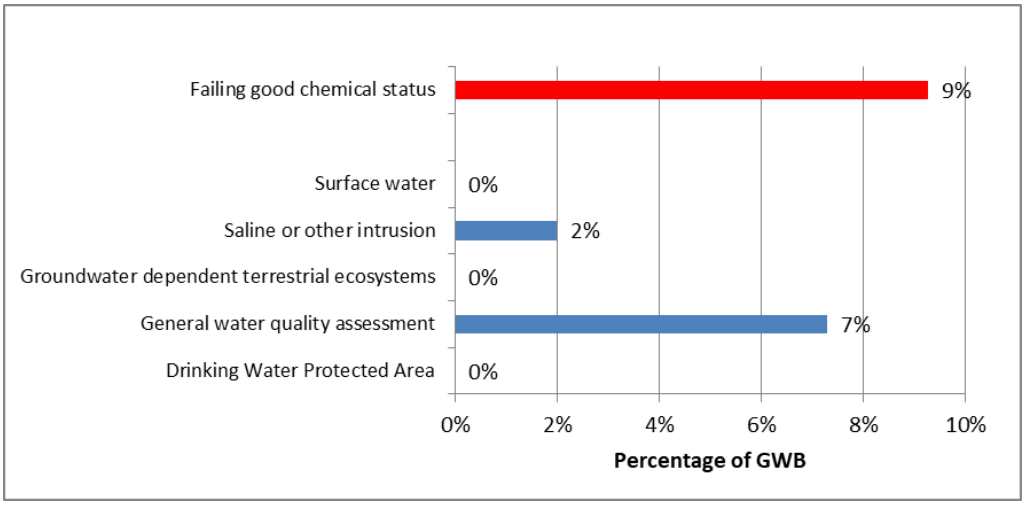
Source: WISE electronic reporting

Figure 6.2 ***Confidence in the classification of chemical status of groundwater bodies in Portugal based on the most recent assessment of status.***



Source: WISE electronic reporting

Figure 6.3 ***Reasons for failing good chemical status in Portugal for the most recent assessment of status.***



Source: WISE electronic reporting

Notes:

'Surface water' = Failure to achieve Environmental Objectives (Article 4 WFD) in associated surface water bodies or significant diminution of the ecological or chemical status of such surface water bodies.

'Groundwater dependent terrestrial ecosystems' = Significant damage to terrestrial ecosystems which depend directly on the groundwater body.

'Saline or other intrusion' = Regional saline or other intrusions resulting from anthropogenically induced sustained changes in flow direction.

'Drinking Water Protected Area' = Deterioration in quality of waters for human consumption.

'General water quality assessment' = Significant impairment of human uses; significant environmental risk from pollutants across the groundwater body.

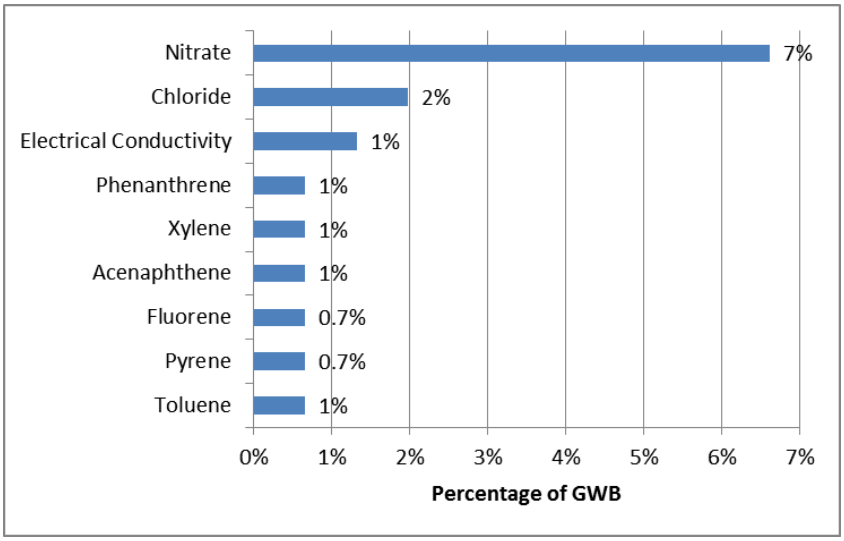
6.1.3 Consideration of groundwater associated surface waters and/or groundwater dependent ecosystems

In six of the ten RBDs a total of 25 groundwater bodies with groundwater associated surface waters have been reported. They are not linked to any risk. These aquatic ecosystems have been considered in status assessment in one of these six RBDs. Figure 6.6 shows the percentage of groundwater bodies at risk of failing good chemical status and good quantitative status.

In seven RBDs a total of 19 groundwater bodies with groundwater dependent terrestrial ecosystems have been reported. They are not related to a risk. In all RBDs where such ecosystems are identified, they have been considered in status assessment.

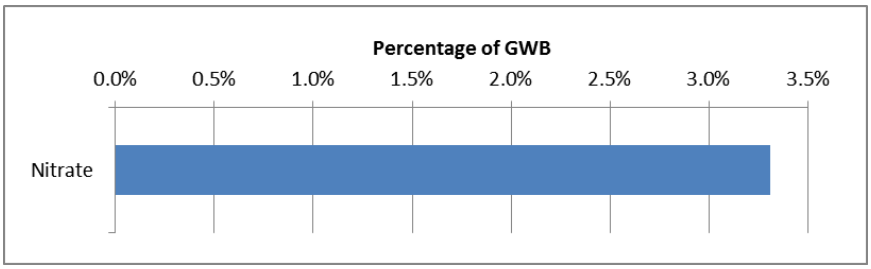
Groundwater associated aquatic ecosystems and groundwater dependent terrestrial ecosystems have been not been considered in the establishment of groundwater threshold values.

Figure 6.4 Top groundwater pollutants causing failure of good chemical status in Portugal.



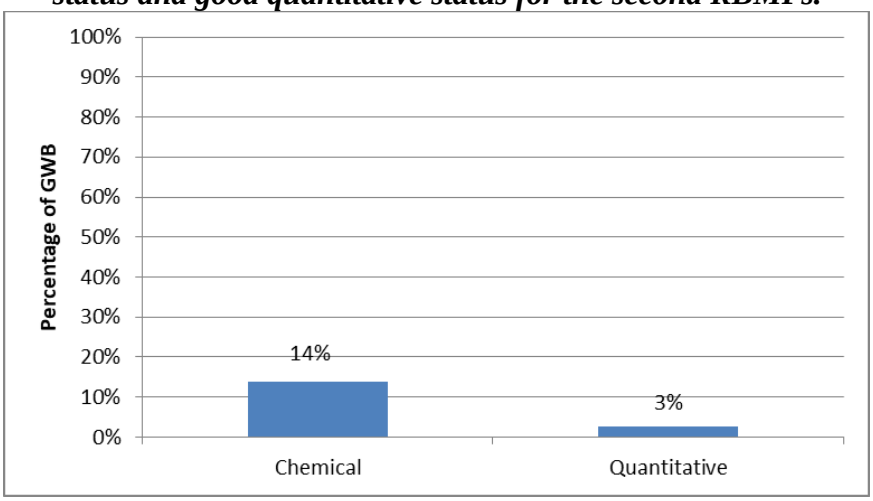
Source: WISE electronic reporting
Note: only 9 pollutants reported causing failure.

Figure 6.5 Top pollutants with upward trends in groundwater bodies in Portugal



Source: WISE electronic reporting

Figure 6.6 Percentage of groundwater bodies in Portugal at risk of failing good chemical status and good quantitative status for the second RBMPs.



Source: WISE electronic reporting

6.2 Main changes in implementation and compliance since the first cycle

The total number of groundwater bodies slightly increased in total, with significant changes at RBD level. 125 of the 151 groundwater bodies remained unchanged since the first RBMPs. Due to a modification of the boundary between the two RBDs, in the Vouga, Mondego and Lis RBD the number of groundwater bodies decreased from 30 to 22, while in the Tagus and West Rivers RBD it increased from 12 to 20.

The monitoring situation deteriorated. The number of groundwater bodies with surveillance monitoring decreased significantly, from 116 of 149 groundwater bodies (78 %) in the first cycle to 86 of 151 groundwater bodies (57 %) in the second cycle. The number of monitoring sites decreased from 575 in the first cycle to 506 in the second . Operational monitoring is only established in 18 of 21 groundwater bodies at risk of failing good chemical status. WFD core parameters are not fully subject to monitoring. No summaries of changes on monitoring of groundwater bodies are included in the RBMPs. It was only mentioned that in the Azores RBD the groundwater monitoring network remained as for the first cycle.

The status situation improved. The total groundwater body area failing good chemical status decreased since the first RBMPs, from 4.9 % to 2.7 % (from 22 groundwater bodies to 14 groundwater bodies). These changes in status are due to re-delineation of groundwater bodies and changes in the status assessment methodology. The deadline for implementing measures was the end of the first cycle so there has not been sufficient time to assess the effectiveness of the measures. Some measures, however, were not implemented.

6.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and first Programmes of Measures requested action on the following:

- Recommendation: *Complete the development of methods for the status assessment of water bodies and determination of reference conditions and apply them through the implementation of robust monitoring programmes. An adequate WFD-compliant assessment and monitoring framework is a necessary pre-requisite to design effective Programmes of Measures and ultimately to achieve the WFD objectives.*

  Assessment: The number of groundwater bodies with surveillance monitoring decreased significantly, from 116 of 149 groundwater bodies (78 %) in the first cycle to 86 of 151 groundwater bodies (57 %) in the second cycle and there is no indication that

grouping of groundwater bodies for monitoring and assessment of chemical status was applied.

Operational monitoring is not complete and is only established in 18 of 21 groundwater bodies at risk of failing good chemical status. WFD core parameters are not fully subject to monitoring.

However, Portugal clarified that most of the issues highlighted above are implemented (see previous sub-sections in this report). Therefore, despite the WISE reported data, the additional information provided by Portugal indicates that, for groundwater bodies, this recommendation is largely fulfilled.

Topic 7 Designation of Heavily Modified and Artificial Water Bodies and definition of Good Ecological Potential

7.1 Assessment of implementation and compliance with the WFD requirements in the second cycle for designation

7.1.1 Designation of Heavily Modified and Artificial Water Bodies

In the second RBMPs, heavily modified water bodies and/or artificial water bodies are designated (Figure 7.1) in the 8 mainland RBDs as well as in the Madeira RBD. For Madeira, 43 river water bodies have been designated as artificial (31 % of all river water bodies), whereas none were designated in the first cycle. In the first RBMP, it had been mentioned that although artificial water bodies existed in the Madeira RBD, lack of data prevented their delimitation and characterisation.

No heavily modified water bodies or artificial water bodies are designated in the Azores RBD. The RBMP states that no heavily modified water bodies have been identified but, for instance for the islands of São Miguel and Terceira, some areas, namely ports, have been identified as having heavily modified water body characteristics. A procedure for their designation as heavily modified water bodies is ongoing, in accordance with Common Implementation Strategy Guidance documents no. 4 and no. 5. No indication is given on when this process will be completed.

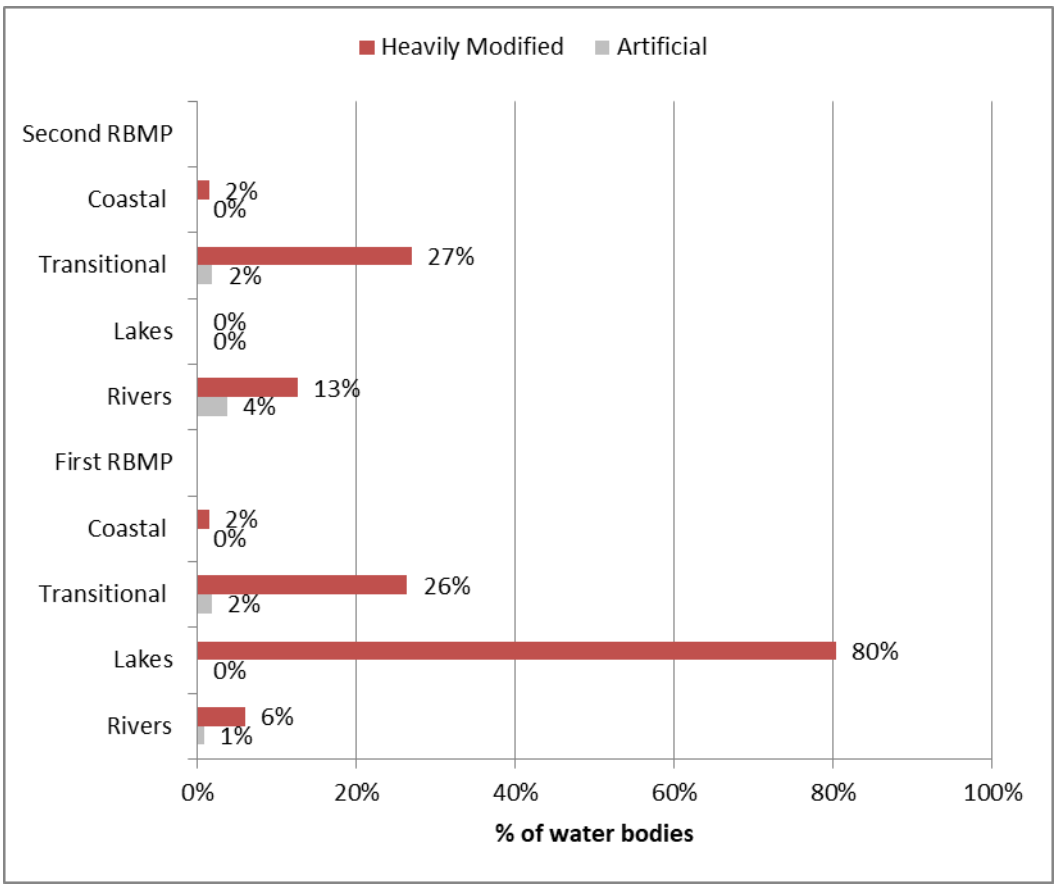
In all 8 mainland RBDs, there are several reservoirs designated as heavily modified water bodies which were originally rivers. This is the case for about half of the designated heavily modified rivers in mainland Portugal.

