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Second River Basin Management Plans - Member State: Croatia

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
QA/QC Directive	Quality Assurance / Quality Control Directive
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 (MS) reports its River Basin Management Plan(s) (RBMP) to the European Commission. The second RBMP 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 River Basin Management Plans (RBMP) prepared earlier. The situation in the Member States may have changed since then.

General Information

Map A Map of RBDs

Source: 2012 assessment reporting 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

Croatia has a population of 4 million and a surface area of 56 000 km^2.[1] Its geography ranges from the lowlands of the Pannonian basin to the Dinaric Alps and the Dalmatian coastline, over 1 800 km long. In addition, Croatia has over 1 200 coastal islands. The Dinaric Alps, coastal areas and islands have a predominantly karstic geology.

Croatia has two RBDs: the Danube RBD and the Adriatic RBD (Table A). Croatia's Danube RBD is part of the international Danube RBD, which covers 14 Member States and third

[1] http://europa.eu/about-eu/countries/member-countries/croatia/index_en.htm

countries. Among these, Croatia's Danube RBD borders on Slovenia, Hungary, Serbia and Bosnia and Herzegovina.

The Adriatic RBD includes Croatia's coastal islands. Moreover, due to these islands, many of them small in size, and Croatia's long coastline, this RBD also covers extensive coastal waters.

Table A Overview of Croatia's RBDs

RBD	Name	Size (km²)				Countries sharing borders
		Mainland	Islands	Coastal waters	Total	
HRC	Danube	35 101 (35 117)			35 101 (35 117)	BA, HU, RS and SI
HRJ	Adriatic	18 185 (18183)	3 262	13 842 (13 858)	35 289 (35 303)	BA, ME and SI

Source: RBMPs reported to WISE. Croatia subsequently provided the values in brackets.

Croatia is part of the Danube international RBD and the Sava river basin, a sub-basin of the Danube international RBD. The Sava River is the largest tributary of the Danube by volume of water, and about one-quarter of the basin's total surface area lies in Croatia.

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

Name international river basin	National RBD	Countries sharing borders	Co-ordination category			
			1		2	
			km²	%	km²	%
Danube	HRC	BA, HU, RS and SI	35 117	4.4 %		
Adriatic	HRJ	BA, ME and SI			25 370 (21 445)	26.0 %

Source: WISE electronic reporting. Croatia subsequently provided the values in brackets.

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.

In addition, Croatia's Adriatic RBD shares four smaller river basins with Bosnia and Herzegovina: Cetina (the basin's surface area in Croatia is 1 531 km² while the entire surface area is 2 614[2] km²); Neretva (surface area in Croatia is 280 km² while the basin's full surface area is 10 520 km²); Trebišnjica (in Croatia Trebišnjica appears as a series of underwater springs and as the Ombla river, which is only 30 m long but with a relatively large discharge, 24 cubic metres per second); and Krka (the source of the river is located on the border between Croatia and Bosnia and Herzegovina). As of 2014, according to the Croatian authorities, joint

[2] Croatia subsequently noted that the correct area of the Cetina RBD is 4145 km².

management plans had not been prepared for any of these river basins. Cooperation for the preparation of joint management plans is on the agenda of the Bilateral Commission of Bosnia and Herzegovina and Croatia for Water Management Issues.

Finally, Croatia's Adriatic RBD shares three small river basins with Slovenia: Dragonja (the basin area in Croatia is 55.6 km^2); Mirna (494 km^2 in Croatia and 47 km^2 in Slovenia); and Rječina (300 km^2 in Croatia and 50 km^2 in Slovenia). The coordination of respective national plans in these basins is carried out under the framework of the Bilateral Commission of Croatia and Slovenia for Water Management Issues.

Status of second river basin management plan reporting

One RBMP covering the two river basin districts in Croatia (Danube, Adriatic) was published on 6 July 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 Croatia are as follows:

- **Governance and public consultation**

  - Croatia cooperates both within international river basin commissions (Danube and Sava) as well as bilaterally with several neighbouring countries.

  - A wide range of stakeholder groups were actively involved in the preparation of the RBMP.

  - Croatia integrated its Flood Risk Management Plan as a part of its RBMP, and also carried out joint consultation with the Marine Strategy Framework Directive.

  - Croatia did not adopt and publish the RBMP in accordance with the timetable in the Water Framework Directive.

- **Characterisation of the RBD**

  - There were significant differences in the number of delineated surface water bodies with respect to the first RBMP, a significant number of changes to water bodies including changes to the designation of heavily modified water bodies. The RBMP states that considering the extent of changes in typology and delineation of water bodies, it is difficult to ensure comparability with the results described in the first RBMP.

  - Further testing of abiotic typology with biological data has been carried out since the first cycle RBMP. However, several of the national types for Croatia in all of the RBDs do not appear to have corresponding intercalibration types (for 21 river water bodies and 15 lake water bodies). According to the information subsequently provided by Croatia, the current analysis showed that appropriate intercalibration types for most national types do exist and the number of national river types for which appropriate intercalibration types are determined will be revised within on-going projects.

  - Type specific reference conditions have not been established for hydromorphological quality elements in any water category. This may lead to some weaknesses in the classification of status/potential according to the hydromorphological biological quality elements. According to information subsequently provided by Croatia, the methodology

for monitoring and assessment of status according to hydromorphological quality elements is in development and these methodologies will determine the type-specific reference conditions for hydromorphological quality elements.

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

- Numerical tools were used to help define the significance of pressures. However, the significance of pressures is reported not to be defined in terms of thresholds or linked to the potential failure of objectives for both RBDs. For groundwater, significance of pressures is not linked to the potential failure of objectives. It was reported that 30 significant pressures were not assessed for surface waters in each RBD. According to Croatia this is likely to be a reporting error.

- Inventories of emissions have been established for both RBDs; however, they only included 6 of the 41 Priority Substances. The CIS Guidance Document n°28 identifies a tiered approach to assessing emissions, however Croatia reported using a different methodology. The data quality was assessed as uncertain.

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

- The second RBMP reports on sites for operational monitoring in coastal and transitional waters in the Adriatic RBD, which was not the case in the first RBMP. There were also increases in the number of operational sites in rivers and lakes.

- There are significant gaps in the monitoring of quality elements. Some required biological quality elements are not monitored in general, and none of them was monitored in lakes. Hydromorphological quality elements are not monitored at all.

- None of the biological quality elements which were the object of surveillance or operational monitoring in coastal and transitional waters, was sampled at least at the minimum recommended frequency.

- None of the water bodies in which there was surveillance monitoring was monitored for all required biological and hydromorphological quality elements.

- 28 River Basin Specific Pollutants were identified but information on how they were selected is not available. Environmental Quality Standards were derived for seven of

them in water and none in sediment or biota, but Guidance Document No. 27 was not used.

- River Basin Specific Pollutants were monitored in all water categories of water. Monitoring in water was done for 23 of them in coastal and transitional waters, for nine in rivers and for six in lakes. Monitoring in sediment was done for four, only in rivers.

- Only eight of the 28 River Basin Specific Pollutants were monitored at least at the minimum recommended frequency at some of the sites. The analytical methods used comply with Article 4(1) or 4(2) of Directive 2009/90/EC for the strictest standard applied.

- An assessment method was reported for macrophytes, but none for angiosperms in coastal and transitional waters nor for macroalgae in transitional waters. None of the assessment methods for biological quality elements was reported to be sensitive to chemical pollution in rivers, even though this impact was reported to be significant.

- The assessment and classification systems for biological quality elements in Croatia are yet to be intercalibrated.

- The expected hydromorphological quality elements are assessed in rivers and lakes. However, the classification boundaries are not related to the class boundaries of the sensitive biological quality elements in rivers. Only morphological conditions are assessed in transitional and coastal waters and, in this case, the class boundaries are related to the sensitive biological quality elements.

- The reported general physicochemical quality elements are assessed in all water categories. However, not all the relevant elements are assessed and for some of the assessed elements the classification boundaries are not related to the class boundaries of the sensitive biological quality elements.

- The classification of all hydromorphological quality elements in all categories was completely based on expert judgment, which introduces uncertainty and undermines the robustness of the classification of ecological status/potential.

- Grouping was used for classifying some physicochemical elements and River Basin Specific Pollutants in rivers and lakes. River Basin Specific Pollutants were only classified in lakes and rivers, even though they are monitored in all four water categories,

and monitoring results were only reported to be used in the classification of rivers. It is therefore not clear what was the basis for grouping for these substances in lakes.

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

  - All surface water bodies were classified. Between the two RBMP, the proportion of surface water bodies with good chemical status decreased slightly, from 97 to 92 %. This may at least partly result from a more accurate assessment of status, based on improved knowledge since the first RBMP. In particular, the number of monitoring sites, the number of water bodies and priority substances monitored increased since the first RBMP.

  - All coastal and almost all transitional water bodies were monitored for chemical status. Less than 10 % of inland water bodies were monitored. Grouping was used to classify the non-monitored water bodies, and this may be linked to the low confidence in the assessment reported for 50 % of surface water bodies.

  - Territorial waters were neither monitored nor classified for chemical status.

  - For Priority Substances, 37 of the 41 were monitored in water for status assessment, and this included all substances identified as discharged. The four substances not monitored were not included in the inventories so it is unclear whether they are discharged. The monitoring frequencies reported were consistent with the recommended minimum frequency for surveillance, but not for operational monitoring. No explanation could be found for the reduced frequencies.

  - Mercury, hexachlorobenzene and hexachlorobutadiene were not monitored in biota for status assessment.

  - Monitoring for long-term trend occurred in sediments in river water bodies; only for up to five of the 14 required substances. Monitoring frequencies were above the recommended minimum frequencies.

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

  - Grouping of groundwater bodies is applied but still 1/3 of the (groups) of groundwater bodies have no quantitative monitoring. There was no improvement since the first RBMP.

- Although this was not reported to WISE, Croatia subsequently stated that the water balance test was considered in all river basin districts. Confidence in status assessment is still low for many groundwater bodies.

- Groundwater dependent terrestrial ecosystems and groundwater associated surface waters ecosystems have now been considered in status assessment.

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

- The reported information shows that in the second cycle not all (groups of) groundwater bodies are subject to monitoring, and there is still no operational monitoring, although five groundwater bodies are at risk. According to the information subsequently provided by Croatia all groundwater bodies are covered by surveillance monitoring and by 2015 the establishment of operational monitoring sites started.

- All WFD core parameters are monitored.

- Croatia subsequently clarified that groundwater dependent terrestrial ecosystems have been considered in status assessment in all river basin districts and that no groundwater body is at risk due to links to those ecosystems.

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

- The information provided on artificial and heavily modified water bodies does not describe the methodology used. The RBMP and background documents available do not give detailed information on criteria to define substantial changes in character due to physical modifications. However, as part of the pressure and impact analysis, the RBMP describes that the impact of physical interventions is estimated by means of a numerical model based on recorded hydromorphological pressures and expert judgement. Concerning the designation process of heavily modified water bodies, no information is provided on how to assess significant adverse effects of restoration measures and other means to achieve the beneficial objectives of the heavily modified water bodies. It seems that heavily modified water bodies and artificial water bodies are still identified as candidates while further methodological development and verifications via monitoring are pending.

- No methodology is yet established for defining good ecological potential but there are plans to do so in the future. According to information subsequently provided by

Croatia, activities on the establishment of a higher quality connection between biological and hydromorphological elements of ecological status of waters are ongoing.

- **Environmental objectives and exemptions**

  - Improvements have been made compared to the first RBMP. Drivers, Pressures and pollutants leading to exemptions were reported.

  - Information on the achievement of objectives has been reported for 2015 and 2016 to 2021. Limited progress for the achievement of the WFD objectives is expected by 2021. No indicators for 2027 have been developed yet and the situation is still unknown for a number of water bodies.