The main water uses for which river water bodies are designated as heavily modified water bodies are hydropower production, drinking water supply for urban areas, irrigation for agriculture and other uses. There is only one coastal heavily modified water body, in the Algarve Rivers RBD, which is designated due to storage for fisheries/aquaculture/fish farms. For transitional heavily modified water bodies, the main water uses are navigation / ports, agricultural land drainage and irrigation, tourism / recreation.

The main physical alterations of river heavily modified water bodies are weirs / dams / reservoirs or other physical alterations (not specified in the WISE reporting). For the coastal heavily modified water bodies in the Algarve Rivers RBD, the physical alteration is not

specified in the WISE reporting. For transitional heavily modified water bodies, the main reported physical alterations are channelisation / straightening / bed stabilisation / bank reinforcement.

Figure 7.1 ***Proportion of total water bodies in each category in Portugal that has been designated as heavily modified or artificial.***



Source: WISE electronic reporting

Some information is provided on how the significant adverse effects of restoration measures on the use and the wider environment (Article 4(3)(a)) have been defined. Overall, these decisions seem to be taken on a case-by-case basis at water body level, without agreed criteria. The RBMPs present water body templates which compile information on the designation criteria for the specific heavily modified water bodies, mostly on the hydromorphological changes. For the stretches downstream of dams used for hydropower and other uses, the water body templates refer to the significant adverse effect on the use, which is mostly reduced amount of available water for human consumption, for farming or for energy production. The templates mention that ecological flow regimes will be implemented (for the stretches of rivers

downstream of the dams) and that confirmation of the characterisation will be performed for the third RBMPs.

7.1.2 Definition of Good Ecological Potential for Heavily Modified and Artificial Water Bodies

Good ecological potential is reported as defined in 8 of 10 RBDs (not defined in the Azores and Madeira RBDs). A hybrid approach combining elements of the Common Implementation Strategy Guidance (approach based on biological quality elements as illustrated in Common Implementation Strategy Guidance No 4) and the Prague approach (based on the identification of mitigation measures) has been used for good ecological potential definition. Definition of good ecological potential has taken place for groups of heavily modified water bodies/artificial water bodies of the same use/physical modification.

A method for good ecological potential is available for mainland Portugal for rivers (including reservoirs), coastal and transitional waters. Classification has been based on monitoring data of 2010-2013. There is a generic statement that good ecological potential definition will be improved in the future, particularly in the Azores and Madeira RBDs, but no further details are provided.

In the WISE reporting, good ecological potential is reported as defined in terms of biology, but the only biological quality element for which biological values have been derived to define maximum ecological potential and good ecological potential is phytoplankton. No other biological quality elements sensitive to hydromorphological changes seem to be included in the biological definition of good ecological potential.

In general, good ecological potential is defined using the same assessment methods and metrics as for the ecological status. The only difference is for reservoirs, where specific metrics are used for phytoplankton. For the reservoirs of northern type, the Mediterranean Reservoir Phytoplankton Evaluation Index is used. For the reservoirs of southern type, only chlorophyll a is used. For the main flow type reservoirs, the metrics used are the same defined for the southern type.

For the other water categories, it is not clear which biological quality elements are used for good ecological potential definition and in which way.

Biological quality element assessment methods which are sensitive to hydrological and/or morphological changes are reported for all water categories. For rivers, there are methods

sensitive to hydrological and morphological changes for macrophytes and fish, methods sensitive to morphology only for benthic invertebrates and methods sensitive to hydrology only for phytobenthos. For lakes, there are methods sensitive only to hydrology for assessing phytoplankton. For coastal waters, there is a method for assessing macroalgae sensitive to morphological changes. For transitional waters, there are methods in place for assessing macroalgae and angiosperms, which are sensitive to morphological changes. For the Azores RBD, there are sensitive methods reported to be in place but these methods are not specified.

Although several methods for assessing different biological quality elements are reported as sensitive to hydrological and morphological changes, it is not clear if these have been considered already for the good ecological potential methodology, since only values for phytoplankton have been used.

Mitigation measures for defining good ecological potential have been reported for nine RBDs (the eight where good ecological potential is defined and the Madeira RBD, where good ecological potential is not defined). The ecological changes expected due to the mitigation measures are described in a qualitative way. The template for each heavily modified water body contains the foreseen measures and it is stated (particularly for heavily modified water bodies downstream of reservoirs) that ecological flow regimes will be implemented and their impacts (also on water body status) will be assessed. No information could be found on a library of mitigation measures for defining maximum/good ecological potential.

A comparison between good ecological potential and good ecological status has not been done in any of the RBDs.[41]

7.2 Main changes in implementation and compliance since the first cycle

No information was found in the second RBMPs on the methodology for heavily modified water body designation having changed since the first RBMPs.

However, the reasons for changes in the number or size of water bodies designated as heavily modified water bodies and artificial water bodies since the first RBMPs are explained.

As mentioned above, for Madeira, artificial river water bodies have been designated in the second RBMPs, whereas none had been designated in the first RBMPs. These artificial water

[41] According to the WFD Reporting Guidance 2016, on the comparability between GEP and GES, see conclusions of the 2010 CIS HMWB workshop, paragraph 60A: https://circabc.europa.eu/sd/a/cd419883-ff4d-4d43-a82b-aef3d33e04ed/Conclusions%20HMWB%20workshop%20Brussels%20March%202009.pdf.

bodies are irrigation water channels, called "levadas", and watering nearly 47,000 land parcels in the Madeira RBD. “Levadas” have existed since the 15th century and, in the first RBMPs, it was not possible to delimit them. In the second RBMPs, there continues to be no data to allow characterisation of their ecological potential.

In the RBDs of mainland Portugal, reservoirs of larger dams were in general considered as heavily modified lake water bodies in the first RBMPs. According to the Reporting Guidance, in the second RBMPs those water bodies have been re-designated as heavily modified river water bodies. In the Portuguese territory, natural lakes only exist in the Azores.

In some RBDs (especially in the Sado and Mira and Guadiana RBDs), there are newly designated river heavily modified water bodies and river artificial water bodies. Some of the new designations of river heavily modified water bodies are due to reasons such as channelling, improvements in data (comparing natural and modified flow), improvements in hydromorphological monitoring and revisions of water body limits (subdivision of former heavily modified water bodies). Certain heavily modified water bodies have been changed to natural water bodies due to the implementation of ecological flows.

No explicit description of improvements made since the first cycle to the method for good ecological potential definition could be found in the RBMPs. There is only a brief reference stating that the improvement consists in the use of more biological quality elements to define good ecological potential than was possible in the first cycle. For reservoirs (heavily modified river water bodies), however, only phytoplankton is used, as was the case in the first cycle. Portuguese authorities communicated that improvements made to the method for good ecological potential result from the revision/refinement of some BQE assessment methods, from the intercalibration and adoption of new methods for other BQEs and from the adoption of a hybrid CIS Guidance/Prague Approach for the definition of ecological potential.

7.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and first Programmes of Measures requested action on the following:

- Recommendation: *"Improve the designation of Heavily Modified Water Bodies and avoid the automatic designation of water body’s downstream big dams. A methodology to establish good ecological potential should be developed. Its application should be documented in the RBMPs."*

Assessment: Although no information was found on modifications to the methodology for heavily modified water bodies designation, the designations of several heavily modified water bodies has been reviewed to take account of Common Implementation Strategy guidance and improved characterisation. No evidence was found of automatic designation of water bodies downstream of large dams.

No explicit description of improvements made to the method for good ecological potential definition since the first cycle could be found in the RBMPs. There is only a brief reference stating that the improvement consists in the use of more biological quality elements to define good ecological potential than was possible in the first cycle. For reservoirs (heavily modified river water bodies), however, only phytoplankton is used, as was the case in the first cycle. Portuguese authorities communicated that improvements made to the method for good ecological potential result from the revision/refinement of some BQE assessment methods, from the intercalibration and adoption of new methods for other BQEs and from the adoption of a hybrid CIS Guidance/Prague Approach for the definition of ecological potential. Portuguese authorities have also reported that the methodologies for the designation and classification of heavily modified water bodies are still being reviewed as part of ongoing developments within the Common Implementation Strategy.

This recommendation has been partially fulfilled.

Topic 8 Environmental objectives and exemptions

8.1 Assessment of implementation and compliance with WFD requirements in the second cycle

8.1.1 Environmental objectives

The environmental objectives are defined in Article 4 of the WFD. The aim is long-term sustainable water management based on a high level of protection of the aquatic environment. Article 4(1) defines the WFD general objective to be achieved in all surface and groundwater bodies, i.e. good status by 2015. Within that general objective, specific environmental objectives are defined for heavily modified water bodies (good ecological potential and good chemical status by 2015[42]), groundwaters (good chemical and quantitative status by 2015) and Protected Areas (achievement of the objectives of the associated Directive by 2015 unless otherwise specified).

Environmental objectives for surface water ecological and chemical status have been reported in all RBDs and this is also the case for quantitative and chemical status for groundwater. Following the Commission's recommendation from the first cycle, Portugal provides in the second RBMPs clear information on when it is planned that water bodies will achieve good status (2021 or 2027).

Member States are also required to define additional environmental objectives and standards in Protected Areas where these are necessary to ensure that the requirements of the associated Directive are met. An assessment of such additional objectives for Portugal is provided in Chapter 15 of this report.

Assessments of the current status of surface and groundwater bodies in Portugal are provided elsewhere in this report: for ecological status/potential of surface waters (Chapter 3); chemical status of surface waters (Chapter 4); quantitative status of groundwater bodies (Chapter 5); chemical status of groundwater bodies (Chapter 6); status of surface and groundwater bodies associated with Protected Areas (Chapter 15).

For the second RBMPs, Member States were required to report the date when they expect each surface and groundwater body to meet its environmental objectives. This information is summarised for Portugal elsewhere in this report, in the same chapters mentioned above.

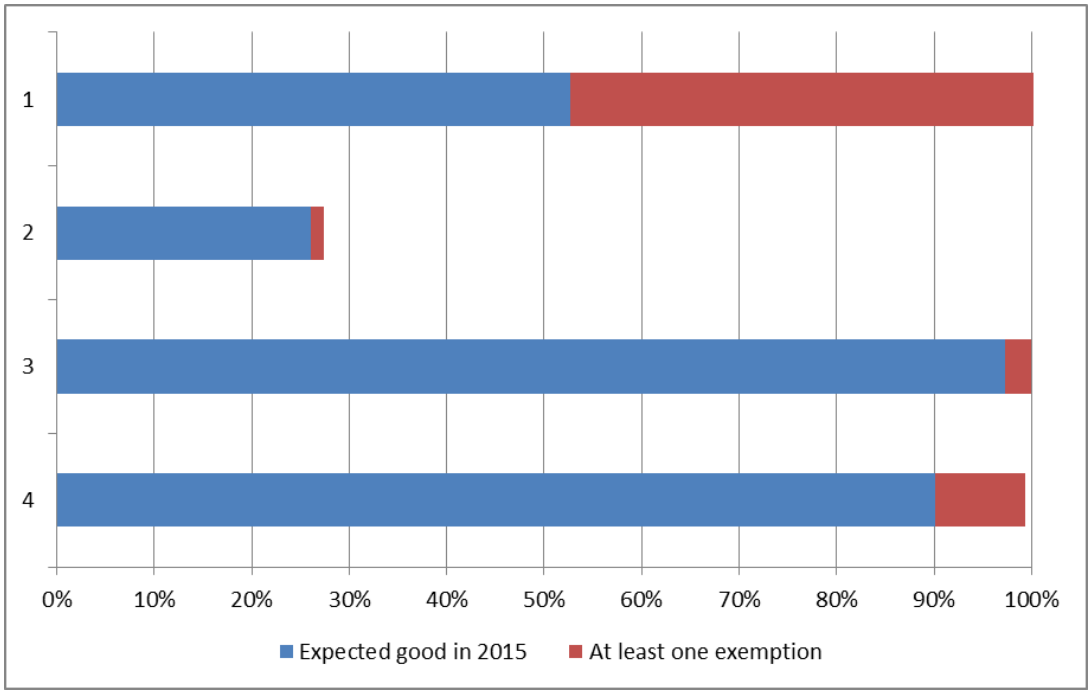
[42] For priority substances newly introduced by Directive 2013/39/EU, good status should be reached by 2027, and for the 2008 priority substances, for which the Environmental Quality Standards were revised by Directive 2013/39/EU, good status should be reached in 2021.

8.1.2 Exemptions

Where environmental objectives are not yet achieved exemptions can be applied in case the respective conditions are met and the required justifications are presented in the RBMPs.

Figure 8.1 summarises the percentage of water bodies expected to be at least in good status in 2015 and the use of at least one exemption in Portugal for the four main sets of environmental objectives.

Figure 8.1 ***Water bodies in Portugal expected to be in at least good status in 2015 and use of exemptions. 1 = Surface water body ecological status/potential; 2 = Surface water body chemical status; 3 = Groundwater body quantitative status; 4 = Groundwater body chemical status***



Source: WISE electronic reports[43]

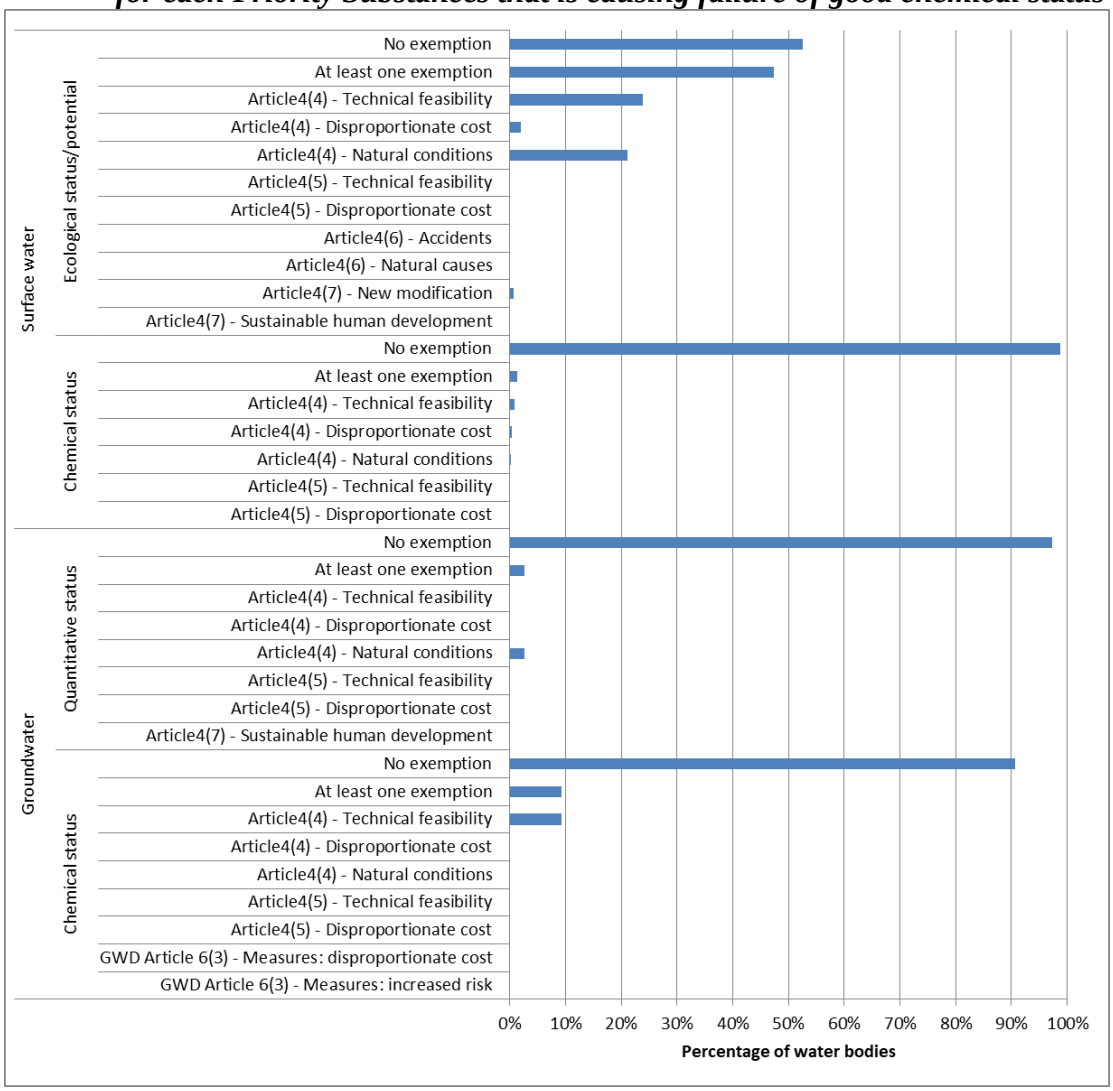
Article 4 of the WFD allows for different exemptions to the objectives: extension of deadlines beyond 2015, less stringent objectives, a temporary deterioration, or deterioration / non-achievement of good status / potential due to new modifications, provided a set of conditions are fulfilled. The exemptions under Article 4 of the WFD include the provisions in Article 4(4) - extension of deadline, 4(5) - lower objectives, 4(6) - temporary deterioration and 4(7) - new modifications / new sustainable human development activities. Article 4(4) exemptions may be justified by disproportionate cost, technical feasibility or natural conditions, and Article 4(5) by disproportionate cost or technical feasibility.

[43] Portugal subsequently clarified that waterbodies with unknown status and their respective environmental objectives were not included in WISE reporting.

In addition, Article 6(3) of Directive 2006/118/EC on the protection of groundwater against pollution and deterioration allows Member States to exempt inputs of pollutants to groundwaters under certain specified circumstances.

Figure 8.2 summarises the percentage of water bodies subject to each type of exemption (and reason) in relation to the four types of environmental objectives in Portugal.

Figure 8.2 ***Type of exemptions applied to surface water and groundwater bodies for the second RBMPs in Portugal. Note: Ecological status and 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, and for surface waters for each Priority Substances that is causing failure of good chemical status***



Source: WISE electronic reports[44]

[44] Portugal subsequently clarified that waterbodies with unknown status and their respective environmental objectives were not included in the WISE reporting.

Application of Article 4(4)

The application of Article 4(4) in surface waters and groundwaters has increased since the first cycle. For surface and groundwater in the first cycle the justifications in relation to Article 4(4) only referred to technical feasibility and natural conditions and this reasoning has not changed in the second cycle for groundwaters. For surface waters, however, also disproportionate costs are now used as a justification in all RBDs except the Algarve Rivers RBD and the Azores RBD. Justification at waterbody level is provided in all mainland and the Azores RBMPs.

For the Douro RBMP a more in-depth assessment was carried out in relation to exemptions. The plan separates justifications due to natural conditions[45] and those due to technical conditions, but some of the justifications included in technical conditions are indeed natural conditions and vice-versa[46]. Technical justifications include:

- interventions on wastewater treatment plants that cannot be concluded prior to 2021;
- ecological flows that need to be tested and adjusted, which takes time;
- control measures of diffuse pollution from agriculture and ecological restoration measures whose effects take time (also due to natural conditions);
- the improvement of classification methods with more elements, including biological quality elements, that change the classification of water bodies; and
- articulation with measures implemented in Spain.

In the Azores RBD, technical feasibility justifications for surface water included:

- some of the measures require conversion of pastures in forests,
- some measures require infrastructure,
- some measures involve land acquisitions, and
- technical complexity of changing currently stable conditions (for instance, a lagoon with a high degree of eutrophication that has been stable for 70 years).

In the Madeira RBMP the only justification provided, for the water bodies with objectives set for 2021, is that the pressures are unknown.

For all RBMPs where disproportionate costs are used as a justification for exemptions, the indicated reasons are social and sectorial impacts or 'other'. In the Douro RBMP it is stated

[45] It should be noted that the justifications of natural conditions in the RBMPs do not correspond to those reported in WISE.

[46] Portugal subsequently explained that the reasoning for the exemptions and the timeframes to achieve environmental objectives might be better developed and reflected in the RBMPs. However, the use of natural conditions or technical feasibility depends on the type of measures to improve the status of the water bodies, as well as the type of quality elements responsible for the status of the water body. Technical feasibility is used if the measures needed imply a technical effort to produce results, e.g., ecological restoration measures or control measures of diffuse pollution of agricultural origin.

that 21 % of exemptions are due to disproportionate costs (Article 4(4)). The reasons are that measures are too costly to be implemented during the first two cycles, and, aso because of the transboundary nature of the basin, that measures need to be articulated with those implemented in Spain. In the Madeira RBD it is indicated in the RBMP that Article 4(4) exemptions justified by disproportionate costs are those for which there is a risk that the cost is too high with relation to the benefit.

The Douro RBD presents natural conditions as a justification for waterbodies achieving the objectives only in 2021 - this is the case for 76 river water bodies and three reservoirs. Some of the justifications for natural conditions are more of the nature of technical feasibility[47]. In the Azores RBD, natural conditions are referred to but sometimes without justification. Justifications include the response time of ecosystems, volcanic activities that might have influence on some parameters and on achieving good status, natural characteristics (namely deep lakes) as well as the bathymetry and morphology of the bottom and sediment dynamics.

The drivers causing exemptions in surface waters in which are common to all RBDs are agriculture and urban development. Additional drivers are industry in the Cavado, Ave and Leca, Douro, Vouga, Mondego and Lis, Tagus and West Rivers and Sado and Mira RBDs; energy in the Cavado, Ave and Leca, Douro, Vouga, Mondego and Lis, Tagus and West Rivers, Sado and Mira, Guadiana and Azores RBDs; fisheries and aquaculture in the Vouga, Mondego and Lis, Sado and Mira, Algarve Rivers and Madeira RBDs; flood protection in the Vouga, Mondego and Lis and Tagus and West Rivers RBDs; and tourism and recreation in the Douro, Tagus and West Rivers, Algarve Rivers and Madeira RBDs.

For groundwaters, agriculture is the driver in the Cavado, Ave and Leca, Vouga, Mondego and Lis, Tagus and West Rivers, Guadiana and Algarve Rivers RBDs. In the Sado and Mira RBD the main driver is industry and in the Algarve Rivers RBD the main driver is tourism and recreation. For the Azores RBD the drivers are not known.

The pressures responsible for exemptions in relation to good status in surface waters in all RBDs except Madeira stem from a broad range of activities including urbanisation, industry, agriculture, mining, abstraction and activities causing changes in hydromorphology (Table 8.1). In the Madeira RBD, the anthropogenic pressures are unknown.

[47] As mentioned above, Portugal subsequently explained that the reasoning for the exemptions and the timeframes to achieve environmental objectives might be better developed and reflected in the RBMPs.In the case of natural conditions, the reasons were, e.g., the lengthy recovery of aquatic ecosystems in waterbodies subject to prolonged pressures and water bodies, such as reservoirs with nutrient pressures, where the natural retention capacity depends on several factors and recovery is also lengthy.

For groundwaters (Table 8.2) the main pressures are ‘diffuse pollution agriculture’ and ‘point sources from settlements and industry’. Contaminated sites or abandoned industrial sites play a role in the Sado and Mira and Guadiana RBDs.

Table 8.1 ***Pressure on surface waters responsible for Priority Substances in Portugal failing to achieve good chemical status in surface waters and for which exemptions have been applied***

Significant pressure on surface water bodies	Failing Priority Substances	Article 4(4) - Technical feasibility exemptions	Article 4(4) - Disproportionate cost	Article 4(4)- Natural conditions
	Number	Number	Number	Number
1.1 - Point - Urban waste water	4	11	2	1
1.3 - Point - IED plants	2	2	1	0
1.4 - Point - Non IED plants	4	4	2	0
2.1 - Diffuse - Urban run-off	2	2	1	0
2.2 - Diffuse - Agricultural	4	11	2	1
2.5 - Diffuse - Contaminated sites or abandoned industrial sites	2	3	0	0
2.6 - Diffuse - Discharges not connected to sewerage network	1	1	0	0
2.10 - Diffuse - Other	2	1	1	0

Source: Member State reports to WISE

Table 8.2 ***Pressure responsible for pollutants in Portugal failing to achieve good chemical status in groundwater and for which exemptions have been applied***

Significant pressure on groundwater	Number of failing pollutants	Number of exemptions
		Article 4(4) - Technical feasibility
1.9 - Point - Other	2	4 (3)
2.2 - Diffuse - Agricultural	1	10
6.1 - Groundwater - Recharges	1	1
9 - Anthropogenic pressure - Historical pollution	6	6 (1)

Source: Member State reports to WISE. The numbers in brackets were subsequently provided by Portugal and do not match the data reported to WISE.

The main impacts of the exemptions on surface waters are nutrient, chemical and organic pollution as well as altered habitats.

For groundwater, the main impacts are diffuse nutrient pollution in several RBDs.

Application of Article 4(5)

Article 4(5) was not applied, as had already been the case in the first cycle.

Application of Article 4(6)

Article 4(6) has not been reported to be applied in the second cycle[48]. However, the RBMPs outline the potential application of Article 4(6). The Plans refer to water bodies potentially affected by temporary deterioration of environmental objectives once they are exposed to events such as floods, droughts and pollution accidents.

Application of Article 4(7)

Article 4(7) has been applied in the Douro, Vouga, Mondego and Lis and Algarve Rivers RBDs. The application of Article 4(7) in the Douro RBD and in the Vouga, Mondego and Lis RBD is linked to the building of new dams for hydroelectricity production. In the Algarve Rivers RBD the application of Article 4(7) was related to drinking water.

Portugal subsequently clarified that the National Programme of Dams, which includes the projects concerned, was approved in 2007 and was at that time subject to a Strategic Environmental Assessment, with a conditionally favourable environmental statement before the first WFD planning cycle. Each project was then subject to an EIA with a conditionally favourable environmental impact statement issued up to 2011 (before approval of the first RBMPs).

In this regard at this stage all the analysis required under Article 4 (7), had already been made as part of the SEA. In the first RBMPs, elements of analysis of what had been done were included. As regards the objectives of the Plan and the assessment of alternative solutions, both aspects have been comprehensively addressed in the framework of the Strategic Environmental Assessment of the National Programme of Dams. In the second RBMPs, the decision to authorise the projects was no longer in question, since this phase had already been concluded. These projects are now under construction. Portugal further clarified that a national assessment methodology has been applied.

Application of Article 6(3) of the Groundwater Directive

Exemptions under Article 6(3) of the Groundwater Directive have not been applied.

[48] Portugal subsequently communicated that this was due to mistakes in reporting to WISE.

8.2 Main changes in implementation and compliance since first cycle

The application of Article 4(4) increased in surface waters and groundwaters from the first to the second RBMPs.