  - Compared to the first RBMP, Article 4(4) is now applied in the second RBMP. A number of uncertainties and gaps remain, particularly with regard to the assessment of water body status/potential and the thorough justification of Article 4(4) exemptions.

- **Programme of Measures**

  - Some progress has been made in identifying significant pressures and mapping national measures/KTMs, and in performing gap analyses. The level of ambition is still low.

  - Croatia has reported investment costs and operation and maintenance costs for all measures, and has reported that a significant level of EU funding is expected. It has further reported that financial commitment has been secured for the implementation of the Programme of Measures in both RBDs.

  - New legislation or regulations to implement the Programme of Measures in the first RBMP was reported necessary and in progress for both RBDs.

  - With a few exceptions, most of the significant pressures in both RBDs are covered by KTMs, indicating that these are operational.

  - There a number of significant pressures that have been identified in the Adriatic RBD that do not appear to have operational KTMs in place.

  - The two nationally derived KTMs have not been properly described. A number of the KTMs against which national measures have been mapped do not appear to be operational, including those reported as relevant for the Marine Strategy Framework

Directive. This may indicate that more measures, not operational in the first RBMP, are planned for the second and third RBMP.

- The KTM reported as addressing nitrate in groundwater is inappropriate - Croatia clarified that the incorrect KTM had been reported. No information has been provided on the number of surface water bodies failing to be of good status as a result of pollution from river basin specific pollutants, but KTMs have been reported.

- The number of water bodies failing to achieve good status as a result of pollution from Priority Substances has been reported, and for some substances KTMs to control them have been reported. For five Priority Substances causing failure in the Danube RBD and seven in the Adriatic RBD, no KTMs have been reported.

- Indicators have been developed and reported for 2015 and 2021. The level of ambition is low, with little change expected by 2021. No indicators for 2027 have been reported.

- Croatia has reported that the RBMP and FRMPs are integrated. However, whilst it has been mapped to national measures, there is no evidence that KTM23 – "Natural water retention measures" has been mapped to national measures, has been made operational, nor has any information been provided in respect of the pressures it is aimed to address in either RBD. Financial commitments for the implementation of a Programme of Measures in the flood protection sector was marked "not applicable", and WFD Article 9(4) has not been applied to impoundment for flood protection.

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

- No information was reported in WISE on water exploitation and trends, although the RBMPs include some relevant information.

- Information was reported on the main uses of water, but it does not refer to water consumption by sectors, only to the number of licences.

- In Croatia, there is a concession, authorisation and/or permitting regime to control water impoundment but no register of impoundments.

- **Measures related to pollution from agriculture**

- There is a clear link between agricultural pressures and agricultural measures. Setting of management objectives for nutrient pollution and a gap assessment for nutrients were undertaken in the Adriatic RBD.

- The implementation of basic measures Article 11(3)(h) for the control of diffuse pollution from agriculture at source are given, but only in the Nitrate Vulnerable Zones. Pesticides and nutrients are covered by the basic measures in all basins.

- Safeguard zones for abstractions have been legally established.

- Supplementary measures for reducing pollution from agriculture are reported

- Financing of measures is not secured. According to information subsequently provided by Croatia, financing of measures related to the reduction of any negative project impacts falls under the responsibility of the project developer.

- No natural water retention measures and no measures to reduce sedimentation from soil erosion and surface runoff are reported.

- The level of ambition is rather limited as some measures are mandatory in the designated vulnerable areas, while in all other areas they are voluntary.

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

- Croatia has identified substance specific measures for all the River Basin Specific Pollutants reported to be causing failure of good status, and for pollutants reported to be causing poor chemical status in groundwater bodies.

- As noted in the context of Topic 9, Croatia has not identified substance-specific measures for several Priority Substances.

- There is more to do to improve urban waste water treatment, especially as regards more stringent treatment in big cities, and as regards diffuse sources.

- Croatia has not yet fully investigated the need for supplementary measures to tackle pollutants from non-agricultural sources.

- **Measures related to hydromorphology**

- In the first RBMP, measures for existing hydromorphological pressures were not included. In the second RBMP, hydromorphological pressures are still not addressed by specific technical measures, as the only activities planned are related to research and monitoring. According to information subsequently provided by Croatia, for determining measures to reduce hydromorphological pressures, research is ongoing on the quality

connections between biological and hydromorphological water status indicators. Some activities related to the review of existing permits and checking their compatibility with the WFD would also still be ongoing.

- Ecological flows have not been derived for the relevant water bodies in any of the RBDs but there are plans to do it during the period of the second RBMP. The activities on ecological flows are ongoing and awaiting the completion of relevant research.

  In addition, none of the RBMP and supporting background documents includes information on the consideration of Natural Water Retention Measures.

- **Economic analysis and water pricing policies**

  - No detailed information on the application of the polluter pays principle was reported.
  - A narrow definition of water services has been used.

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

  - Protected Areas of all types have been reported associated with both surface and groundwater. However, the setting of additional objectives is limited to Protected Areas designated for economically significant species (shellfish).
  - Monitoring programmes for each Protected Area type have not been reported for all types and the number of monitoring sites is low compared to the number of Protected Areas.

- **Adaptation to drought and climate change**

  - Climate change was considered in all river basin districts. However, it is stated that the Common Implementation Strategy guidance document on how to adapt to climate change was not used for the preparation of the RBMPs.
  - KTM 24 - "Adaptation to climate change" is not made operational to address significant pressures in the river basin districts.
  - No information is reported regarding the relevance of droughts in Croatia. No drought management plan has been reported. According to the information subsequently provided by Croatia, the Climate Change Adaptation Strategy is in the process of

preparation and adoption. Following its adoption, a decision will be made as to whether the preparation of a drought management plan (in the context of water management) is required.

Recommendations

- Croatia should carry out the preparation of the next cycle of RBMP in accordance with the WFD timetable, to ensure the timely adoption of the third RBMP.
- The mechanisms for active involvement of stakeholders should be further developed, for example establishing advisory groups that bring together stakeholders.
- Croatia should further strengthen bilateral cooperation with neighbouring countries and continue to improve international cooperation, including coordinated assessments of the technical aspects of the WFD such as ensuring a harmonized approach for status assessment and a coordinated Programme of Measures in order to ensure the timely achievement of the WFD objectives.
- Croatia needs to do further work on the identification of pressures, in particular in transitional and coastal waters.
- The inventories of emissions, discharges and losses of chemical substances need to be completed.
- Croatia should continue improving chemical and quantitative groundwater monitoring.
- Croatia should continue to improve monitoring, in order to increase the confidence in the assessment of water body status, as there are still important gaps. Monitoring should cover all relevant quality elements in all water categories, in particular hydromorphological quality elements, which were reported not to be monitored at all.
- An increased level of monitoring should lead to a lower dependence on expert judgment for the classification of ecological status/potential.
- Hydromorphological and biological monitoring needs to be reinforced, to facilitate preparation of a higher quality Programme of Measures to control and reduce hydromorphological pressures on water bodies.

- Croatia should continue to strengthen its assessment methods for biological, general physicochemical and hydromorphological quality elements by developing assessment methods for all biological quality elements, and by setting physico-chemical and hydromorphological classification boundaries that are sensitive to biological quality elements.

- Croatia should continue improving the confidence in the assessment of surface water chemical status and make sure territorial waters are assessed for chemical status. In particular, monitoring should be performed in a way that provides sufficient spatial coverage to reach good confidence in the assessment, if necessary in combination with robust extrapolation/grouping methods. All substances should be considered in the relevant matrix. The monitoring frequencies for operational monitoring should be as specified in the Directive. If a different matrix or reduced frequencies are used, please provide the corresponding explanations, as required by the Directive.

- Trend monitoring should be further improved, to ensure that all the relevant substances specified in Directive 2008/105/EC are monitored in a way that provides sufficient spatial coverage.

- Croatia should develop an appropriate methodology for the designation of Heavily Modified Water Bodies. The designation of HMWBs should comply with all the requirements of Article 4(3), including criteria to define substantial changes in character due to the physical modification, the assessment of significant adverse effects on their use or the wider environment and the lack of significantly better environmental options. This is needed to ensure transparency of the designation process. In addition, a methodology needs to be established for defining ecological potential.

- Progress needs to be continued to further reduce uncertainties regarding the assessment of water body status/potential and the timeframe for the achievement of the WFD objectives. The application of Article 4(4) exemptions needs to be properly justified. For potential future application of Article 4(7), Croatia needs to ensure a thorough assessment of possible new modifications in line with the requirements of the WFD and as further specified by the judgment of the Court in case C-461/13.

- The RBMP should clearly identify the gap to good status, and the Programme of Measures designed and implemented to close that gap.

- Croatia should carry out cost-effectiveness analysis and provide specific prioritisation of measures based on this analysis.

- KTMs should be reported to control Priority Substances in both RBDs.

- Information on the number of the water bodies failing to achieve good status due to River Basin Specific Pollutants should be provided.

- Croatia should provide in the next cycle all relevant information on the level of compliance and the timing to reach compliance of agglomerations, including information on funding, in accordance with Directive 91/271/EEC (Article 15 and following). It should ensure compliance with Article 5 UWWTD for more stringent treatment, especially in big cities. It should also assess the need to take additional measures on point source pollution beyond the requirements of the UWWTD and IED to fulfil the WFD objectives, and complete the identification of KTMs for diffuse sources.

- Croatia should ensure that abstraction controls are in place and that information on uses, water exploitation and trends is collected and reported.

- The use of natural water retention measures to mitigate risk to water quality from agricultural pollutants (nutrients, agri-chemicals, sediment, organic matter) should be considered when drawing up the third RBMP.

- In the third RBMPs, Croatia should state clearly to what extent, in terms of area covered and pollution risk mitigated, basic measures (minimum requirements to be complied with) or supplementary measures (designed to be implemented in addition to basic measures) will contribute to achieving the WFD objectives and identify sources of funding (e.g. CAP Pillar 1, RDP), as appropriate, to facilitate successful implementation of these measures.

- Croatia should continue the work on revising existing controls to ensure that agricultural practices do not cause hydromorphological pressure and update controls where necessary for inclusion in the Programme of Measures of the next RBMP.

- The necessary measures to tackle hydromorphological pressures are still under development. Croatia should ensure that these measures are defined and implemented as soon as possible, in particular for river continuity and restoration. Ecological flows need to be derived and implemented in all RBDs.

- Croatia 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 which can be in many cases more cost-effective than grey infrastructure.

- Croatia should apply cost recovery for water use activities having a significant impact on water bodies or justify any exemptions using Article 9(4). Croatia should present in a transparent way how financial, environmental and resource costs have been calculated and how the adequate contribution of the different users is ensured. The water-pricing policy, including the use of adequate incentives for users to use water efficiently should be presented in a transparent way and it should provide a transparent overview of estimated investments and investment needs.

- Additional measures have only been set for Shellfish Protected Areas and no monitoring programmes are reported for any of the Protected Areas. Croatia needs to ensure that all relevant Protected Areas are properly monitored.

- Due consideration on the need for a drought management plans is encouraged given the vulnerability of Croatia to droughts and the significant pressure on water bodies due to abstraction.

Topic 1 Governance and public participation

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

1.1.1 Administrative arrangements – river basin districts

Croatia has two RBDs: the Danube and the Adriatic. Both are international RBDs. Croatia's Danube RBD borders on Bosnia and Herzegovina, Hungary, Serbia and Slovenia and is part of the international Danube RBD (moreover, just over 2/3 of Croatia's Danube RBD is part of the Sava River basin, a sub-basin of the Danube international RBD).

Croatia's Adriatic RBD borders on Bosnia and Herzegovina, Montenegro and Slovenia. Croatia informed that in the Adriatic RBD, Croatia shares five international river basins of larger than 100 km^2: with Bosnia and Herzegovina, the Neretva and Cetina river basins; and with Slovenia, the Rječina, Mirna and Dragonja river basins.