8.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and first Programmes of Measures requested action on the following:

- Recommendation: *New hydro-morphological modifications, such as new hydropower plants, should comply with the requirements for exemptions of Article 4(7) and should be adequately justified, in particular for the assessment of alternative options and include all necessary mitigation measures.*

  Assessment: Article 4(7) cases have been reported to WISE and in the RBMPs. There is evidence that the steps required by Article 4(7) have been performed with a focus on assessments at strategic level. While strategic level assessments are important for decision making, further detailed assessments and justifications at water body level are necessary for informed decision making. The recommendation has therefore been partly fulfilled.

- Recommendation: *Include, in the second RBMPs, estimations of when WFD objectives will be achieved.*

  Assessment: This recommendation was fulfilled and information about by when the WFD objectives are expected to be met is provided.

- Recommendation: *Include, in the RBMPs, justification for the exemptions applied. Portugal should in particular improve the justifications regarding disproportionate costs and technical unfeasibility, as well as the cost-efficiency analysis. Exemptions should be adequately justified at water body level (in particular, natural conditions should not be invoked when measures are not being implemented due to other reasons, such as lack of funding).*

  Assessment: For Article 4(7) see the assessment of the first recommendation above. As regards Article 4(4), criteria have been developed for the application of "technical feasibility", "disproportionate costs" and "natural conditions". However, the reasoning for the exemptions and the timeframes to achieve environmental objectives need to be further developed and reflected in the RBMPs. The recommendation has therefore been partly fulfilled.

Topic 9 Programme of measures

The aim of this chapter is to provide an overview of the Programmes of Measures reported by Member States; more specific information on measures relating to specific pressures (for example arising from agriculture) is provided in subsequent chapters.

The Key Types of Measure (KTM) referred to in this section are groups of measures identified by Member States in the Programme of Measures, which target the same pressure or purpose. The individual measures included in the Programme of Measure (being part of the RBMP) are grouped into Key Types of Measure for the purpose of reporting. The same individual measure can be part of more than one Key Typeof Measure because it may be multi-purpose, but also because the Key Types of Measure are not completely independent silos. Key Types of Measure have been introduced to simplify the reporting of measures and to reduce the very large number of Supplementary Measures reported by some Member States (WFD Reporting Guidance 2016).

A Key Type of Measure may be one national measure but it would typically comprise more than one national measure. The 25 predefined Key Types of Measure are listed in the WFD Reporting Guidance 2016.

The Key Types of Measure should be fully implemented and made operational within the RBMP planning period to address specific pressures or chemical substances and achieve the environmental objectives.

9.1 Assessment of implementation and compliance with WFD requirements in the second cycle

9.1.1 General issues

An indication on whether or not measures have been made operational is when they have been reported as being planned to tackle significant pressures (Key Types of Measure level). Significant pressures are also reported at the water body level. It would be expected that there would be measures planned to tackle all significant pressures. For surface water, KTMs were reported for all significant pressures in all RBDs, except in the Sado and Mira RBD, where no KTMs were reported for significant pressure “Abstraction and flow diversion” from agriculture

and industry [49], and in the Madeira RBD where KTMs were reported for all significant pressures except "Diffuse pressure from transport" and "Anthropogenic pressure from historical pollution". The Minho and Lima, Cavado, Ave and Leca, Douro, Vouga, Mondego and Lis, Tagus and West Rivers, Sado and Mira, Guadiana and Algarve Rivers RBDs included physico-chemical parameters, individual chemical substances, and priority pollutants. For groundwater, KTMs were reported for all significant pressures, knowing that three of the ten RBDs had no significant pressures on groundwater.

For each RBD Portugal listed the national or RBD-specific measures incorporated into each KTM, including some KTMs developed by Portugal in all RBDs except the Azores. 429 national basic measures and 831 national supplementary measures have been mapped to KTMs, covering a wide range of measure types. 25 % of the national basic measures and 19 % of the national supplementary measures have been mapped against KTM1 – construction or upgrades of wastewater treatment plants. A further 2 % of national basic measures and 18 % of supplementary measures have been mapped against KTM21 – measures to prevent or control the input of pollution form urban areas, transport, built infrastructure. The only type of basic measure that is not used is "Recharge augmentation groundwater".

KTMs have been mapped against national measures in all 10 RBDs; however, not all KTMs were linked to individual pressures, therefore it is not clear if these are relevant or will be made operational. Nevertheless, the percentage of water bodies which are not expected to achieve good status / potential has been reported as 0 by 2027 for all significant pressures in all RBDs.

KTMs used to tackle River Basin Specific Pollutants and Priority Substances have been reported for all those causing failure of objectives in all eight mainland RBDs (no data for two RBDs - the Azores[50] and Madeira - but they do not appear to be subject to pressures from individual substances). The number of groundwater bodies failing objectives due to chemical pollutants has also been listed for all except the Minho and Lima, Douro and Madeira RBDs, but this was not the case for surface water bodies. The number of surface water bodies failing objectives due to Priority Substances has been listed for all mainland RBDs.

Portugal reported indicators of the gaps to be filled for significant pressures (including individual chemical / Priority Substances and physico-chemical parameters) on groundwater and surface water for 2015, 2021 and 2027. KTMs are listed for all significant pressures and the indicator gaps are presented mainly as number of water bodies failing environmental

[49] Portugal subsequently clarified that there was a reporting error and these two types of pressure were repeated for the Tagus and West Rivers RBD instead of the Sado and Mira RBD.

[50] Portugal subsequently clarified that for the Azores RBD the results of the Specific Pollutants monitoring programme were always below the analytical detection limit.

quality standards, and in some cases "other indicators" for KTMs developed by Portugal. For the Azores RBD, the gap indicators are in terms of area or length of water bodies where pressures prevent achievement of objectives, or number of point sources causing failure of objectives. All the gaps are expected to be closed by 2027, with a small number closed by 2021. (See also Section 9.1.2 for gap analyses for 'other significant pressures').

Cost-effectiveness analysis is an appraisal technique that provides a ranking of alternative measures on the basis of their cost and effectiveness, where the most cost-effective has the highest ranking. The first RBMPs included a cost-efficiency analysis, but the results presented were limited and very general. For the second RBMPs, a combination of qualitative and quantitative cost-effectiveness analysis was carried out in one RBD (Azores) to support the selection of measures proposed under the 2015-2021 PoM. No cost-effectiveness analysis was carried out in the Madeira RBD, and no information was available on the other eight RBDs[51]. The prioritisation of measures was further explored and it was found that in all RBDs priorities were established according to the nature of measures. Specific basic measures on water bodies failing to achieve WFD objectives received the highest priority, followed by specific basic measures aimed at achieving good status, then RBD basic measures, followed by supplementary measures on water bodies failing to achieve WFD objectives, then RBD supplementary measures, and lastly supplementary measures on water bodies in good status[52].

In the Azores RBD, priorities were established by means of a complex Implementation Priority Index = grade of protection regime of the water body x gap of the status of the water body to the objective x effectiveness index. Each of the parameters has a scale depending on several factors. Also for the Azores RBD it was stated that all basic measures, measures already being implemented, and measures with no associated costs receive the highest ranking[53].

For the Madeira RBD it was reported that the prioritisation was based generally on technical, social and financial aspects, and included weighting of the importance of the problem that each of the measures aimed at solving or mitigating. It was also indicated that basic measures and measures deriving from legislation were given the highest priority.

A critical factor in the success of the implementation of the Programmes of Measures is the availability of funding to support the investments required. In the first RBMPs, investment

[51] Portugal subsequently clarified that the cost-effectiveness analysis of the measures in the eigth mainland RBMPs will occur during the process of evaluating the implementation of the measures in 2018. This will allow for an evaluation of the effectiveness of the measures against the state of the bodies of water.

[52] Portugal subsequently clarified that the methodology for the prioritisation of measures was applied to all RBDs in the mainland.

[53] Portugal subsequently clarified that "the basic measures have all "high priority" since they aim to achieve the environmental objectives expressed in existing legislation

costs have been reported for the years 2009-15 separately for Article 11(3)(a) measures (required to implement Community legislation for the protection of water) and Article 11(3)(b-l), Article 11(4) and Article 11(5) (all other measures) for all RBDs except Madeira, where the total for all types of measure was given. The total investment in Portugal was €2183 million. In the second RBMPs, investment and annual costs are presented for the years 2016-21 separately for Article 11(3)(a), Article 11(3)(b-l), Article 11(4) and Article 11(5) for all 10 RBDs; depreciation has not been included in any calculations. To implement Article 11(3)(a) requirements it is reported that the capital investment required ranges from €0.132 million in the Azores RBD to €429 million in the Madeira RBD. In total, capital investment of €829 million is required. Annual operation and maintenance costs for Article 11(3)(a) measures range from €0.011 million in the Azores RBD to €71.5 million in the Madeira RBD. Capital investment requirements for Article 11.3(b-l), Article 11(4) and Article 11(5) measures range from €17.74 million in the Guadiana RBD to €159.51 million in the Tagus and West Rivers RBD. The annual operational and maintenance costs for these investments range from €0.89 million in the Guadiana RBD to €7.98 million in the Tagus and West Rivers RBD.

The Madeira RBD reported the same figure for the capital investment (€429 million) and annual operation and maintenance (€71.5 million) costs for both Article 11(3)(a) measures and Article 11(3)(b-l), Article 11(4) and Article 11(5) measures which suggests that figures are the total costs. It is therefore not possible to identify the total investment costs required for Portugal separately for Article 11(3)(a) measures and Article 11(3)(b-l), Article 11(4) and Article 11(5) measures. Thus the total investment costs for both Article 11(3)(a) measures and Article 11(3)(b-l), Article 11(4) and Article 11(5) measures required for Portugal in 2015-21 seem to be €1411 million, i.e. about two thirds of the 2009-15 investment costs. Estimated European Union funding figures were also presented for the first and second cycles (note: the Azores RBD marked “Not Applicable” for the first cycle, and a very high figure for the second cycle, “72082000”, which was a reporting error, the correct figure having been subsequently provided as €72.082 million,.

A clear financial commitment has been secured for the implementation of the Programmes of Measures in all RBDs. On a sectoral basis, commitments have been secured for Agriculture, Industry, Urban, Recreation (not applicable to the Azores RBD) and Flood Protection in all RBDs where applicable. For Transport, Energy and Aquaculture, commitments have been secured for one RBD only (Madeira), although these measures are applicable in some other

RBDs. There are no commitments for Hydropower in the Azores RBD, although this is mentioned as a significant pressure[54].

Portugal reported co-ordination of the preparation of all RBMPs and Programmes of Measures with the Marine Strategy Framework Directive, but no joint consultation on the RBMPs and the Marine Strategy, and no consideration of the need for additional or more stringent measures beyond those required by the WFD in order to contribute to the achievement of the relevant Marine Strategy Framework Directive objectives in coastal and marine environments. National measures/RBD-specific measures that are relevant to the Marine Strategy Framework Directive and the relevant KTMs are listed; the measures are all basic measures to tackle point source discharges in the mainland RBDs and accidental pollution in the other two (the Azores and Madeira). Links to documents are provided for all RBDs.

The RBMPs and Flood Risk Management Plans have been integrated in two of the 10 RBDs, i.e. in the Autonomous Regions of the Azores and Madeira. Joint consultation of RBMPs and Floods Risk Management Plans, as reported in WISE, was carried out on all except two RBDs (Minho and Lima and Guadiana), and the objectives and requirements of the Floods Directive have been considered in the second RBMPs and Programmes of Measures in all RBDs. Portugal also indicated that win-win measures in terms of achieving the objectives of the WFD and Floods Directive, drought management and use of Natural Water Retention Measures have been included in the Programmes of Measures of all RBDs. However, whilst KTM23 "Natural water retention measures" has been mapped to national measures, its implementation is to begin after approval of the RBMPs[55]. The design of new and existing structural measures, such as flood defences, storage dams and tidal barriers, has been adapted to take account of WFD Environmental Objectives in all RBDs. Clear financial commitments have been secured for the implementation of Programmes of Measures in the flood protection sector in all RBDs. Article 9(4) of the WFD has been applied to impoundment for flood protection in only one RBD (the Azores) and therefore it would be an activity/use which should be subject to cost recovery under Article 9 in the remaining nine RBDs, where relevant.

[54] Portugal subsequently clarified that although hydropower may constitute a significant morphological pressure on one water body (09SMGR004) in Azores RBD, it was not considered determinant in the classification status. The water body significant pressures are associated to diffuse pollution from urban and agricultural effluent discharges. Nevertheless, the measure RH9_B_011A defines several actions in order to reduce the impacts of hydroelectric plants.

[55] Portugal clarified that in KTM23 there are two measures for all mainland RBD: - Adopt agricultural practices beneficial to the climate and the environment / "Greening"; - Promoting sustainable forestry. These measures are integrated in the funding of for the Rural Development Programme of mainland Portugal and are operational.

9.1.2 Measures related to other significant pressures

Most of the other significant pressures relate to unknown anthropogenic pollution in seven of the ten RBDs, anthropogenic historical pollution in one RBD, and introduced species or diseases in two RBDs (none were reported for the Azores). The gap indicators are given as number of water bodies failing environmental quality standards or "other indicators" for KTMs developed by Portugal, and are shown for 2015, 2021 and 2027. All the gaps are expected to be closed by 2027. Additional quantitative indicators for a number of KTMs are also listed for these significant pressures for 2015, 2021 and 2027; these indicate that all gaps would be closed by 2021.

9.1.3 Mapping of national measures to Key Types of Measure

It was expected that Member States would be able to report their Programmes of Measures by associating their national measures with predefined Key Types of Measure. Key Types of Measure are expected to deliver the bulk of the improvements through reduction in pressures required to achieve WFD environmental objectives. A Key Type of Measure may be one national measure but it would typically comprise more than one national measure. Member States are required to report on the national measures associated with the Key Types of Measure, and whether the national measures are basic (Article 11(3)(a) or Article 11(3)(b-l)) or supplementary (Article 11(4)).

Table 9.1 summarises the number of national measures that have been mapped to the relevant Key Types of Measure in Portugal. Also shown is the number of RBDs for which each Key Type of Measure has been reported. Table 9.2 then summarises the type of basic measures associated with the national measures mapped against the Key Type of Measure.

Table 9.1 Mapping of the types of national measures to Key Types of Measure in Portugal

Key Type of Measure	National basic measures	National supplementary measures	Number of RBDs where reported
KTM1 - Construction or upgrades of wastewater treatment plants	106	160	8
KTM11 - Water pricing policy measures for the implementation of the recovery of cost of water services from agriculture	8		8
KTM12 - Advisory services for agriculture		20	9
KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc)	9	9	9
KTM14 - Research, improvement of knowledge base reducing uncertainty	75	113	10

Key Type of Measure	National basic measures	National supplementary measures	Number of RBDs where reported
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	42	9	9
KTM16 - Upgrades or improvements of industrial wastewater treatment plants (including farms).		23	8
KTM17 - Measures to reduce sediment from soil erosion and surface run-off		10	8
KTM18 - Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases		15	7
KTM2 - Reduce nutrient pollution from agriculture	35	44	9
KTM20 - Measures to prevent or control the adverse impacts of fishing and other exploitation/removal of animal and plants		16	8
KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure	7	150	9
KTM22 - Measures to prevent or control the input of pollution from forestry		1	1
KTM23 - Natural water retention measures		17	8
KTM24 - Adaptation to climate change	1	26	9
KTM3 - Reduce pesticides pollution from agriculture.	8		8
KTM4 - Remediation of contaminated sites (historical pollution including sediments, groundwater, soil)	4	18	5
KTM5 - Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams)	9	6	6
KTM6 - Improving hydromorphological conditions of water bodies other than longitudinal continuity	15	84	9
KTM7 - Improvements in flow regime and/or establishment of ecological flows	35		7
KTM8 - Water efficiency, technical measures for irrigation, industry, energy and households	7	28	10
KTM9 - Water pricing policy measures for the implementation of the recovery of cost of water services from households	10	4	10
PTE1P05 - Definição de condicionantes aplicar no licenciamento	19	9	8
PTE2P04 - Condicionantes aplicar no licenciamento	2	10	8
PTE2P05 - Controlar a recarga das águas subterrâneas		18	8
PTE3P04 - Condicionantes aplicar no licenciamento	3	9	5
PTE9P01 - Promover a fiscalização		8	8
PTE9P03 - Revisãolegislativa		8	8
PTE9P04 - Articular com objectivos das Directivas Habitats e Aves	8		8
PTE9P05 - Articular com objectivos da DQEM	8		8
PTE9P06 - Gestão das bacias internacionais	4	5	4
PTE9P07 - Articular com politicas setoriais	8	9	8

Key Type of Measure	National basic measures	National supplementary measures	Number of RBDs where reported
KTM99 - Other key type measure reported under PoM - Risk management	7	4	1
Total number of Mapped Measures	**429**	**831**	**10**

Source: Member States reports to WISE

Table 9.2 Type of basic measure mapped to Key Type of Measures in Portugal

Key Type of Measure	Basic Measure Type														
	Accidental pollution	Controls water abstraction	Cost recovery water services	Efficient water use	Habitats or Birds	Hydromorphology	IPPC IED	Nitrates	Other	Point source discharges	Pollutants diffuse	Pollutants direct groundwater	Protection water abstraction	Surface Priority Substances	Urban Waste Water
KTM1 - Construction or upgrades of wastewater treatment plants															106
KTM11 - Water pricing policy measures for the implementation of the recovery of cost of water services from agriculture			8												
KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc)													9		
KTM14 - Research, improvement of knowledge base reducing uncertainty	1	3	1	8					41	1	4			8	8
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	8									1	1			32	
KTM2 - Reduce nutrient pollution from agriculture								16			19				
KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure	1									6					
KTM24 - Adaptation to climate change				1											
KTM3 - Reduce pesticides pollution from agriculture.											8				
KTM4 - Remediation of contaminated sites (historical pollution including sediments, groundwater, soil)											3	1			
KTM5 - Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams)						9									
KTM6 - Improving hydromorphological conditions of water bodies other than longitudinal continuity						15									
KTM7 - Improvements in flow regime and/or establishment of ecological flows						35									
KTM8 - Water efficiency, technical measures for irrigation, industry, energy and households		2		4											1
KTM9 - Water pricing policy measures for the implementation of the recovery of cost of water services from households			10												
KTM99 - Other key type measure reported under PoM		3			16		8		8	13	1	8			1

Source: Member States reports to WISE

Key

'Accidental pollution' = Article 11(3)(l): Any measures required to prevent significant losses of pollutants from technical installations and to prevent and/or reduce the impact of accidental pollution incidents.
'Controls water abstraction' = Article 11(3)(e): Controls over the abstraction of fresh surface water and groundwater and impoundment of fresh surface waters including a register or registers of water abstractions and a requirement for prior authorisation of abstraction and impoundment.
'Cost recovery water services' = Article 11(3)(b): Measures for the recovery of cost of water services (Article 9).
'Efficient water use' = Article 11(3)(c): Measures to promote efficient and sustainable water use.
'Habitats or Birds' = Habitats Directive (92/43/EEC) or Birds Directive (2009/147/EC)
'Hydromorphology' = Article 11(3)(i): Measures to control any other significant adverse impact on the status of water, and in particular hydromorphological impacts.
'IPPC IED' = Integrated Pollution Prevention Control Directive (96/61/EC) and the Industrial Emissions Directive (2010/75/EU) .
'Nitrates' = Nitrates Directive (91/676/EEC).
'Other' = Other Directives mentioned in Part A of Annex VI of the WFD.
'Point source discharges' = Article 11(3)(g): Requirement for prior regulation of point source discharges liable to cause pollution.
'Pollutants diffuse' = Article 11(3)(h): Measures to prevent or control the input of pollutants from diffuse sources liable to cause pollution.
'Pollutants direct groundwater' = Article 11(3)(j): Prohibition of direct discharge of pollutants into groundwater.
'Protection water abstraction' = Article 11(3)(d): Measures for the protection of water abstracted for drinking water (Article 7) including those to reduce the level of purification required for the production of drinking water.
'Surface Priority Substances' = Article 11(3)(k): Measures to eliminate pollution of surface waters by Priority Substances and to reduce pollution from other substances that would otherwise prevent the achievement of the objectives laid down in Article 4.
'Urban Waste Water' = Urban Waste Water Treatment Directive (91/271/EEC).

9.1.4 Pressures for which gaps have to be filled to achieve WFD objectives and the Key Types of Measure planned to achieve objectives

Member States are required to report the gaps that need to be filled to achieve WFD environmental objectives in terms of all significant pressures on surface waters and groundwaters, in terms of Priority Substances causing failure of good chemical status and in terms of River Basin Specific Pollutants causing failure of good ecological status/potential. Member States were asked to report predefined indicators of the gaps to be filled or other indicators where relevant. Values for the gap indicators were required for 2015 and 2021, and were optional for 2027.

The information reported in WISE on the gaps to fulfil to achieve good ecological status include detailed data on the significant pressures on surface and groundwaters that may cause failure on the environmental objectives. For chemical status, the Member States reported the specific chemical substances causing failure.

This information is reported at the sub-unit level. Sub-units are smaller geographic areas within particular RBDs identified by Member States. Not all Member States have defined and reported sub-units.

Member States were required to report which KTMs are to be made operational to reduce the gaps to levels compatible with the achievement of WFD environmental objectives. A number of indicators were predefined for each KTM. Values of the indicators for the second and subsequent planning cycles were also to be reported to give an indication of the expected progress and achievements: the values for 2027 could be optionally reported. This means that the value of the indicator will be reduced with time as measures are implemented. A value of zero is comparable with 100 % good ecological status or potential or good chemical status.

This information was reported at sub-unit level, or at RBDs level if sub-units have not been reported by the Member State.

9.2 Main changes in implementation and compliance since first cycle

In general, the amount and quality of information has improved considerably since the first RBMPs. The level of implementation of the first Programmes of Measures in all 10 RBDs was reported as “some measures completed”. Obstacles in terms of delays and extreme events were reported for all except two RBDs (the Azores and Madeira); lack of finance for all except one (the Azores); lack of measures and mechanisms in one RBD (Madeira); and no obstacles were reported due to Governance and cost effectiveness, although the latter does not seem to have

been analysed in all but one RBD. Gap analyses have been provided for most significant pressures and the gaps are expected to be closed by 2027 (some by 2021).

There are no further details of changes since the first RBMPs. The second Programmes of Measures are a continuation of the first ones, with some adjustments and/or strengthening of some measures taking into account the results of the first measures that could be observed. The RBMPs for the Azores and Madeira state that as the implementation of the first Programmes of Measures started in 2013 and 2014 respectively, there was insufficient time for the measures to have an impact or to assess it. However, all mainland RBMPs except Minho and Lima mention measures that were implemented with positive results despite not being planned in the first RBMPs, and these measures are currently included in the second Programmes of Measures.

New legislation or regulations to implement the first Programmes of Measures was reported as being necessary and in progress for the eight mainland RBDs but not necessary for the other two RBDs.

9.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and first Programmes of Measures requested action on the following:

- Recommendation: *Make basic measures legally binding and identify them clearly in the second RBMPs to allow for a clear assessment of the need for additional measures, e.g. on agriculture or wastewater treatment.*

  Assessment: New legislation to implement the Programmes of Measures in the eight mainland RBDs has been reported as 'necessary' and in progress, but it was reported as 'not necessary' in the Autonomous Regions of Azores and Madeira. There is no information on the legal status of supplementary measures (whether they are mandatory or voluntary), although they may be 'in progress'. Additional measures were not considered to be necessary. This recommendation has been partially fulfilled.

- Recommendation: *Ensure that the RBMPs clearly identify the gap to good status, and that the Programme of Measures is designed and implemented to close that gap.*

  Assessment: Portugal reported indicators of the gaps to be filled for significant pressures (including individual chemicals / Priority Substances and physico-chemical parameters) on groundwater and surface water for 2015, 2021 and 2027. KTMs are listed for all significant pressures and the indicator gaps are presented mainly as

number of water bodies failing Environmental Quality Standards. All the gaps are expected to be closed by 2027, with some by 2021, including all those failing because of 'other significant pressures' (mainly unknown anthropogenic pollution, historical pollution and introduced species or diseases). This recommendation has been fulfilled.

- Recommendation: *Ensure that the measures foreseen are clearly prioritized in terms of cost-effectiveness, whether measures are voluntary or obligatory and available funding, exploring the possibility of using European Union funds (e.g. RDP funds, Structural and Investment funds and LIFE Integrated Projects) to implement Programme of Measures.*

  Assessment: A cost-effectiveness analysis to support the selection of measures was reported for one RBD only (Azores) (no analysis for Madeira and no information for the eight mainland RBDs), and some further information has been provided on prioritisation of measures. There is no information on whether Portugal's supplementary measures are voluntary or mandatory[56]. However, clear financial commitments seem to have been secured for the Programmes of Measures of all RBDs (although not for some relevant sectors in a few RBDs); estimated European Union funding is also included (there are some uncertainties relating to the Azores and Madeira RBDs). Only very limited progress seems to have been made in relation to this recommendation.

[56] Portugal subsequently clarified that the supplementary measures can be mandatory (by licensing) or voluntary. The voluntary measures have to be encouraged through funding such as the Common Agricultural Policy with green payments and the Rural Development Programme of mainland Portugal

Topic 10 Measures related to abstractions and water scarcity

10.1 Assessment of implementation and compliance with the WFD requirements in the second cycle

10.1.1 Water exploitation and trends

Water abstraction pressure has been reported as relevant for all RBDs except for the Azores. However, it is not considered to be an issue of international relevance - this understanding is shared with Spain. Several RBDs face relevant Water Exploitation Index +, namely the Tagus and West Rivers, Sado and Mira, Guadiana and Algarve Rivers RBDs with indexes between 20 and 38 % (according to data of 2012); the other RBDs show indexes below 20 %. The month with the worst exploitation index has been August (2012). No information is reported in WISE on water exploitation or abstraction trends, even if the RBMPs include such information. Given these high water exploitation levels, the number of water bodies that fail achieving good status due to abstraction pressures appears very low in most of the RBDs (except Madeira).

No significant change has been identified for Portugal since the reports published on the assessment of the first RBMPs. A data gap has been identified regarding Madeira where the Water Exploitation Index + is reported but there is no data on the uses most responsible for water consumption. This is explained by the fact that the RBMP for Madeira includes a figure for total abstraction, but no figures for abstraction by sector.

In the Algarve Rivers RBD, groundwater consumption pressures have increased in the recent past. The total of groundwater consumption was 126.72 million m^3/year in 2009-2015 when including the water use for farming based on soil occupation, and is 133.18 million m^3 in 2016-2022.

10.1.2 Main uses for water consumption

In the RBDs which face significant water abstraction levels, agriculture is the main water user, usually irrigated with surface water. The exception is the Vouga, Mondego and Lis RBD, with 13.6 % of all groundwater bodies in bad quantitative status and a significant share of irrigation based on groundwater. It should be noted, however, that agricultural abstraction data are only based on estimations based on established water use coefficients and ancillary data. In the first RBMPs, the data were in some cases incomplete. In the second RBMPs there are data available

from the application of the water resource tax and water rights or permits. The data used to estimate water use in farming in the second RBMPs is from the farming census carried out in 2009, which was the latest available. An estimate of the water use in golf courses is provided (0.45 million cubic metres per year) and has been multiplied by the number of golf courses. The second RBMPs also use monitoring data from 2010-2013. In all RBDs and according to national legislation, permits are required for water abstractions, except for small abstractions which are only registered.