1.1.2 Administrative arrangements – competent authorities

Croatia has reported two Competent Authorities for the RBMP.

Hrvatske vode (Croatian Waters, the national body responsible for water management) has the following main roles: the monitoring and assessment of groundwater and surface water; pressure and impact analysis; economic analysis; preparation of RBMP and Programme of Measures; reporting to the European Commission; and implementation of measures. *Hrvatske vode* has the following supplementary roles: public participation and co-ordination of implementation.

Croatia reported that the main roles of the Ministry of Agriculture are enforcement of regulations, public participation and co-ordination of implementation; however, the Directorate for Water Management has recently moved from the Ministry of Agriculture to the Ministry of Environment and Energy, which should now hold these roles.

1.1.3 River Basin Management Plans – structure and Strategic Environmental Assessment

Croatia has a single RBMP for both its RBDs. Croatia published its RBMP in June 2016, six months after the timetable for the second RBMP (it can be noted that Croatia's first RBMP was published in June 2013, just before its accession to the European Union in July 2013).

The RBMP has a sub-plan for the construction of infrastructure for municipal water services[3]. Croatia's reporting references a second sub-plan, for infrastructure investment in irrigation as well as flood protection[4].

According to the assessment of Croatia's Flood Risk Management Plan, that plan is an integral part of the country's RBMP. However, this is not clear from Croatia's reporting on the RBMP.

A Strategic Environmental Assessment was carried out for Croatia's RBMP.

1.1.4 Public Participation and active involvement of stakeholders

The public and interested parties were informed of the consultation via Internet, via invitations to stakeholders and via meetings. The consultation documents were available via download (only) for the required six months. For both Croatia's RBMP, there was international co-ordination of public participation.

The following stakeholder groups were actively involved in the development of the second RBMP (in both RBDs): agriculture/farmers, energy/hydropower, fisheries, aquaculture, industry, local/regional authorities, navigation/ports, NGOs/nature protection and water supply and sanitation. Active involvement took place via two mechanisms: involvement in drafting and regular exhibitions.

For both RBMPs, public consultation had the following impacts: addition of new information, adjustment to specific measures, changes to selection of measures, commitment to action in the next RBMP and commitment to further research. For the Adriatic RBMP, there was joint consultation with the Marine Strategy Framework Directive[5].

1.1.5 Integration with other European Union legislation: Floods Directive and Marine Strategy Framework Directive

In Croatia, the RBMP was integrated with the corresponding Flood Risk Management Plan: specifically, the Flood Risk Management Plan was designated an integral part of the RBMP. Consequently, there was joint consultation for the RBMP and Flood Risk Management Plan.

[3] Višegodišnji program gradnje komunalnih vodnih građevina planski, November 2015.

[4] VIŠEGODIŠNJI PROGRAM GRADNJE REGULACIJSKIH I ZAŠTITNIH VODNIH GRAĐEVINA I GRAĐEVINA ZA MELIORACIJE, November 2015.

[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

Croatia also reports that there was joint consultation with the Marine Strategy Framework Directive (specifically for the Adriatic RBD). Further information on integration with respect to measures is provided in Chapter 9 of this report.

1.1.6 International Coordination

Both of Croatia's RBDs are part of international RBDs.

For the Danube RBD, there is an international agreement, permanent co-operation body and international RBMPs are in place (designated as category one cooperation). Specifically, Croatia is a Party to both the Danube River Convention and to the Framework Agreement on the Sava River Basin. Moreover, explicit links have been made with national RBMPs within the international RBMPs. Both agreements have involved joint identification of significant water management issues, joint objectives and joint monitoring, among other areas of cooperation.

For the Adriatic RBD, there is an international agreement and a permanent co-operation body are in place (designated as category two cooperation).

Croatia has bilateral agreements on water management in place with four of its five neighbouring Member States and third countries (Croatia lacks a bilateral agreement with Serbia):

- Agreement on water management between the Croatian government and the government of the Republic of Hungary;
- Treaty between the Government of the Republic of Croatia and the Government of Bosnia and Herzegovina on the regulation of water management relations;
- Treaty between the Government of the Republic of Croatia and the Government of the Republic of Slovenia on the regulation of water management relations;
- Treaty between the Government of the Republic of Croatia and the Government of the Republic of Montenegro on mutual relations in the field of water management; and,

All these bilateral agreements have set up joint committees or commissions for water management. Croatia’s RBMP refers to cooperation via the Danube and Sava international commissions as well as bilaterally with neighbouring countries, though it does not provide details on the extent of cooperation. On the other hand, the report on the Strategic Environmental Assessment for the RBMP refers to consultation with neighbouring countries in

the context of the Strategic Environmental Assessment (written comments were received from Italy and Montenegro and a bilateral meeting was held with Bosnia and Herzegovina).

Croatia participated in the extensive cooperation activities under the Danube and Sava Commissions. Work in the Sava IRBD, for example, included coordination on delineation and typology of water bodies, significant water management issues, monitoring, water body status, identification of pressures as well as the preparation of the international RBMP and PoM (for further information see the reports on international coordination on the Water Framework Directive).

The timetable of Croatia's second RBMP was published in June 2016, and six months after the international Danube RBMP, published in December 2015. The Sava River RBMP was published a year earlier, in December 2014, and it appears it was linked mainly to Croatia's first RBMP (published in June 2013). Both the Danube and Sava international RBMP refer to coordination with basin countries including Croatia.

Croatia informed that the preparation of the second RBMP for the Adriatic RBD was coordinated for shared catchments on a bilateral basis with Bosnia and Herzegovina and with Slovenia.

1.2 Main changes in implementation and compliance since the first RBMP

The information reported to WISE for governance does not indicate major changes for Croatia.

1.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMP and Programme of Measures requested action on the following:

- Recommendation: *Coordinate the preparation of the next RBMP with the preparation of the international Danube RBMP and the Sava RBMP and ensure that cooperation with the neighbouring countries extends to all shared catchments. Coordination of measures in internationally shared karstic aquifers should be established.*

  Assessment: The Commission recommended in its 2015 Commission Staff Working Document that Croatia improve international coordination, both with international river basin authorities and with neighbouring countries. Moreover, the 2015 Commission Staff Working Document noted that the timetable for Croatia's first RBMP was not linked to that of the Danube and Sava international RBMP (this concerns the Danube

RBD), and also that joint WFD planning with Bosnia-Herzegovina was not carried out for shared river basins (this referred mainly to the Adriatic RBD).

Croatia's RBMP refers to cooperation via the Danube and Sava international commissions as well as bilaterally with neighbouring countries, though it does not provide details on the extent of cooperation. On the other hand, the report on the Strategic Environmental Assessment for the RBMP refers to consultation with neighbouring countries in the context of the Strategic Environmental Assessment (written comments were received from Italy and Montenegro and a bilateral meeting was held with Bosnia and Herzegovina).

The timetable of Croatia's second RBMP was published in June 2016, and six months after the international Danube RBMP, published in December 2015. The Sava River RBMP was published a year earlier, in December 2014, and it appears it was linked mainly to Croatia's first RBMP (published in June 2013). Both the Danube and Sava international RBMP refer to coordination with basin countries including Croatia.

In addition, Croatia indicated that it co-operated with neighbouring Bosnia and Herzegovina and Slovenia on shared catchments that are part of its Adriatic RBD.

Based on this information, it appears that Croatia has improved international coordination within the Danube and Sava international river basins and also with at least some of its neighbouring countries. It appears that bilateral co-ordination could be further strengthened, at least with Serbia and also with Slovenia. Consequently, Croatia has partially fulfilled this recommendation.

Topic 2 Characterisation of the River Basin District

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

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

Overall there was an increase in the number of water bodies delineated from the first to the second cycles (Table 2.1).

For river water bodies, there was a 21 % increase overall. For lake water bodies, there was an increase of 9 % overall but a decrease of 20 % in the Adriatic RBD. For coastal water bodies, there was an 18 % increase in the Adriatic RBD and a decrease in transitional water bodies of 11 %.

The typology has been revised since the first cycle RBMP which resulted in the repetition of the process of delineation of river water bodies. The revised typology led to merging of water bodies that previously were of different types and splitting of water bodies that previously were of the same type. Additional criteria for water bodies were introduced in order to delineate water bodies that are more appropriate for water quality management, however these criteria were not explained in the second RBMP. The RBMP further states that considering the extent of changes in typology and delineation of water bodies, it is difficult to ensure comparability with the results obtained in the two cycles. The second RBMP did not provide any specific information on the consequences of re-delineation.

Table 2.2 shows the differences in size distribution of surface water bodies in Croatia between the second and first RBMPs. The minimum size of lakes has increased in the Adriatic RBD from 0.88 km^2 to 1.35 km^2. The minimum length of rivers has slightly decreased and the maximum length of rivers has decreased significantly in both RBDs. The minimum size criteria reported were 10 km^2 catchment area for rivers and 0.5 km^2 surface area for lakes[6].

[6] Croatia subsequently explained that all the smaller water bodies which not delineated under the RBMP and are not a part of a larger water body are subject to the same conditions as those for a water body belonging to the same category (river, lake, transitional waters or coastal waters) of the most sensitive ecotype in the associated ecoregion.

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

RBMP	RBD	Lakes		Rivers		Transitional		Coastal	
		Number of water bodies	Total area (km^2) of water bodies	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
2nd cycle	HRC	33	125	1 126	14 941				
2nd cycle	HRJ	4	41	358	2 688	25	150	26	13 747
2nd cycle	Total	37	166	1 484	17 629	25	150	26	13 747
1st cycle	HRC	29	127	897	10 768				
1st cycle	HRJ	5	42	334	2 273	28	145	22	13 752
1st cycle	Total	34	169	1 231	13 041	28	145	22	13 752

Source: WISE electronic reporting

Table 2.2 Size distribution of surface water bodies in Croatia in the second and the first RBMPs

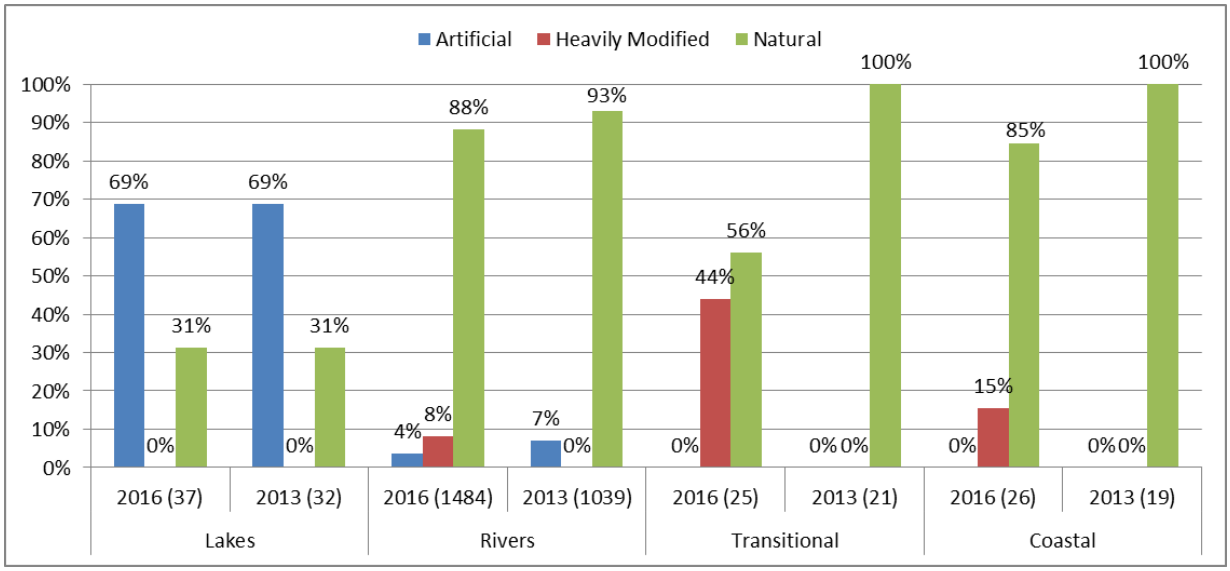
RBMP	RBD	Lake area (km^2)			River length (km)			Transitional (km^2)			Coastal (km^2)		
		Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average
2nd cycle	HRC	0.51	16.17	3.8	0.01	94.69	14.26						
2nd cycle	HRJ	1.35	30.48	10.15	0.02	47.66	8.07	0.01	35.72	5.98	0.64	4 238.81	528.74
1st cycle	HRC	0.51	17.88	4.38	0.03	133.69	12						
1st cycle	HRJ	0.88	30.46	8.44	0.02	109.37	6.81	0.01	34.43	5.2	0.63	4 237.10	625.11

Source: WISE electronic reporting

In the first cycle, 86 % of identified surface water bodies were natural with 9 % being designated as heavily modified and 5 % as artificial water bodies. In the second cycle, the situation was quite different with 92 % natural, 8 % artificial and no heavily modified water bodies (Figure 2.1).