10.1.3 Measures related to abstractions and water scarcity

Regarding basic measures, Portugal reports that abstraction control is undertaken in all RBDs, except for small abstractions, which do not require permits but are registered, even if in the RBMPs no references to such a register have been found. However, new small abstractions may also be subject to permitting in all RBDs[57]. The Tagus and West Rivers RBMP for example, includes a measure to adopt an authorisation regime for new groundwater abstractions using engines with < 5 HP, even if there is no foreseen budget for this measure in the PoM. There is a concession, authorisation and/or permitting regime to control water impoundment and a register of impoundments.

All RBDs implement supplementary measures associated to KTM8 - Water efficiency, technical measures for irrigation (funded by the Rural Development Programme 2014-2020), industry, energy and households. Measures associated to other KTMs are only foreseen for the Madeira RBD, for pressures from public water supply, including KTM9 - Water pricing policy measures for the implementation of the recovery of cost of water services from households, and KTM14 - Research, improvement of knowledge base reducing uncertainty.

Reuse is a measure foreseen in all RBDs. Measures for efficient and sustainable water use (Article 11(3)(c)) and artificial recharge or augmentation of groundwater bodies (Article 11(3)(f)) are included in the RBMPs of mainland Portugal, and not planned for the Azores and Madeira RBDs. In mainland Portugal, no authorisations are granted.

It remains unclear whether the measures to address water abstraction pressures are sufficient to reach good status.

[57] Portugal clarified that if small abstractions (installed extraction power of less than 5 HP and private waters) have a significant impact on the water body, then they will also be subject to permitting. (measure PTE2P04M01_SUB_RH)..

10.2 Main changes in implementation and compliance since the first cycle

No major changes have been identified. The Tagus and West Rivers RBMP, for example, reports a measure to adopt an authorisation regime for new groundwater abstractions using engines with < 5 HP, even if there is no foreseen budget for this measure in the PoM[58].

10.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and first Programmes of Measures requested action on the following:

- Recommendation: *Review all existing permits for abstractions and flow regulations, including dams, and, where necessary, amend them to ensure that they are compatible with the WFD objectives.*

  Assessment: Portugal should have updated all licences and permits for abstractions and flow regulations, including dams, to ensure that they are compatible with the WFD objectives, but this has not been widely implemented. A planned step is that mainland RBMPs report a measure to adopt an authorisation regime for new groundwater abstractions using engines with < 5 HP. However, the measures taken seem limited to adequately address water abstraction pressures in Portugal[59].

  The part of the recommendation referring to permits for flow regulation, in particular ecological flows, is addressed in chapter 13 of this report (on measures related to hydromorphology).

  Overall this recommendation as far as abstractions are concerned has not been fulfilled.

[58] Portugal clarified that this measure is related to licensing, so there is no need to define an investment value and the cost for the users is integrated into the operating costs.

[59] Portugal subsequently indicated that the revision of the licenses and permits for abstractions and flow regulations, including dams, that needed to be updated were made. The Portuguese law allows changing the permits when the quality objectives of the water bodies are not achieved. This measure was applied to all 8 RBDs in the mainland. An investment value has not been included since it is an administrative measure associated with the licensing to be carried out by the Portuguese Environment Agency. The costs involved for the users are associated with the right of using public water resources. The obligation of authorization for new groundwater abstractions using engines with < 5 HP can be implemented if there is a significant impact on the waterbody.

Topic 11 Measures related to pollution from agriculture

11.1 Assessment of implementation and compliance with the WFD requirements in the second cycle

The main agricultural pressure in all RBDs is diffuse pollution leading to nutrient, organic and chemical pollution and altered habitats. Hydrological alteration – Agriculture and hydromorphological alterations are reported as pressures in the Vouga, Mondego and Lis, Tagus and West Rivers, Sado and Mira, Guadiana and Algarve Rivers RBDs. The link between pressures and measures has been established. A gap assessment was missing in the first RBMPs but was carried out for the second RBMPs. It addresses diffuse chemical pollution and nitrates.

Measures found in all RBDs except Madeira are KTM2 - Reduce nutrient pollution, KTM12 - Advisory services for agriculture, and KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc.). KTM2 and KTM13 are a combination of basic and supplementary measures. KTM12 is applied as a supplementary measure. There are also several measures in KTM8 - Water efficiency, technical measures for irrigation, industry, energy and households for all mainland RBDs.

KTM3 - Reduce pesticides pollution, KTM17 - Measures to reduce sediment from soil erosion and surface run-off and KTM23 - Natural water retention measures are found in all RBDs except Azores and Madeira. KTM3 is applied as a basic measure. KTM17 and KTM23 are applied as a supplementary measure.

For KTM2 some measures relate to the update of master plans and guidelines to be elaborated by the competent authorities. For farmers, the measures are mostly voluntary, in the sense that in order to benefit from economic mechanisms and funds, the farmers have to comply with some rules and regulations. But a farmer may decide not to apply for those opportunities. In vulnerable zones, the Programmes of Measures contain mandatory measures to accompany the implementation the Action Plan to reduce nitrates. Under measure KTM3, farmers have to comply with the legislation on the correct use of pesticides. KTM12 measures relate to available funds to be used by farmers wanting to engage in sustainable farming on a voluntary basis. Under KTM13 the conditions for the perimeters of protection of abstractions for supply are published in the law and those are mandatory. Furthermore, one of the measures included

in the plans is to promote the establishment of protection perimeters, namely to promote the necessary studies prioritising the abstractions in waterbodies classified in less than good status.

The implementation of Article 11(3)(h) basic measures for the control of diffuse pollution from agriculture at source is required in all RBDs. In all RBDS except the Azores[60] the same rules apply across the whole RBD. In the Azores RBD different rules exist for different parts of the RBD. The issues covered by the general binding rules to control diffuse pollution from agriculture are in all RBDs: microbiological/bacteriological pollution, nitrates, organic pollution, other pollutants, pesticides, phosphorus and sediments.

Farmers/Farmers' Unions have been consulted under the Public Consultation process in all RBDs. Although the PoM of the Tagus and West Rivers RBMP (examined in more detail as an example) contains measures to promote the approval of the safeguard zones around the drinking water protection areas, the annex does not contain any detailed measures. The PoM also contains measures to protect the origins of potable water in order to reduce the required treatment. Measures are generic and include: 1) to perform the necessary studies to understand which areas to delimit, starting with water bodies where the status is less than good; and 2) to harmonise, at national level, the limitations to water uses and to activities that can be performed in the delimited areas.

There are also additional control measures planned on farm land (not just in safeguard zones but in the wider catchment) to prevent nitrogen, phosphorus or pesticides from entering drinking water sources. These measures aim to reduce pollution by nitrates from farming, including livestock, and measures to reduce pollution from pesticides from agriculture. The fiches of measures present a list of best practices to adopt directly or refer to documents containing best practices. There is one specific measure related to manure storage and spreading.

Financing of agricultural measures is secured in all RBDs.

[60] Portugal clarified that in the Azores RBD the control measures of diffuse pollution are directly addressed to lakes not covered by management plans (POBHL) and rivers with status less than good. In the other waterbodies, their management plans regulation contemplates various types of measures to avoid and control pollutants discharges into the water bodies.

11.2 Main changes in implementation and compliance since the first cycle

The types of pressures from agriculture have not changed and the types of measures applied seem to be the same. A gap assessment was missing in the first RBMPs but was carried out in the second ones.

11.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and first Programmes of Measures requested action on the following:

- Recommendation: *Ensure that diffuse sources of pollution in the agricultural sector are controlled, including mandatory requirements for farmers where necessary.*

  Assessment: This recommendation has been fulfilled, as the implementation of Article 11(3)(h) basic measures for the control of diffuse pollution from agriculture at source is ensured in all RBDs.

- Recommendation: *Deal with phosphate pollution and not just nitrates. Portugal should ensure that measures taken will be sufficient to address agriculture nutrient pressures to the level needed to secure nutrient conditions consistent with good status.*

  Assessment: This recommendation has been partly fulfilled, as some measures addressing phosphate pollution have been found in the Programmes of Measures. These are 1) update the code of conduct; 2) require farmers to comply with the rules for agricultural valorisation of livestock effluents (adoption of good fertilisation practices for manure and slurry management); 3) implement best practices and guidelines; and 4) adopt sustainable production systems (organic production/ integrated production). However, there is no funding foreseen for these measures. Farmers are expected to comply with some rules and procedures, but it is not mentioned how the farmers are informed (except for cases where farmers receive EU funds in order to implement sustainable production methods), or if there is any inspection to ensure compliance.

- Recommendation: *Consider and prioritise the use of green infrastructure and/or natural water retention measures that provide a range of environmental (improvements in water quality, increase water infiltration and thus aquifer recharge, flood protection, habitat conservation etc.), social and economic benefits which can be in many cases more cost-effective than grey infrastructure.*

  Assessment: This recommendation has been fulfilled as green infrastructure and natural water retention measures have been included.

Topic 12 Measures related to pollution from sectors other than agriculture

12.1 Assessment of implementation and compliance with WFD requirements in the second cycle

In the context of this topic, pollution is considered in terms of nutrients, organic matter, sediment, saline discharges and chemicals (Priority Substances, River Basin Specific Pollutants, groundwater pollutants and other physico-chemical parameters) arising from all sectors and sources apart from agriculture. Key Types of Measure (KTMs) are groups of measures identified by Member States in their Programmes of Measures which target the same pressure or purpose. A KTM could be one national measure but would typically comprise more than one national measure. The same individual measure can also be part of more than one KTM because it may be multipurpose, but also because the KTMs are not completely independent of one another.

KTMs relevant to non-agricultural sources of pressures causing failure of WFD objectives have been reported for all RBDs in Portugal. These KTMs are:

- KTM1 – Construction or upgrades of wastewater treatment plants.
- KTM4 – Remediation of contaminated sites.
- KTM8 - Water efficiency, technical measures for irrigation, industry, energy and households
- KTM 14 – 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).
- 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.

KTM15 and KTM21 are reported to be implemented in all RBDs except Madeira. KTM 1 and KTM16 are reported to be implemented in the eight mainland RBDs.

The WFD specifies that the Programmes of Measures shall include, as a minimum, "basic measures" and, where necessary to achieve objectives, "supplementary measures" when basic measures are not enough to address specific significant pressures. Quantitative information on basic and supplementary measures used to tackle pollution from non-agricultural sources (number of measures per KTM) is provided for all RBDs in Portugal. The number of basic measures to tackle pollution from non-agricultural sources is provided for three types of basic measures incorporated into each KTM for all but one of the Portuguese RBDs (Madeira).

Portugal provided more targeted information on basic measures required under Article 11(3)(c to k). Use of an authorisation and/or permitting regime to control wastewater point source discharges (basic measures Article 11(3)(g)), and the operation of a register of wastewater discharges (basic measures Article 11(3)(g)) are reported for all RBDs for surface water and groundwater.

All wastewater discharges are registered in all Portuguese RBDs and small wastewater discharges do not require permits except in the Azores RBD where all wastewater discharges require permits. Similarly (basic measure Article 11(3)(g)), some direct discharges to groundwater are authorised in accordance with Article 11(3)(j) in all RBDs other than the Azores RBD where there is a prohibition of all direct discharges to groundwater.

Portugal further clarified that the small wastewater discharges that do not require permits are exclusively domestic wastewater discharges from isolated houses (less than 10 people) which cannot be connected to the public sewer systems. All the discharges (domestic and industrial wastewaters) into water or soil (via septic tanks) from industries, commercial activities or services require a discharge permit.

As regards the different approach that was taken in the Azores RBD when compared to other RBDs (no thresholds below which wastewater discharges do not require permits and are not subject to registration, prohibition of all direct discharges), Portugal explained that given the small area of each of the nine islands combined with the fragility of their ecosystems, it was considered prudent to require permits for all wastewater discharges into the soil and water.

Measures to eliminate / reduce pollution from Priority Substances and other substances (basic measures, Article 11(3)(k)) are reported to be in place in all nine RBDs where these substances are causing failure. (In the Azores RBD, all waterbodies are reported to be in good chemical status).

For the eight mainland RBMPs in Portugal about 74 % of the rivers are not classified in terms of chemical status. In all RBDs there are measures addressing Priority Substances, but they are generic and to be applied throughout the RBD; they consist of elaborating the inventories of emissions, discharges and losses of Priority Substances and other pollutants, and revising the water resources tax of the urban wastewater treatment plants which discharge Priority Substances from the industries connected to the network. For each water body failing to achieve good status due to factors other than agriculture, the most common measure in all mainland RBDs is improvement of an urban wastewater treatment plant. This is partly because the majority of industries and services in Portugal are small and medium sized enterprises connected to public sewer systems.

In the Azores RBD the chemical status of all surface water bodies is considered good and the RBMP highlights that there is no monitoring or analysis regarding Priority Substances. The only measure is to establish an action plan to prevent the risk of pollution by hydrocarbons and other Priority Substances. Also in the Azores RBD the knowledge of River Basin Specific Pollutants is very limited, as there are few studies or analysis.

In the Madeira RBD it is not clear why some surface water bodies fail to achieve good chemical status. There are no details on the measures in the RBMP; hence it is not possible to state if they are related to Priority Substances, although Portugal has clarified that some relevant basic measures are in place such as improving wastewater treatment systems and controlling point sources.

As regards groundwater, in all eight mainland RBDs the poor status of 10 water bodies is due to nitrates, and measures have been included (measures had also been applied in the first cycle, but no change of status was achieved). All other groundwater bodies are in good chemical status except one due to petroleum hydrocarbons in the Sado and Mira RBD.

In the Azores, the failure to achieve good chemical status in three groundwater bodies is due to saline intrusion. There is a specific measure to address this issue. This measure includes studies to determine the optimal groundwater abstraction rate and control of groundwater use, studies to determine alternative locations for abstraction, and improved monitoring.

In Madeira all groundwater bodies are in good chemical status.

12.2 Main changes in implementation and compliance since first cycle

Portugal identified the main point and diffuse source pressures to surface waters (i.e. point sources – urban wastewater and industry; diffuse – agriculture) and groundwaters (i.e. point – mining and waste deposits and uncontrolled landfill) in the first RBMPs and these broadly remain relevant from the information reported in the second RBMPs. Some progress was made on the development of inventories but to differing extents in different RBDs. Assessment of this aspect in Chapter 2 confirms that further work is required. The first Programmes of Measures included a range of measures to address the identified significant pressures and impacts, but the measures were not related to specific substances in the information reported to WISE for the first cycle, as subsequently clarified by Portugal.[61] The improved reporting implemented for the second RBMPs has enhanced the understanding of linkages between pressures and measures associated with chemical pollution, such that more targeted information on basic measures required under Article 11(3)(c to k) has been generally reported now, although there does not appear to have been a full assessment of the likely effectiveness of the measures.

12.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and Programmes of Measures requested action on the following:

- Recommendation: *Make basic measures legally binding and clearly identified in the second RBMPs to allow for a clear assessment of the need for additional measures, e.g. on agriculture or wastewater treatment.*

  Assessment: With respect to measures for wastewater treatment, it appears that targeted basic measures have been applied in relation to this significant pressure for all RBDs. Portugal confirmed that these measures are legally binding. There is insufficient information on the need for supplementary measures. This recommendation has been partially fulfilled.

[61] http://ec.europa.eu/environment/water/water-framework/pdf/4th_report/MS%20annex-Portugal.pdf

Topic 13 Measures related to hydromorphology

13.1 Assessment of implementation and compliance with WFD requirements in the second cycle

Significant hydromorphological pressures are identified in all RBDs. The sectors most commonly associated with the significant hydromorphological pressures are agriculture, hydropower and public water supply.

Operational KTMs to tackle significant hydromorphological pressures are reported in all RBDs except one. No operational KTMs for hydromorphology are reported for the Madeira RBD, although the RBMP indicates that some measures may be planned, for example related to habitat restoration and sediment management. However, no full descriptions of the planned measures are provided. The main KTMs made operational to reduce hydromorphological pressures are KTM5, 6 and 7. Specific measures in the RBMPs include a variety of measures, such as fish ladders, habitat restoration, removal of structures, sediment management, setting ecological flows, conditions to licensing such as periods in which it is not possible to abstract water, limits to sand and stone extraction from river beds and banks. In the Azores RBD, only KTM14 (research-related measures) is reported as operational to tackle this type of pressures, specifically a study of marine hydrodynamics and hydromophology.

In terms of basic measures, with respect to Article 11(3)(i) of the WFD there is in all RBDs an authorisation and/or permitting regime in place to control physical modifications, which covers changes to the riparian area of water bodies, as well as a register of physical modifications of water bodies.

Overall management objectives for restoring river continuity have been reported as set in two of the ten RBDs (the Azores and Madeira), but these management objectives are not quantitative. At the same time, KTM5 (Improving longitudinal continuity) is not reported in these two RBDs but it is reported against national measures in six RBDs of the mainland (all except Cávado, Ave and Leça and Algarve Rivers RBDs).

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 of all RBDs. In addition, the design of new and existing structural measures, such as flood defences, storage dams and tidal barriers, is reported to have been adapted to take into account WFD objectives in all RBDs. KTM23, on Natural Water

Retention Measures, has been mapped against national measures in all mainland RBDs, but is not explicitly reported in WISE as a KTM tackling specific significant pressures. However, specific measures mentioned in some of the RBMPs indicate relevance to Natural Water Retention Measures and green infrastructure, e.g. maintenance of permanent prairies and pastures and areas of ecologic interest, as well as sustainable forestry.

Ecological flows have been derived for some relevant water bodies in nine of the 10 RBDs. In eight RBDs, the ecological flows which have been derived have been implemented in some relevant water bodies but the work is ongoing. Although in some RBMPs (e.g. Tagus and West Rivers) measures are included to model stretches of rivers downstream of reservoirs (to impose limits and controls on water uses), it is not explained if and how these measures can support implementation of ecological flows. In addition, the ecological flow measures planned for specific water bodies indicate that ecological flows will be defined and implemented according to the concession contracts in force (and taking into account guidelines provided by the Water Authority, namely on the definition of ecological flow and on monitoring), or in other cases, ecological flows will be defined in order to apply to future concessions.

A measure to be implemented by the National Water Authority consists in the elaboration of a methodological guide for the definition of ecological flows in different regions of mainland Portugal. According to the Programmes of Measures in all eight RBDs in the mainland, a plan for the revision of the regime of ecological flows has a deadline of 2019.

No information is provided on the implementation of derived ecological flows in Madeira. In the Azores, no ecological flows have been derived but there are plans to do so in the next cycle.

In terms of the ambition of measures to address hydromorphological pressures, the majority of measures are already taken in 2015, while a few measures are planned for 2021. The number of water bodies failing to achieve the objectives due to significant hydromorphological pressures will be reduced from 2015 to 2021 by approximately one third. The remaining two-thirds of the water bodies affected by hydromorphological pressures are expected to achieve the objectives by 2027.

13.2 Main changes in implementation and compliance since first cycle

The RBMPs do not highlight any elements of marked progress on the hydromorphological measures planned when compared with the measures proposed in the first RBMPs.

13.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and first Programmes of Measures requested action on the following:

- Recommendation: *Review all existing permits for abstractions and flow regulations, including dams, and, where necessary, amend them to ensure that they are compatible with the WFD objectives.*

  Assessment: In some RBMPs (e.g. for the Tagus and West Rivers RBD), there are measures on licensing, indicating the setting of periods in which it is not possible to abstract water. This is referred as relevant also to existing permits. Portugal subsequently communicated that the licenses and permits for abstractions and flow regulations, including dams, that needed to be updated were reviewed. The Portuguese law allows changing the permits when the quality objectives of the water bodies are not achieved. An update of the permits has been made to allow the implementation of measures to make them compatible with the WFD objectives. Since 2007, several permits were revised in order to implement ecological flows. Also a monitoring programme was established in order to determine the effectiveness of the ecological flows towards reaching the objectives.

  Overall, information in the RBMPs indicates that there is work still in progress concerning the definition of ecological flow regimes, to be used as a basis for requirements in the sections downstream of hydraulic infrastructure. A significant portion of dams still do not have ecological flows defined (particularly older ones) and monitoring programs have been and are being developed to define ecological flow regimes[62].

  Overall, this recommendation has been so far partially fulfilled and work seems to be still in progress to ensure that all permits are compatible with WFD objectives.

- Recommendation: *Consider and prioritise the use of green infrastructure and/or natural water retention measures that provide a range of environmental (improvements in water quality, increase water infiltration and thus aquifer recharge, flood protection,*

[62] Portugal subsequently clarified that ecological flows have been defined for all dams built after1990. Since 2008 significant efforts have been made to adapt the old dams to the required ecological flows, including the construction of specific devices, and this is already showing good results on the ecological status of water bodies downstream of the dams.

habitat conservation etc.), social and economic benefits which can be in many cases more cost-effective than grey infrastructure.

Assessment: The specific KTM23 on Natural Water Retention Measures has been mapped against national measures in all mainland RBDs, but is not explicitly reported in WISE as a KTM tackling specific significant pressures. However, specific measures mentioned in some of the RBMPs indicate relevance to Natural Water Retention Measures and green infrastructure, e.g. maintenance of permanent prairies and pastures and areas of ecologic interest, as well as sustainable forestry.

There is no national or regional strategy that prioritises the implementation of Natural Water Retention Measures and green infrastructure measures per se. However, the National Climate Change Adaptation Plan includes these types of measures. Also the Common Agriculture Programme with green payments and the Rural Development Programme of mainland Portugal promote Natural Water Retention Measures, and these are reflected in some of the RBMPs.

This recommendation is partially fulfilled.

Topic 14 Economic analysis and water pricing policies

14.1 Assessment of implementation and compliance with the WFD requirements in the second cycle and main changes since the first cycle

A rather broad definition of water services is applied in the Portuguese RBDs, but they still differ from RBD to RBD.

There are activities that are related to a significant pressure and are not exempted under Article 9(4), such as diffuse pollution from agriculture and water quantity/ecological flows.

Water uses are described in the RBMPs in the chapter “Characterisation”.

Environmental and resource costs are indicated in most RBDs as calculated, internalised and significant for drinking water abstraction/treatment and distribution, self-abstraction, sewage collection and wastewater treatment and irrigation water abstraction/treatment/distribution (when defined as a water service). In addition, for one "other" water service ("Gestão de Empreendimentos de Fins Múltiplos) - if defined as a water service - environmental and resource costs are indicated as calculated and significant; in some RBDs these are not internalised, in others partly. There is no information whether the cost recovery rates or the contribution of the different users are adequate or not.

An updated economic analysis has been done, focussing on the analysis of measures (not related to Article 9) and common approaches/data sources.

14.2 Progress with Commission recommendations

The Commission recommendations based on the first cycle RBMPs and PoM requested action on the following:

- Recommendation: *Develop fully the economic analysis of water use, including the calculation of Environmental and Resource Costs and ensure that the combination of water tariffs and the Water Resources Tax lead to adequate recovery of the costs of water services.*

Assessment: A rather broad definition of water services is applied in the mainland Portuguese RBDs and in Madeira, but they still differ from RBD to RBD; in the Azores, only two water services are defined.

In all RBDs water supply and wastewater services have been identified as water services. Irrigation services have been identified in all relevant RBDs of mainland Portugal, while other services defined differ. For mainland Portugal the water services provided by entities managing multipurpose dams (irrigation, energy, water supply, flood protection) are considered as "other services". "Other services" in mainland Portugal also relate to the services partially funded by water related taxes and provided by 1) the Portuguese Environment Agency and the Water Resources Protection Fund; 2) the Waste and Water Regulatory entity; and 3) the entities supporting and regulating Collective Irrigation Schemes.

The Azores RBD also reports flood protection as a water service in WISE, but this is not explicitly done in the RBMP[63]. The cost recovery calculation covers only "urban", meaning water supply and sanitation for households, commerce and services.

In the Madeira RBD, the cost recovery is calculated for the single water supply company, separately for urban, irrigation and industry sectors.

There are activities that are related to a significant pressure and are not exempted under Article 9(4), such as diffuse pollution from agriculture and water quantity/ecological flows.

In some RBDs, the same utility may provide services to combinations of household, industry and agriculture, but the cost recovery calculation is based only on the profits and losses of the utilities. The RBDs Minho and Lima and Cávado, Ave and Leça do not have such entities, and cost recovery is not calculated in those RBDs. In the other RBDs that have such entities only one has cost recovery to some extent (Alqueva in the Guadiana RBD), being null in all the other cases until now.

Water uses are described in the RBMPs in the chapter “Characterisation”.

According to the information reported to WISE, for most water services financial costs are included in the cost recovery (in some cases, partially), while for all except self-supply the financial costs are indicated as calculated. Various degrees of cost recovery are provided, but the cost recovery rates in some RBDs and for some water services are

[63] Portugal subsequently clarified that this is a reporting error.

not reported, even if indicated as calculated (the calculated revenues are legally stipulated but have not yet been charged - this is the case of multi-purpose dams and the maintenance tax in the irrigation infrastructures).

Environmental and resource costs are indicated in most RBDs as calculated, internalised and significant for drinking water abstraction/treatment and distribution, self-abstraction, sewage collection and wastewater treatment and irrigation water abstraction/treatment/distribution (when defined as a water service). In addition, for one "other" water service ("Gestão de Empreendimentos de Fins Múltiplos) - if defined as a water service - environmental and resource costs are indicated as calculated and significant; in some RBDs these are not internalized, in others partly.

In the mainland, the cost recovery calculation was based on an estimation and included financial costs, resource costs and environmental costs. The environmental and resource costs are said to be internalised via the: 1) Water Resources Tax, applied in the mainland, charged by the water authority to fund its activities and as a source of the Water Resources Fund; 2) a regulation tax, charged by the regulatory authority (urban use); and 3) a tax on beneficiaries, charged by the Ministry in charge of agriculture. However, the latter has never been charged, as the Government has not defined the percentage of investment that should be repaid by the beneficiaries.

The Water Resources Tax or something equivalent is not yet applied in the Azores and Madeira RBDs, hence there is no internalisation of the environmental and resource costs there.

The Water Resources Tax has components for each type of water use: water abstracted, deviated or used (volume) including for energy production; wastewater discharge (per kg of nitrogen and phosphorous); volume of extracted inerts (sand, gravel, etc.) from the public water domain; occupation for private use of the public water domain (area); private use of water under public management. These charges seem to form the basis for the calculation of environmental and resource costs. It is also acknowledged that there are still knowledge and information gaps.

To conclude, environmental and resource costs are still not really calculated; instead, they are regarded as internalised through the existing legislation.

There is no information whether the cost recovery rates or the contribution of the different users to it are adequate or not, except for households on the mainland, where calculations are presented on the weight of water expenses by income class.

Due to the fractured approach to defining water services and cost recovery calculations in Portugal, it is difficult to assess the level of Article 9 implementation. There was some work done, with large gaps still remaining. Overall, some progress on the Commission´s recommendation can be noted.

Topic 15 Considerations specific to Protected Areas (identification, monitoring, objectives and measures)

15.1 Assessment of implementation and compliance with the WFD requirements in the second cycle

Portugal has reported Protected Areas designated under all relevant Directives in the second RBMPs (Table 15.1).