The number of groundwater bodies remained the same in the Danube RBD, while for the Adriatic RBD there was an increase of 8 % (Table 2.3).

Figure 2.1 ***Proportion of surface water bodies in Croatia designated as artificial, heavily modified and natural for the second and the first RBMPs. Note that the numbers in parenthesis are the numbers of water bodies in each water category***



Source: WISE electronic reporting 2016

Table 2.3 ***Number and area of delineated groundwater bodies in Croatia for the second and first RBMPs***

RBMP	RBD	Number	Area (km²)		
			Minimum	Maximum	Average
2nd cycle	HRC	20	97.32	5 189.02	1 754.18
2nd cycle	HRJ	13	143.65	3 754.00	1 593.73
2nd cycle	Total	33			
1st cycle	HRC	20			
1st cycle	HRJ	12			
1st cycle	Total	32			1 942

Source: WISE electronic reporting 2016

Table 2.4 summarises the information provided by Croatia on how water bodies have evolved between the two cycles. It is notable that the changes to the river and lake water bodies have been recorded as the creation of new water bodies.

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

Type of water body change for the second cycle RBMP	Groundwater	Rivers	Lakes	Transitional	Coastal
Splitting	3			6	4
Aggregation and splitting	1			5	
Change				1	14
Extended area				5	
Reduced area				5	2
Creation		1 484	37		2
Deletion		1 232	33	3	
Change in code	29			3	4
Total water bodies before deletion	33	2 716	70	28	26
Delineated for the second cycle RBMP (after deletion from 1st cycle RBMP)	33	1 484	37	25	26

Source: WISE electronic reporting

2.1.2 Identification of transboundary water bodies

Transboundary river water bodies have been designated in the Danube RBD and river, transitional and coastal transboundary water bodies have been designated in the Adriatic RBD. 15 transboundary groundwater bodies have been identified in the Danube RBD and six in the Adriatic RBD.

The RBMP explains that the transboundary water management is done under a framework of bilateral agreements with neighbouring states. There is no specific information about whether delineation or typology of water bodies was specifically covered by these agreements.

2.1.3 Typology of surface water bodies

The number of surface water body types reported by Croatia for the first cycle and second RBMPs are displayed in Table 2.5. In the second cycle Croatia reported five coastal water body types, 15 (6)[7] lake types, 28 river types and four transitional types. The numbers of lake,

[7] Croatia subsequently clarified that there are 6 lake water body types, but this does not match the data reported to WISE

transitional and coastal water body types remained largely the same between the two cycles, but the number of river water body types has a significant decrease from 52 to 28. The second RBMP reported that the typology had been revised since the first RBMP, which allowed for the merging of water bodies.

Table 2.5 Number of surface water body types at RBD level in Croatia for the first and second RBMPs

RBD	Rivers		Lakes		Transitional		Coastal	
	2013	2016	2013	2016	2013	2016	2013	2016
HRC	29	18	10	11 (2)	0	0	0	0
HRJ	27	17	4	4	6	4	5	5
TOTAL	52	28	14	15 (6)	6	4	5	5

Source: WISE electronic reporting Note that the total is not the sum of the types in each RBD as some types are shared by RBDs. The numbers in brackets were subsequently provided by Croatia and do not match the data reported to WISE.

In Croatia, the typology system B has been applied. The reasons provided where that the system is more flexible and allows the definition of a typology that better describes the biological diversity of surface waters. Further testing of the abiotic typology with biological data allowed for the grouping of types with very similar biocenoses. There was work undertaken to determine the extent to which the layout and structure of the biota can be associated with the abiotic typology of the Croatian hydrographic network[8].

Member States were asked to report "Not applicable" if there is no corresponding intercalibration type for national types. Many national types (heavily modified, artificial and natural) have been intercalibrated. Several of the national types for Croatia in all of the RBDs do not appear to have corresponding intercalibration types: 21 river water body types and 15 lake water body types[9,10]. It is unclear how the intercalibration process has been transferred to these national types[11].

[8] The Faculty of Natural Sciences of Zagreb has produced a background document "Testing Biological Methods for Evaluation of Ecological Status (Water Framework Directive, 2000/60/EC) in representative basins of Panonic and Dinaric Ecoregion".

[9] Croatia subsequently highlighted that the number of national river types for which appropriate intercalibration types are determined will be revised within an on-going projects, in which biological classification systems for the assessment of ecological status of rivers are intercalibrated. The deadlines for implementation of these projects are end of 2018 and March 2019.

[10] Croatia subsequently clarified that the typology of the natural lakes in the Dinaric ecoregion (six lakes) has been carried out, but they do not have appropriate intercalibration types. Neither typology nor standardisation of the natural lakes in the Pannonian ecoregion (three lakes in the Danube floodplain area) have been carried

2.1.4 Establishment of reference conditions for surface water bodies

Table 2.6 shows the percentage of surface water body types in Croatia for which reference conditions were established for the first and second RBMPs. Type specific reference conditions have been established for some, all or none relevant biological quality elements (all for all river water body types). Type specific reference conditions have been established for all physicochemical quality elements in rivers, transitional and coastal waters and for some, all or none for lake water body types. Type specific reference conditions have not been established for hydromorphological quality elements in any water category[12].

Table 2.6 Percentage of surface water body types in Croatia 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
Lakes (15)	All			40 %
	Some	40 %		53 %
	None	60 %	100 %	7 %
Rivers (28)	All	100 %		100 %
	Some			
	None		100 %	
Transitional (4)	All			100 %
	Some	100 %		
	None		100 %	
Coastal (5)	All			100 %
	Some	100 %		
	None		100 %	

Source: WISE electronic reporting

out, while other stagnant rivers are not of natural origin and their typology has been carried out within the projects for development of the classification system for ecological potential.

[11] Croatia subsequently highlighted that the current analysis shows that appropriate intercalibration types for most national types do exist, with the exception of mountainous streams (altitude larger than 500 m) and intermittent running rivers in the eastern-continental intercalibration group.

[12] Croatia subsequently clarified that the methodology for monitoring and assessment of status according to hydromorphological quality elements in rivers is in testing and updating stages, whereas the methodology for other water categories is under development. These methodologies will determine the type-specific reference conditions for hydromorphological quality elements.

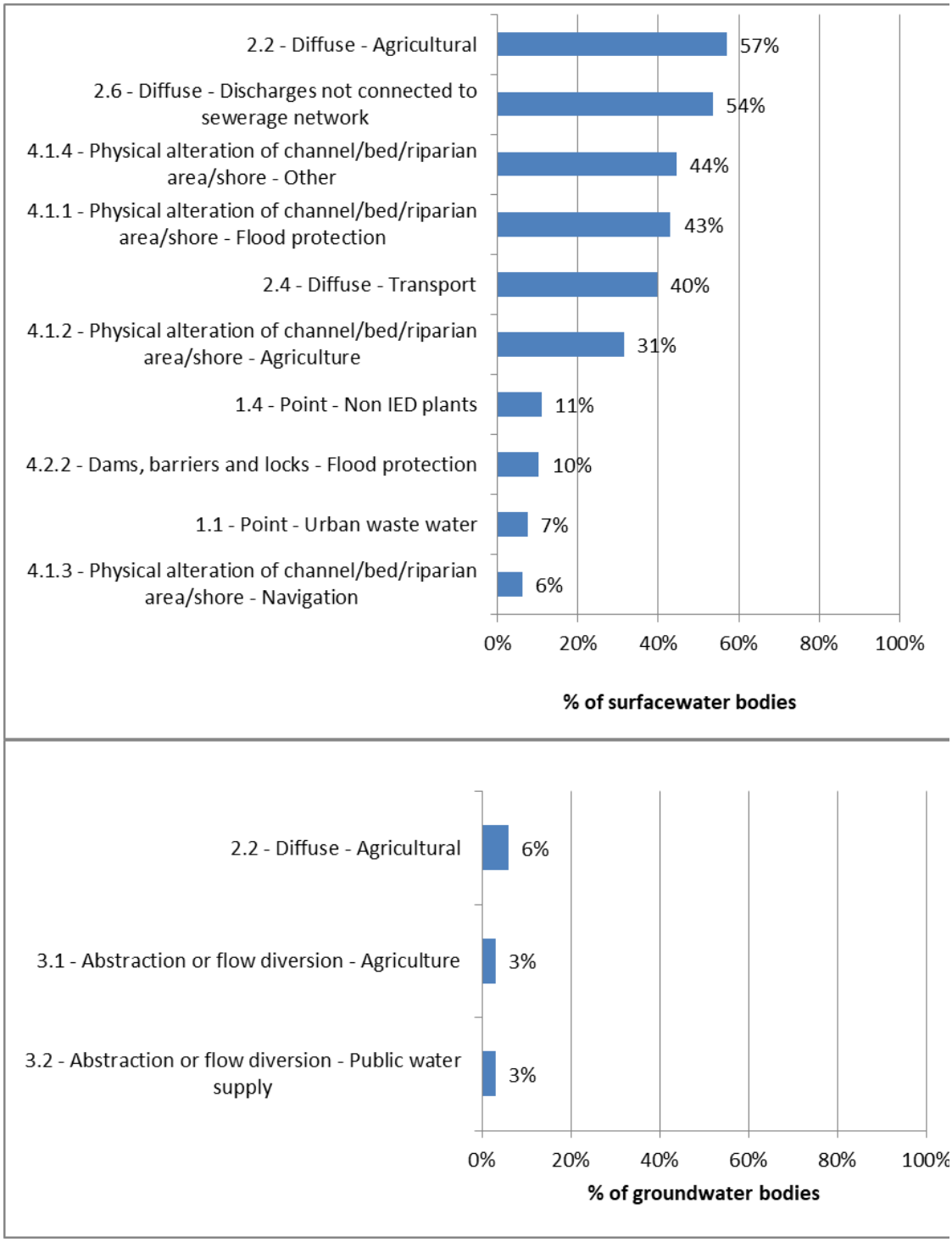
2.1.5 Characteristics of groundwater bodies

The characteristics of the geological formation and details on layering of groundwater bodies were reported in the second RBMP. Further characterisation work has been reported since the first RBMP with the inclusion of the assessment of linkages to surface water bodies and terrestrial ecosystems.

2.1.6 Significant pressures on water bodies

In the second RBMP, the significant pressures reported most often are 'Diffuse – Agricultural' (57 % of surface waterbodies) and 'Diffuse - Discharges not connected to sewerage network' (54 %) (Figure 2.2). Croatia reported on significant pressures in the first cycle at an aggregated level. The most significant pressure was found to be diffuse pollution (92 % of surface water bodies) followed by hydromorphological pressures (70 %) which are similar to the pressures reported for the second cycle RBMP.