For groundwater, Protected Areas have been associated with Drinking Water Protected Areas and Nitrate Vulnerable Zones. Protected Areas for nitrates are reported for 13 lakes in the Azores RBD.

Table 15.1 Number of water bodies of all types in each RBD of Portugal, for surface and groundwater.

Protected Area type	Number of water bodies associated with[64]				
	Rivers	Lakes	Transitional	Coastal	Groundwater
Abstraction of water intended for human consumption under Article 7	152	1	1		264
Recreational waters, including areas designated as bathing waters under Directive 76/160/EEC[65]	97		17	385	
Protection of species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under Directive 79/409/EEC (Birds)[66]	36 (35)	2	7	23	
Protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under Directive 92/43/EEC (Habitats)[67]	72 (59)	4	13	42 (41)	
Nutrient-sensitive areas, including areas designated as vulnerable zones under Directive 91/676/EEC (Nitrates Directive)[68] and areas designated as sensitive areas under Directive 91/271/EEC (Urban Wastewater Treatment Directive)[69]	11	8		1	9

[64] Portugal subsequently amended the data reported to WISE (the corrected numbers are in parentheses)

[65] Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32006L0007

[66] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0147

[67] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043

[68] Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:31991L0676

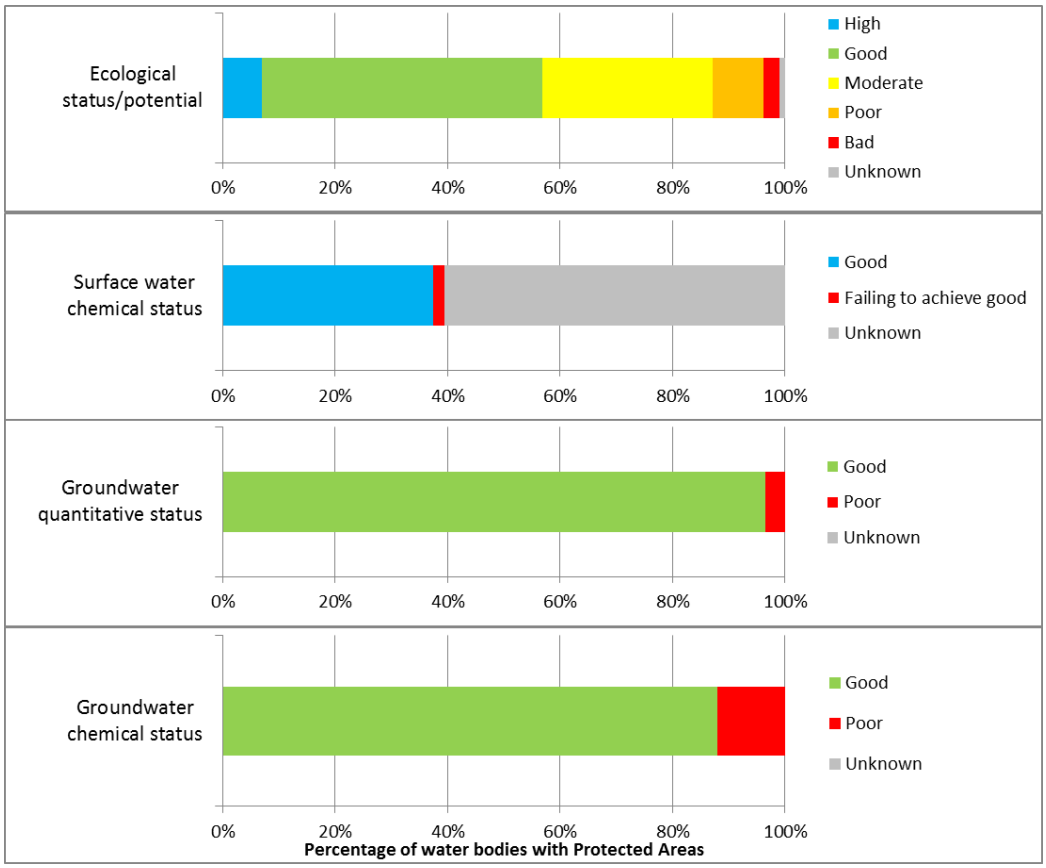
[69] Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31991L0271

Protected Area type	Number of water bodies associated with[64]				
	Rivers	Lakes	Transitional	Coastal	Groundwater
Areas designated for the protection of economically significant aquatic species	87 (83)		18	61 (58)	
Other	5	3		64	

Source: Member States reports to WISE

A good overview of the status of water bodies associated with Protected Areas is reported (Figure 15.1).

Figure** 15.1 **Status of water bodies associated with Protected Areas for Portugal. NB - based on status/potential aggregated for all water bodies associated with all Protected Areas.



Source: WISE electronic reports

Specific objectives are set for shellfish areas (bacterial content), which are different from those in the Shellfish Waters Directive[70] in all RBDs, except for the Azores, where no microbiological standards have been set to protect shellfish areas.

Portugal has reported to WISE that the WFD objectives for water bodies associated with the Habitats and Birds Protected Areas are sufficient also to reach the objectives according to the corresponding Directives in most RBDs, but an individual assessment of the status and of the need for more stringent objectives has not been done. In the Madeira RBMP this is not stated, instead noting that some specific water objectives have been set to protect dependent habitats and species, but work is still on-going to determine needs. No information is given on groundwater dependent Birds and Habitat Protected Areas.

Specific objectives are set for drinking water areas associated with both groundwater and surface water bodies for all RBDs except the Azores RBD[71].

In the first cycle, a substantial monitoring programme for Protected Areas was reported for both surface and groundwater bodies and for all relevant Protected Area types: 158 surface water monitoring points and 314 groundwater monitoring points for Protected Areas designated under Article 7 of the WFD, as well as 392 monitoring points for Bathing Waters, 27 for Birds Directive, 91 for Fish, 283 for Habitats, 58 for Nitrate, 93 for Shellfish and 49 for Urban Waste Water Treatment Directive.

For the second cycle, no data were reported to WISE. However, the RBMPs included information which is presented in Table 15.2. The data provided were not all divided by water body category. These data show that there has been some reduction in the number of surface monitoring points for Protected Areas designated under Article 7 of the WFD, but an increase of 70 % in groundwater monitoring points. There were also increases in the number of sites for Protected Areas for Bathing Waters and Nitrates and no data were included for monitoring of Protected Areas for Birds, Habitats or the Urban Waste Water Treatment Directive. The number of sites monitoring fish appears to be nearly the same as in the previous cycle.

[70] Council Directive 79/923/EEC of 30 October 1979 on the quality required of shellfish waters http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31979L0923

[71] In some cases, drinking water objectives are reported as being met, but no objectives are reported to be set. Portugal subsequently clarified to the Commission that objectives are set for all surface water bodies associated with protected areas, but not all have been reported.

Table 15.2 Number of monitoring sites associated with Protected Areas in Portugal.

Protected Area type	Number of monitoring sites associated with Protected Areas in				
	Rivers	Lakes	Transitional	Coastal	Ground water
Abstraction of water intended for human consumption under Article 7	75	46	1	0	535
Recreational waters, including areas designated as bathing waters under Directive 76/160/EEC	96		310		
Nutrient-sensitive areas, including areas designated as vulnerable zones under Directive 91/676/EEC (Nitrates Directive)					194
Areas designated for the protection of economically significant aquatic species	55 (cyprinid) 38 (salmonid)				

For Drinking Water Protected Areas, there are safeguard zones in all 10 RBDs and there are no plans in the second RBMPs to change the regulations. The measures to be taken in these are not clearly described in the Plans and the information reported is generally administrative, such as delimiting the zones and defining objectives in a generic way[72].

For the other types of Protected Areas (Habitats, Birds, Shellfish and Bathing Waters) no information was reported in the RBMPs or Programmes of Measures about implementation or planning for additional measures. For Birds and Habitats Protected Areas, good ecological status is assessed to be sufficient, so no additional measures are needed.

15.2 Main changes in implementation and compliance since the first cycle

There have been some changes in the number of Protected Areas since the first cycle. In general, the total number of Drinking Water Protected Areas has been reduced to around half of the number reported in the first Plans, while the number of Habitats and Shellfish Protected Areas has increased. For the other types of Protected Areas, there are no major changes in the numbers reported.

No data has been reported to WISE for the second RBMPs for surface water and groundwater monitoring of water bodies associated with Protected Areas. Data included in the RBMPs show that there has been some reduction in the number of surface monitoring points for Protected Areas designated under Article 7 of the WFD, but an increase of 70 % in groundwater monitoring points. There were also increases in the number of sites for Protected

[72] Portugal subsequently clarified that the measures to be taken are associated with the environmental restrictions established in the Drinking Water Protected Areas (DWPA), published as a legal document, in order to protect groundwater and avoid its deterioration. Three safeguard zones are established: immediate, intermediate and extended protection zone. Two residence times (t) are considered: t=50 days for the intermediate zone and t=3500 days for the extended zone. In each zone, specific measures, namely restrictions to land use, are defined. The safeguard zones and the restrictions are published in a legislative act.

Areas for Bathing Waters and Nitrates, while no data were included for monitoring of Protected Areas for Birds, Habitats or the Urban Waste Water Treatment Directive. The number of sites monitoring fish appears to be nearly the same as in the previous cycle.

15.3 Progress with Commission recommendations

No recommendations were made for this topic.

Topic 16 Adaptation to drought and climate change

16.1 Assessment of implementation and compliance with the WFD requirements in the second cycle

Climate change was considered in various ways in all RBDs, on the basis of the guidance on how to adapt to climate change (Common Implementation Strategy Guidance Document No. 24). The National Strategy for Adaptation to Climate Change is mentioned in the second RBMPs but not in the reporting to WISE.

Specific climate change aspects have been considered when selecting robust adaptation measures: checking the effectiveness of measures, assessing direct and indirect climate pressures, monitoring change at reference sites and forecasting the economics of water supply and demand.

Adaptation measures in all mainland RBDs consist of the articulation of the several sectorial policies addressed by the National Climate Change Adaptation Strategy regarding water resources issues, and the monitoring of the implementation of the National Climate Change Adaptation Strategy in what relates to water resources. The Azores RBMP states that it will profit from the investment of €21.8 million for measures of adaptation to climate change, included in the Operational Programme for the Azores, for the elaboration of a droughts and water scarcity management plan and for the identification of the necessary information to develop a water balance. There are also knowledge measures that address climate change issues, such as knowledge increase on groundwater bodies and on marine hydrodynamic and hydromorphology.

In the Madeira RBD, one basic measure refers to the promotion of measures related with water resources on adaptation to climate change, with a budget of €20,000. There is no detailed description of those measures.

Climate change is also considered with respect to flood risk management and for maximisation of cross-sectoral benefits and minimisation of negative effects across sectors in all RBDs except the Algarve Rivers RBD.. It is also considered for drought management when dealing with water scarcity. KTM24 is not reported to be applied in any RBD[73].

[73] Portugal subsequently clarified that KMT24 is applied.

According to the available information, all RBDs in Portugal face droughts, and will face (more) severe droughts with climate change. In fact, there are four RBDs (Tagus and West Rivers, Sado and Mira, Guadiana, Algarve Rivers) which have already applied Article 4(6) exemptions for not achieving objectives in the first cycle. However, it is unclear if Portugal has adequate drought management plans in place[74] and how useful these are for preventing the effects of droughts and avoiding the fact that prolonged droughts result in the non-achievement of environmental objectives.

All the 8 mainland RBMPs include 'Forestation of agricultural and non-agricultural land for water retention', the 'Implementation of National Climate Change Adaptation Strategy' and 'Controlling coastal erosion' as measures to address droughts. In the Tagus and West Rivers RBD, there are also increased control measures, and measures consisting of the development of simulation models for specific reservoirs to determine the storage volume necessary to supply the needs from different uses and respect ecological flows, including in dry periods, and to manage the pricing of the use of water resources. However, it is unclear if such measures are applied across Portugal to keep water abstraction levels at sustainable levels and to fulfil all conditions for the application of Article 4(6).

Even though there is no legal obligation to prepare drought management plans, many Member States have prepared them in order to cope with droughts. Moreover, as Portugal has applied Article 4(6) exemptions, a proper drought management plan with the establishment of drought management tools should be in place. This is however not shown by the reported data in WISE or the information available in the RBMPs.

Portugal subsequently clarified that after the adoption of the RBMPs the Council of Ministers Resolution No. 80/2017 established the Permanent Commission for the Prevention, Monitoring and Follow-up of the Effects of Drought. This has a wide remit and includes drought plans and preparation of measures to be adopted in the medium and long term, in a perspective of preparation for greater resilience to drought events.

16.2 Main changes in implementation and compliance since the first cycle

While for the first cycle no climate check of measures was done it seems that such check of measures has been done in the second cycle.

[74] Portugal subsequently clarified that a prevention, monitoring and contingency plan for droughts situations exists, but was not reported by mistake.

For drought, there are no changes, though Portugal reported Drought Management Plans in place for all relevant RBDs in a different framework in 2012[75]. This was not reported in the 2nd RBMPs, although Portugal subsequently clarified that a drought management plan is in place.

16.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and Programmes of Measures requested action on the following:

- Recommendation: *Ensure that climate change is adequately considered in the assessment of pressures and status of water bodies and that the objectives of the National Strategy for Adaptation to Climate Change are properly taken into account in the design of the Programme of Measures.*

- Assessment: The RBMPs state that the national water authority (relevant for mainland Portugal) coordinated the working group on water resources of the National Climate Change Adaptation Strategy. One of the measures include in the RBMPs is to monitor implementation of that component of the strategy. This recommendation is partially fulfilled.

[75] Topic report on: Assessment of Water Scarcity and Drought aspects in a selection of European Union RBMPs, http://ec.europa.eu/environment/water/quantity/pdf/Assessment%20WSD.pdf