Figure 2.2 The most significant pressures on surface water and groundwater bodies in Croatia for the second RBMP



Source: WISE electronic reporting

'No significant pressure' was reported for 90 % of groundwater bodies, and the most

significant pressure was 'Diffuse – Agricultural' (6 %).

In the second RBMP, Croatia reported which significant pressures were not assessed for surface waters, a total of 30 in each RBD. The RBMP does not give any explanation for the excluded pressures[13]. For groundwater, only one pressure was reported not to have been assessed: 'Groundwater - Recharges.'

2.1.7 Definition and assessment of significant pressures on surface and groundwater

For surface waters, a combination of both expert judgement and numerical tools was used for defining diffuse and point pressures, and pressures from abstractions and flow diversions in each RBD. The significance of pressures is reported not to be defined in terms of thresholds or linked to the potential failure of objectives for both RBDs[14]. No further information was found on this in the RBMP or background documents.

Some changes to the methodology since the first RBMP were noted in the second RBMP. For point sources, estimates of pollutant emissions were made for all known types of point sources for the reference year 2012. Data on the abstraction of water for all known uses were collected and analysed. There was no change in the assessment of hydromorphological pressure data compared to the first RBMP and the completeness and reliability of the data is still limited.

The extent of diffuse sources considered has expanded since the first RBMP. Some diffuse sources have been considered in full detail, based on reliable data, and, for some, only estimations of the emissions have been made. Particular attention has been given to diffuse pollution from agriculture. In the program of supplementary measures of the first RBMP, activities were undertaken to investigate the impact of agricultural production on surface and groundwater status. A model of the spatial distribution of nitrogen and phosphorus applications originating from mineral and organic fertilisers was developed. Furthermore, the spatial distribution of pesticides and active substances in pesticides, by pesticide groups and cultures has been modelled.

For groundwater, a combination of expert judgement and numerical tools was used for defining diffuse and point source pressures. Numerical tools were used only for abstraction pressures in the Adriatic RBD and a combination was used in the Danube RBD. Artificial recharge pressures have not been assessed. For groundwater, significance of pressures is reported to be defined in terms of thresholds but not linked to the potential failure of objectives. The second

[13] Croatia subsequently stated that this is likely to be a reporting error.

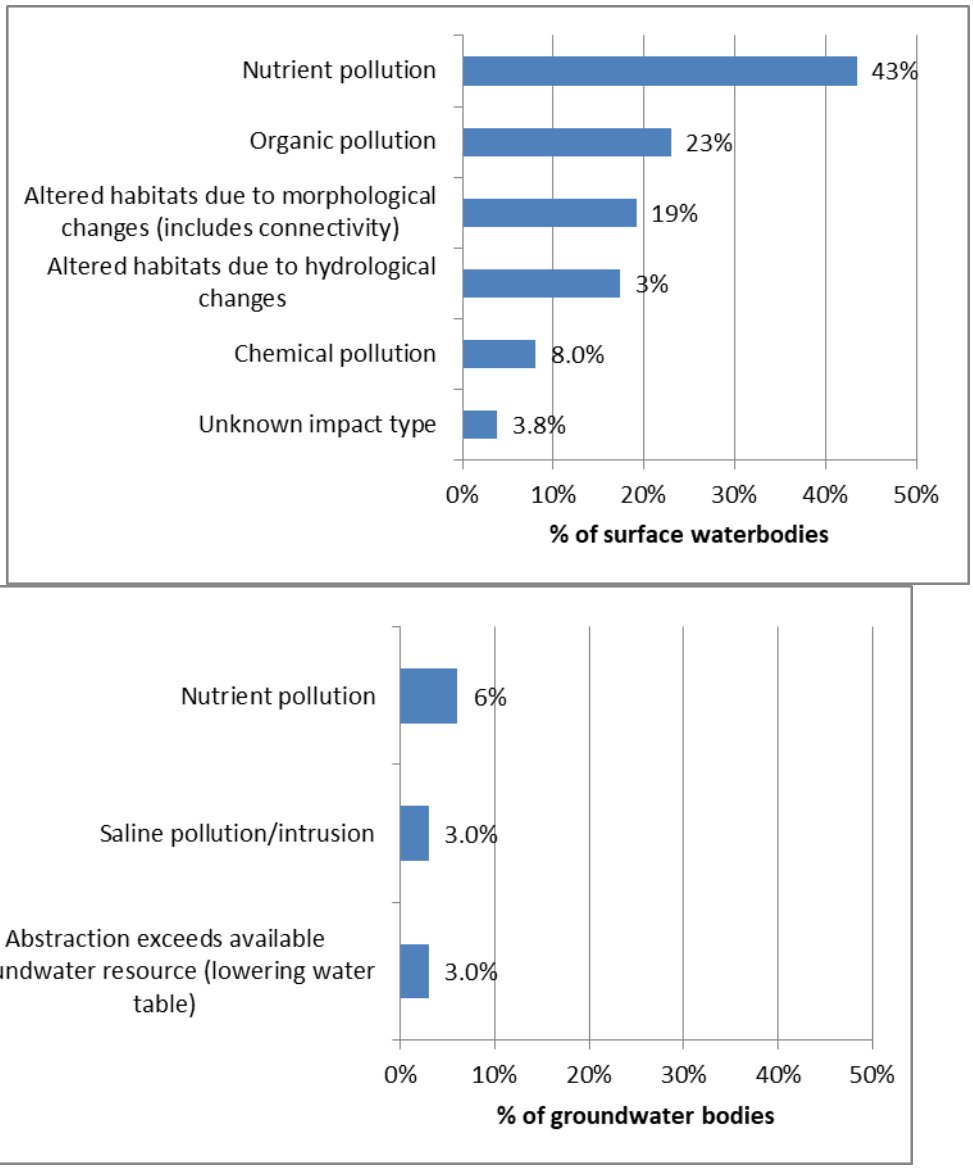
[14] Croatia subsequently highlighted that it is very hard to define significance thresholds for different pressure types and especially for small water bodies.

RBMP explains that significant pressures in groundwater are related to the failure of groundwater quality and quantity thresholds.

2.1.8 Significant impacts on water bodies

In the second RBMP, the most significant impact on surface water bodies was 'Nutrient pollution' (43 %) (Figure 2.3), with 40 % reported as having "no significant impact". For groundwater, 90 % were reported as "no significant impact". The most significant impact was 'Nutrient pollution' (6 %). Croatia did not report on impacts in the first RBMP.

Figure 2.3 Significant impacts on surface water and groundwater bodies in Croatia for the second RBMP. Percentages of numbers of water bodies



Source: WISE electronic reporting

2.1.9 Groundwater bodies at risk of not meeting good status

In each RBD, 15 % of groundwater bodies were reported to be at risk of failing to meet good chemical status. The pollutants responsible for groundwater bodies being at risk of failing good chemical status have been reported.

In the Adriatic RBD 15 % of groundwater bodies were also reported to be at risk of failing to meet good quantitative status, while none were reported to be at risk in the Danube RBD. Further information on the quantitative and chemical status of groundwater bodies is provided in Chapters 5 and 6 of this report.

2.1.10 Quantification of the gap and apportionment of pressures

There are some inconsistencies in the WISE reporting of pressures for which measures are planned and the significant pressures reported at the water body level. For example, in the Danube RBD, 'Anthropogenic pressure – Unknown' has been reported as a significant pressure at surface water body level but this pressure has not been reported as being tackled in the Programme of Measures. Similarly, 'Abstraction or flow diversion – Hydropower' is reported as being addressed in the Programme of Measures but is not identified as a significant pressure at a surface water body level.

The Priority Substances and other substances causing failure of good chemical status have been reported. The measures to tackle these substances to achieve good status by 2021 and the indicator of the gap have been reported. However, there are some substances for which a gap to good status will remain (e.g. fluoranthene). Further information on the implementation of the Programme of Measures is provided in Chapters 9 to 13 of this report.

2.1.11 Inventories of emissions, discharges and losses of chemical substances

Article 5 of the Environmental Quality Standards Directive (EQS Directive)[15] requires Member States to establish an inventory of emissions, discharges and losses of all Priority Substances and the eight other pollutants listed in Part A of Annex I 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.

[15] 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:02008L0105-20130913

Croatia reported that only 6 of the 41 Priority Substances were included in the inventories in each RBD. The RBMP explained that the inventory will be completed in the future following the Common Implementation Strategy Guidance Document No 28 - Preparation of Priority Substances Emissions Inventory[16]. Firstly, the pollutants that are relevant to water pollution in Croatia will be identified and then data will be collected for the assessment of emissions, releases and losses of those pollutants to the aquatic environment.

The two step approach from the Common Implementation Strategy Guidance Document n°28 has been followed for all substances considered in the inventories. The Guidance Document identifies a tiered approach to assessing emissions, but Croatia reported using a different methodology. The data quality was assessed as uncertain.

2.2 Main changes in implementation and compliance since the first cycle

Overall there was an increase in the number of water bodies delineated from the first to the second RBMP. For river water bodies, there was a 21 % increase overall. For lake water bodies, there was an increase of 9 % overall but a decrease of 20 % in the Adriatic RBD. For coastal water bodies, there was an 18 % increase in the Adriatic RBD and a decrease in transitional water bodies of 11 %. The number of groundwater bodies remained the same in the Danube RBD and there was an increase of 8 % for the Adriatic RBD. In the second RBMP, 86 % of identified surface water bodies were natural with 9 % being designated as heavily modified and 5 % as artificial water bodies. In the first RBMP, the situation was quite different with 92 % natural, 8 % artificial and no heavily modified water bodies.

The number of river water body types had a significant decrease, from 52 to only 28 types. The second RBMP reported that the typology had been revised since the first RBMP, which allowed for the merging of water bodies.

Croatia reported on significant pressures in the first RBMP at an aggregated level. The most significant pressure was found to be diffuse pollution followed by hydromorphological pressures, which are similar to the pressures reported for the second RBMP.

2.3 Progress with Commission recommendations

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

[16] https://circabc.europa.eu/sd/a/6a3fb5a0-4dec-4fde-a69d-5ac93dfbbadd/Guidance%20document%20n28.pdf

- Recommendation: *Review the pressures and impacts analysis and status assessment in the second RBMPs and ensure that the measures are based on the updated pressures and impacts analysis and status assessment of water bodies.*

  Assessment: This recommendation applies to more than one Topic. In terms of characterisation, Croatia has reported the pressures and impacts at a water body level. Croatia reported that only 6 of the 41 Priority Substances were included in the inventories in each RBD.

  For surface waters, a combination of both expert judgement and numerical tools were used for defining diffuse and point pressures, and pressures from abstractions and flow diversions in each RBD. For groundwaters, a combination of expert judgement and numerical tools was used for defining diffuse and point source pressures. Numerical tools were used for abstraction pressures in the Adriatic RBD and a combination was used in the Danube RBD. Therefore, there does not appear to be an overreliance on expert judgement.

  The measures to tackle Priority Substances and other substances causing the failure of good chemical status by 2021 and the gap indicator have been reported. However, there are some substances for which a gap to good status will remain (e.g. Fluoranthene).

  Overall this recommendation has been partially fulfilled.

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 RBMP

3.1.1 Monitoring of ecological status/potential

Monitoring programmes

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 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 were reported for rivers and lakes in both RBDs, and for coastal and transitional waters in the Adriatic RBD which had also identified these two water categories. The relevant water categories were all included in a surface water monitoring programmes. No monitoring was reported for territorial waters.

Monitoring sites

Table 3.1 compares the number of monitoring sites used for surveillance and operational purposes from the first to the second RBMP, and Table 3.2 gives the number of sites used for different purposes for the second RBMP.

Table 3.1 Number of sites used for surveillance and operational monitoring in Croatia for the second and first RBMP. Note that for reasons of comparability with data reported in 2013, the 2016 data 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 RBMP								
HR_C	32	118	3	7				
HR_J	8	17	3	7	81	23	49	29
Total by type of site	*40*	*135*	*6*	*14*	*81*	*23*	*49*	*29*
Total number of monitoring sites	*152 (175)*		*19 (20)*		*88*		*69*	
First RBMP								

HR_C	32	107	1	3				
HR_J	6	10	4	3	52		87	
Total by type of site	*38*	*117*	*5*	*6*	*52*	*0*	*87*	*0*
Total number of monitoring sites	*132*		*10*		*52*		*87*	

Sources: Member States electronic reporting to WISE in 2013 and 2016. The numbers in parentheses were subsequently communicated by Croatia.

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

Monitoring Purpose	Lakes	Rivers	Transitional	Coastal
CHE - Chemical status	5	124	28	37
DWD - Drinking water - WFD Annex IV.1.i	1			
ECO - Ecological status	1	194	87	69
HAB - Protection of habitats or species depending on water - WFD Annex IV.1.v	16	181	42	13
INT - International network of other international convention		14		
MSF - Marine Strategy Framework Directive monitoring network				34
NID - Nutrient sensitive area under the Nitrates Directive - WFD Annex IV.1.iv	2	51		
OPE - Operational monitoring	14	135	23	29
REF - Reference network monitoring site			11	9
RIV - International network of a river convention (including bilateral agreements)		10		
SEA - International network of a sea convention			2	10
SHE - Shellfish designated waters - WFD Annex IV.1.ii			7	8
SOE - EIONET State of Environment monitoring	8	43	4	11
SUR - Surveillance monitoring	6	40	81	49
Total sites irrespective of purpose	**25**	**309**	**91**	**69**

Source: WISE electronic reporting

For the first RBMP, there were no sites for operational monitoring in coastal and transitional waters in the Adriatic RBD, for the second RBMP 29 sites and 23 sites were reported for coastal and transitional waters, respectively. There were also increases in the number of operational sites in river and lakes in both RBDs compared to the first RBMP. Whilst there was a decrease in the number of coastal and lake sites used for surveillance purposes in the Adriatic RBD for the second RBMP, there was no change in the number of surveillance sites in rivers in the Danube RBD and increases in lake sites in the Danube RBD, and in transitional waters and rivers in the Adriatic RBD.

The number of monitoring sites in the 2015 Commission Staff Working Document[17] for the first RBMP are the wrong way around in terms of surveillance and operational monitoring – this has been corrected in Table 3.1.

Monitored quality elements (excluding RBSPs)

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

Table 3.3 Quality elements monitored for the second RBMP in Croatia (excluding River Basin Specific Pollutants). Note; quality element 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	No	No	No	No	No			No			No		No
Rivers	Yes	Yes	Yes	Yes	Yes			No			No	No	No
Transitional	Yes	Yes		Yes	Yes	No	No	No			No		No
Coastal	Yes	Yes		Yes		No	No	No			No		No

	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	No	Yes	No	No	Yes	Yes	No	No
Rivers		Yes	Yes	No	Yes	Yes	Yes	No	No
Transitional	Yes	No	Yes	Yes	No	Yes	Yes	No	No
Coastal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No

Source: WISE electronic reporting[18]

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

[18] Croatia subsequently made the following corrections to the table, as there might be reporting errors in WISE. For lakes, transparency conditions, oxygenation conditions, nitrogen and phosphorus conditions are monitored. For rivers and for coastal waters silicates are not monitored. For transitional waters thermal conditions, acidification status and silicates are not monitored.

There are significant gaps in the monitoring of required and expected quality elements. Fish, macrophytes and phytoplankton are not monitored in lakes. Angiosperms and macroalgae are not monitored in coastal waters or transitional waters, though macrophytes are reported for both. Hydromorphological quality elements are not reported to be monitored in any water category. A wide range of physicochemical quality elements are reported at the specific determinand level (e.g. nitrite as part of nutrient conditions), but there still are gaps.

Morphological conditions were used in the classification of all water categories, hydrological regime was also used in rivers and lakes and continuity in rivers. The classification of all hydromorphological quality elements in all water categories was based on expert judgment: none of these elements were reported to be monitored. This introduces uncertainty on the robustness of the classification of ecological status/potential in Croatia.

Monitoring sites in lakes in the Adriatic RBD are only used for chemical monitoring: this means that biological quality elements, hydromorphological and physicochemical quality elements are not monitored, with only River Basin Specific Pollutants and Priority Substances being included.

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

None of the biological quality elements used for the surveillance or operational monitoring of coastal and transitional waters were sampled at, or more than, the WFD minimum frequency. In contrast, three of the five biological quality elements used for surveillance, and two of the four used for operational monitoring were sampled at, or more than, the minimum frequency at all sites where they were monitored. The one site used for monitoring lakes (including for phytobenthos and benthic invertebrates) was not used for surveillance or operational purposes.

Monitoring of River Basin Specific Pollutants

In total eight different River Basin Specific Pollutants (mostly metals) were reported to be monitored in Croatia, according to the WISE reporting. These substances are: arsenic, chromium, copper, cobalt, zinc, fluoride, AOX and PCBs. However, Croatia subsequently

clarified that cobalt is not considered as a River Basin Specific Pollutant. Consequently the right number of River Basin Specific Pollutants monitored is seven.

All substances were monitored in water for status assessment and four were monitored in sediment for trend assessment.

For status assessment all seven river basin specific pollutants confirmed by Croatia were monitored in rivers, two in coastal and transitional waters and four in lakes. The number of monitoring sites for each water body type in the second RBMP is shown in Table 3.4.

Table 3.4 ***Number of sites used to monitor River Basin Specific Pollutants reported in the second RBMP and non-priority specific pollutants and/or other national pollutants reported in the first RBMP in Croatia. Note 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 RBMP***

RBMP		Lakes	Rivers	Transitional	Coastal
second	Sites used to monitor River Basin Specific Pollutants	9	141	26	38
first	Sites used to monitor non-priority specific pollutants and/or other national pollutants	NR	NR	NR	NR

Sources: WISE electronic reporting.
NR: Not reported at the site level

Each of the seven River Basin Specific Pollutants was monitored at a frequency at least as high as the WFD recommended minimum frequency in most of the monitoring sites.

Croatia identified and reported non-priority specific pollutants as part of their first RBMP (to be monitored in lakes and rivers), however this information was not reported at the site level. It is therefore not possible to make comparison at the site level between the two RBMP.

Surveillance monitoring of surface water bodies

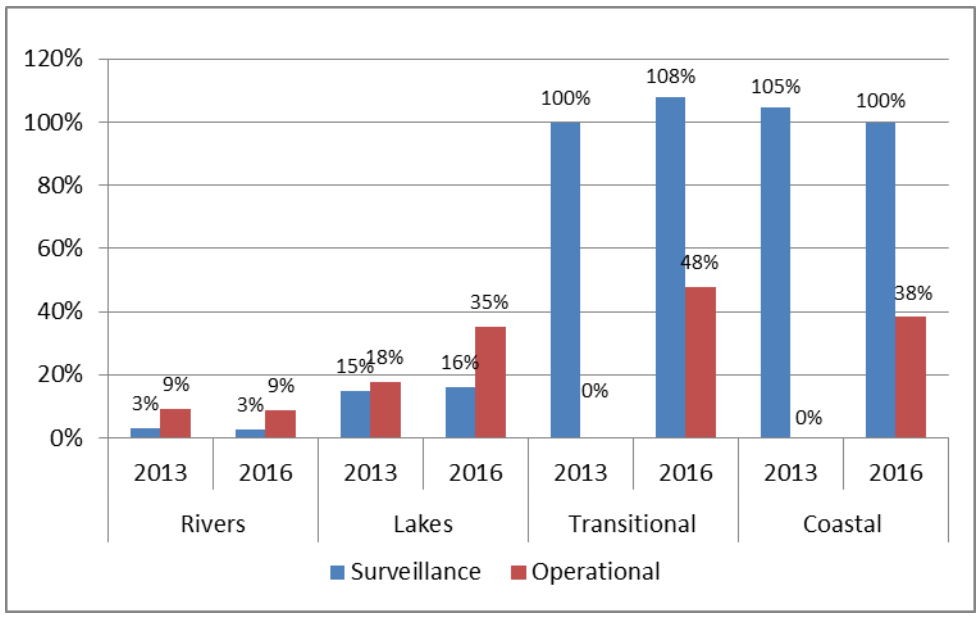
None of the water bodies used for surveillance monitoring in lakes, rivers, transitional and coastal water was monitored for all required biological and hydromorphological quality elements. Around 84 % of coastal and transitional water bodies included in surveillance

monitoring were monitored for all required physicochemical quality elements: none of the rivers and lake water bodies was monitored for all required elements.

Proportionally more surface water bodies in Croatia were included in operational monitoring (10 %) compared to surveillance (6 %). There are discrepancies in the number of lakes and transitional water bodies reported in the WISE monitoring schema compared to those reported in the WISE surface water body schema. More are reported in the former compared to the latter.

For the first RBMP, there was no operational monitoring in coastal and transitional waters: for the second RBMP there was. Overall for the first RBMP, 9 % of surface water bodies were included in operational monitoring and 7 % in surveillance monitoring: the respective values for the second RBMP were 10 % and 6 %. It should be borne in mind that there was a 20 % increase in the number of surface water bodies from 1 315 for the first RBMP to 1 572 for the second RBMP. Figure 3.1 shows the proportion of surface water bodies included in surveillance and operational monitoring in Croatia for the first and second RBMP for each water category.

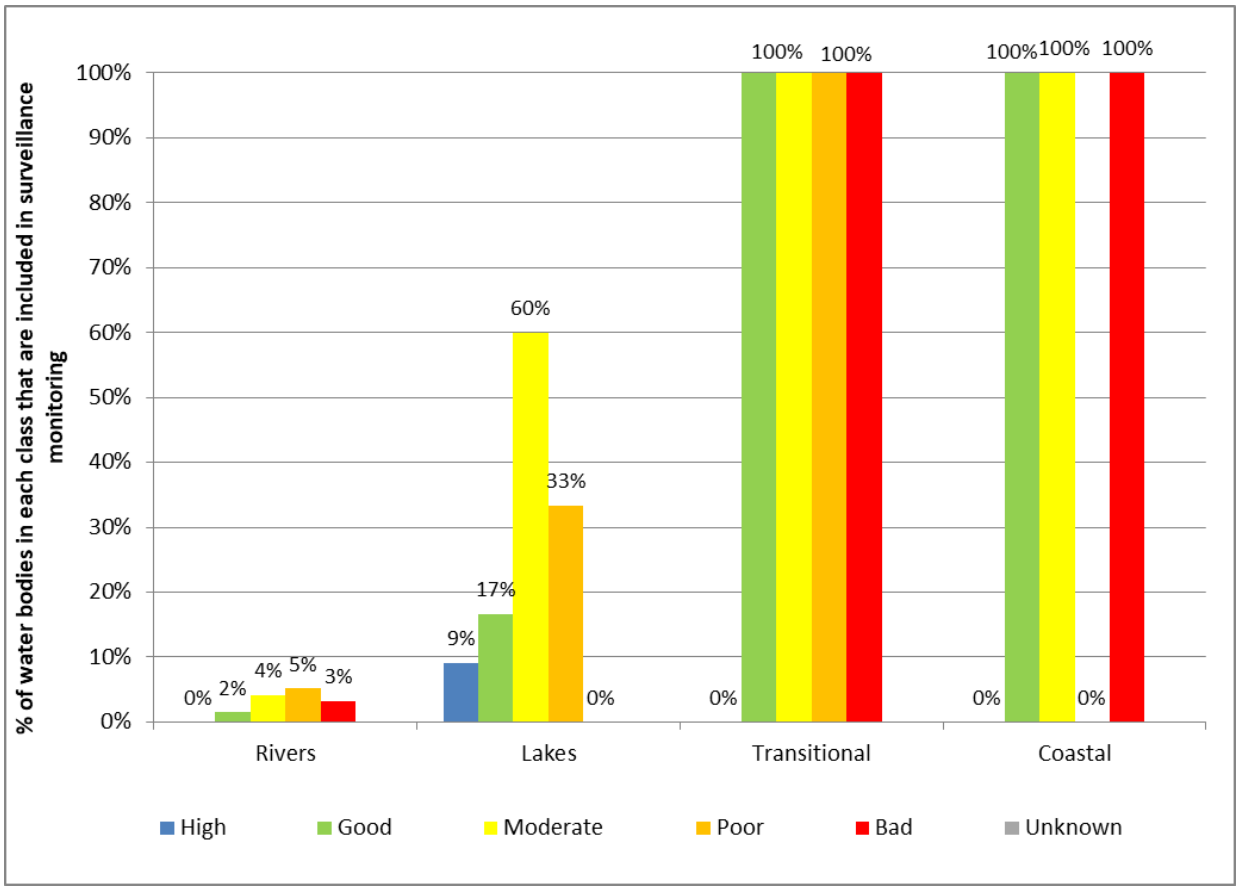
Figure 3.1 ***Percentage of water bodies included in surveillance and operational monitoring in Croatia for the first RBMP (2013) and second RBMP (2016). Note: no differentiation is made between water bodies included in ecological and/or chemical monitoring***



Source: WISE electronic reporting. Note that there are discrepancies in the number of transitional water bodies reported in the WISE monitoring schema compared to those reported in the WISE Surface Water Body schema resulting in percentages greater than 100.

Figure 3.2 shows the proportion of water bodies in each ecological status/potential class that are included in surveillance monitoring in Croatia. This shows the desired distribution of surveillance monitoring sites among the ecological status/potential class.

Figure 3.2 Proportion of water bodies in each ecological status/potential class that are included in surveillance monitoring in Croatia



Source: WISE electronic reporting

Operational monitoring of surface water bodies

No biological quality element was used in the operational monitoring of lakes in Croatia. Predominantly benthic invertebrates and phytobenthos were used for operational monitoring of rivers though macrophytes and phytoplankton were also used to a lesser extent: fish were not monitored. Phytoplankton and benthic invertebrates were mainly used in coastal and transitional waters with macrophytes also used in both categories and fish in transitional waters.

Transboundary surface water body monitoring

Croatia reported transboundary coastal, river, transitional and groundwater bodies. Monitoring sites that are part of international network of river or other convention or of a sea convention were reported for coastal waters (10 sites), rivers (24 sites) and transitional waters (two sites).

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

Ecological Status/potential of surface water

The ecological status/potential of surface water bodies in Croatia for the second RBMP is illustrated in Map 3.1. This is based on the most recent assessment of status.

Croatia delineated a high number of river water bodies (1 484). This large number seems to complicate the ecological status assessment.

Figure 3.3 compares the ecological status of surface water bodies in Croatia for the first RBMP with that for the second (based on the most recent assessment of status/potential) and that expected by 2015).

A detailed breakdown of ecological status/potential in each RBD and water category can be viewed in the WISE electronic reports.

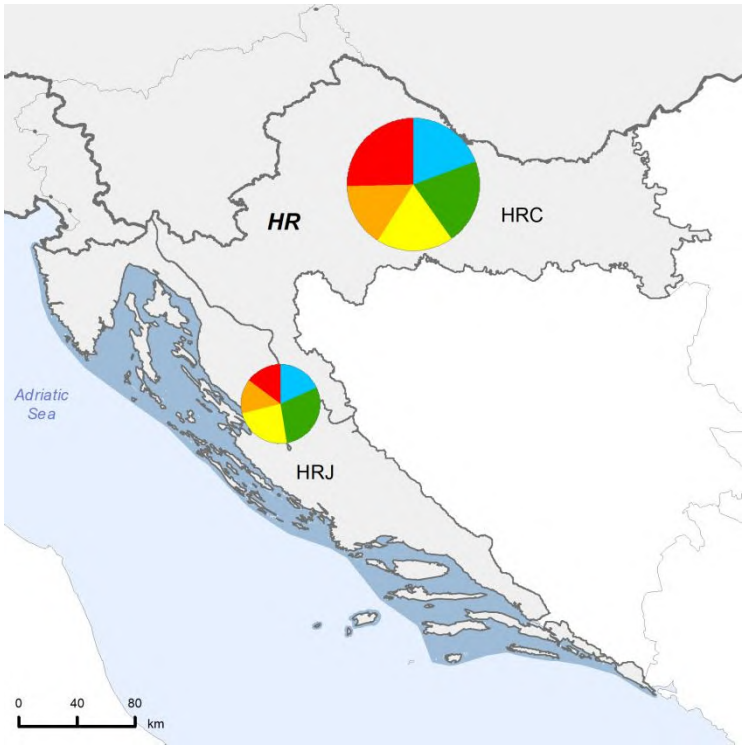
There was a decrease in the proportion of surface water bodies at good or better ecological status/potential from 51 % for the first RBMP to 42 % for the second.

The significance of the changes in status/potential need to be considered in terms of, for example, changes in the delineation of water bodies. There was a 20 % increase in the number of delineated surface water bodies between the two RBMPs with the largest increase being in river water bodies (1 231 for the first RBMP to 1 484 for the second).

Member States were asked to report the expected date for the achievement of good ecological status/potential. The information for Croatia is shown in Figure 3.4. The expected date of achievement of good ecological status/potential for a large proportion of river and lake water bodies remains unknown.

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

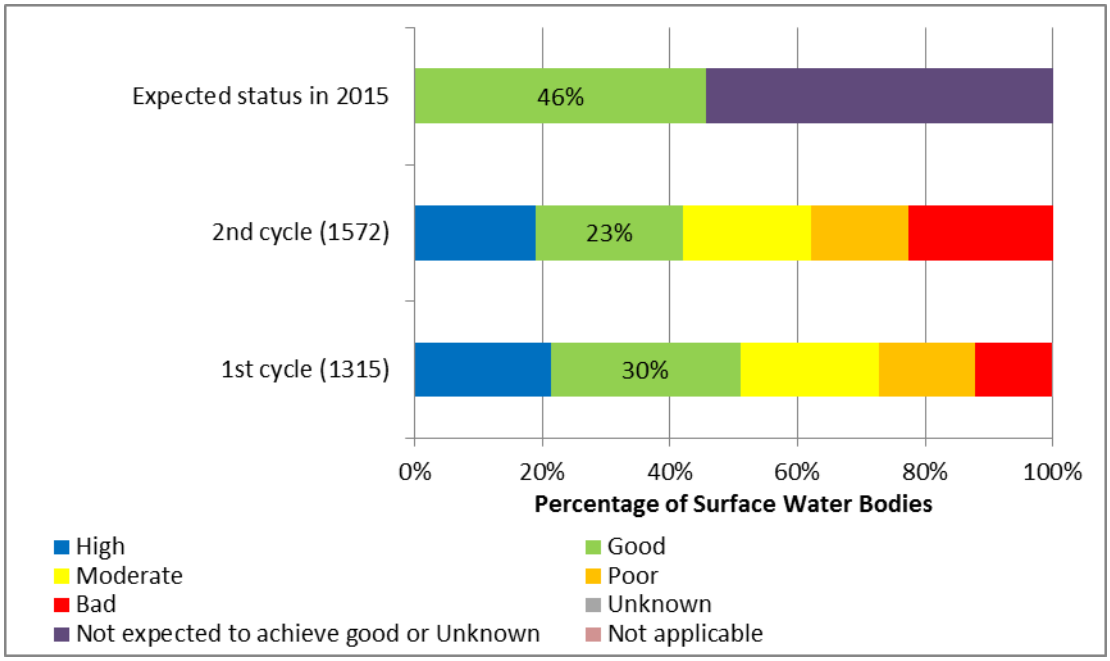
Note: Standard colours based on WFD Annex V, Article 1.4.2(i).



Source: WISE, Eurostat (country borders)

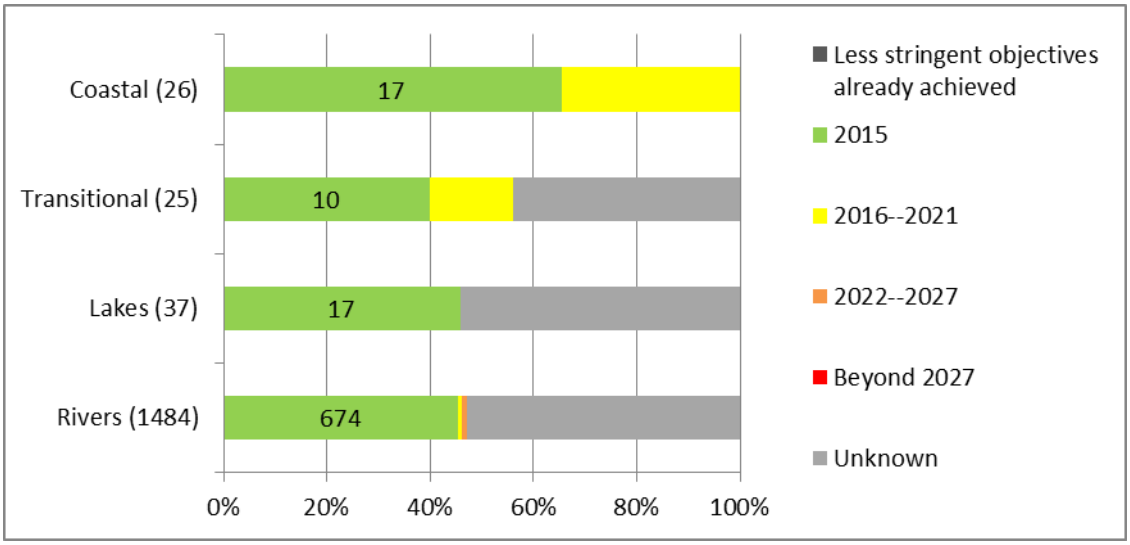
High
Good
Moderate
Poor
Bad
Unknown
RBDs
Countries outside the European Union

Figure 3.3 ***Ecological status or potential of surface water bodies in Croatia for the second RBMP, for the first RBMP and expected in 2015. The number in the parenthesis is the number of surface water bodies for both cycles. Note the period of the assessment of status for the second RBMP was 2010 to 2015. The year of the assessment of status for first RBMP is not known***



Source: WISE electronic reporting

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

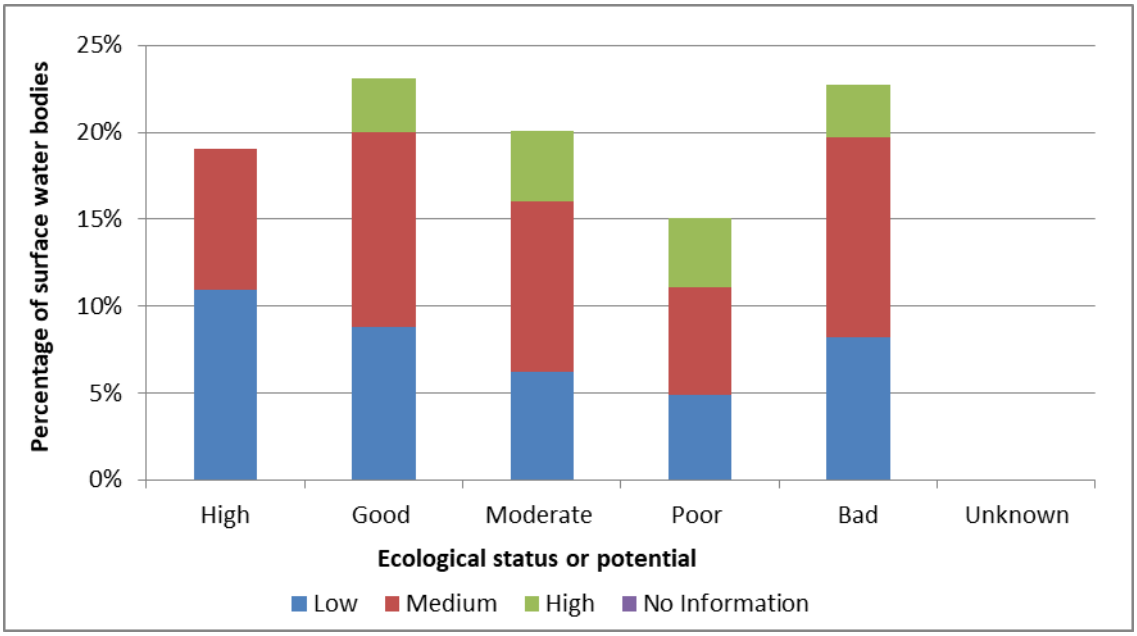


Source: WISE electronic reporting

Confidence in Ecological Status 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 Croatia based on the most recently assessed status/potential



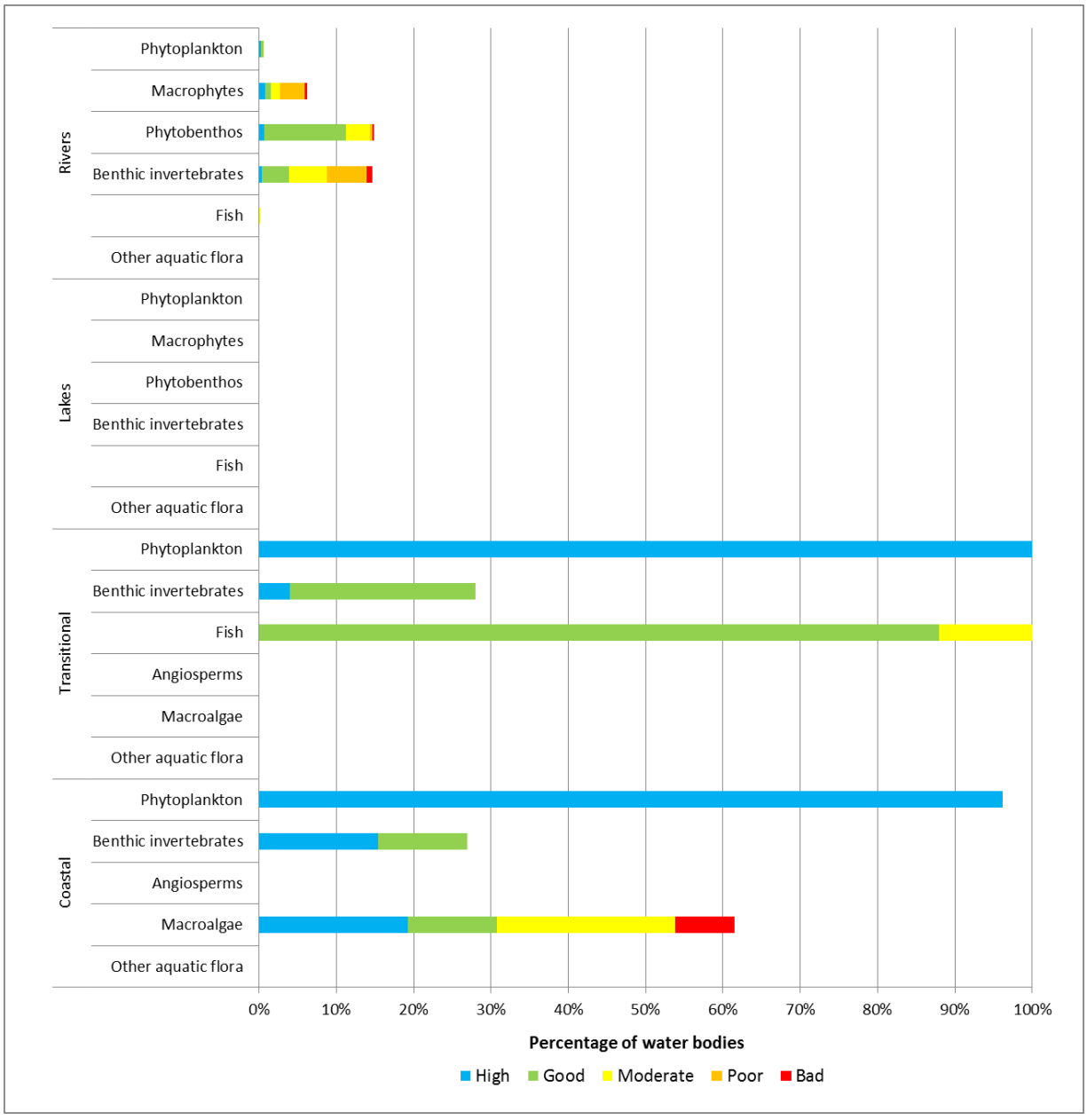
Source: WISE electronic reporting

A medium level of confidence was reported for all surface water bodies classified for ecological status/potential for the first RBMP in Croatia. For the second RBMP, all three levels of confidence were reported with 14 % at high, 47 % at medium and 39 % at a low level of confidence.

Classification of ecological status at the quality element level

Only a very small fraction of water bodies has been classified on the basis of biological quality element assessments. The ecological status of most water bodies is based on physicochemical or hydromorphological quality elements. The biological elements have only been used in the classification for about 15 % of water bodies. Coastal water bodies are best covered by biological classification (Figure 3.6).

Figure 3.6 Ecological status/potential of the biological quality elements used in the classification of surface water bodies in Croatia. Note that water bodies with unknown status/potential, and those that are monitored but not classified or not applicable, are not presented

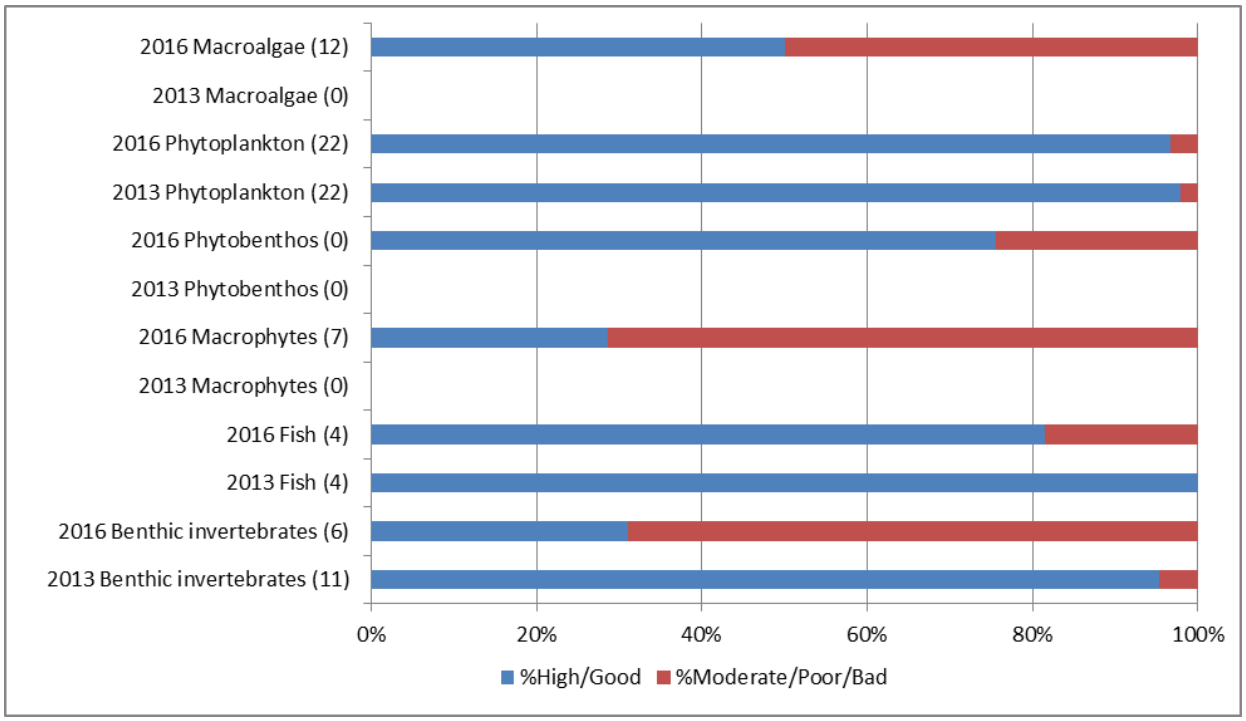


Source: WISE electronic reporting

Figure 3.7 compares the classification of biological quality elements in terms of ecological status/potential for the two 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 from the first to the second RBMP. Some additional biological quality elements have been introduced in the second RBMP: macroalgae,

phytobenthos, macrophytes and some indicate a deterioration in status in the second RBMP (benthic invertebrates and fish).

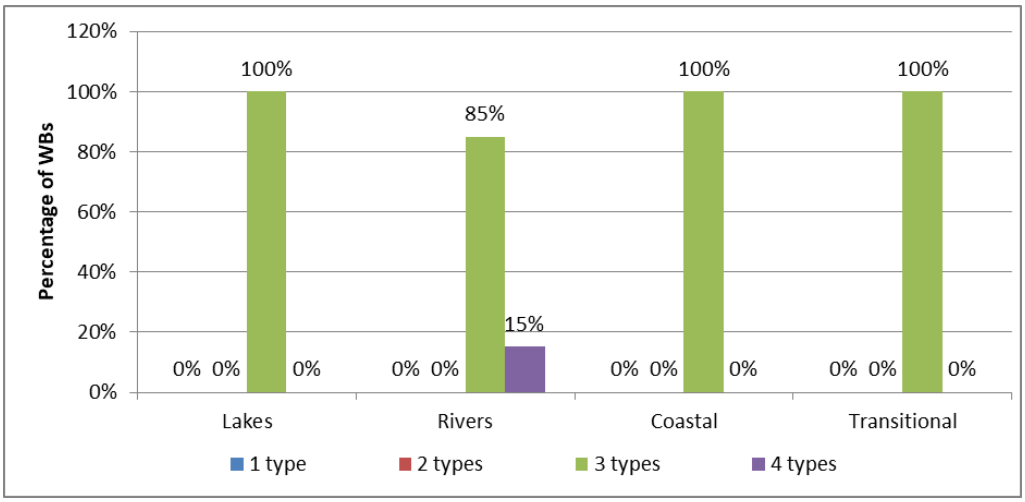
Figure 3.7 Comparison of ecological status/potential in Croatia according to classified biological quality elements in surface waters from the first to the second RBMP. The numbers in parentheses are the number of surface water bodies with a classification for that element.



Source: WISE electronic reporting.

Figure 3.8 illustrates the basis of the classification of ecological status/potential of rivers and lakes in Croatia for the second RBMP; confirming that only 15 % of river water bodies are classified on the basis of all four types of quality element with the remainder of rivers and other water categories classified on the basis of just three.

Figure 3.8 ***The classification of the ecological status or potential of surface water bodies in Croatia using 1, 2, 3 or 4 types of quality element. Note: The 4 types are: biological; hydromorphological, general physicochemical and River Basin Specific Pollutants.***



Source: Extracted from WISE.

Assessment methods for the biological quality elements

No methods were reported for angiosperms in coastal and transitional waters, and for macroalgae in transitional waters though a method for macrophytes was reported.

Furthermore, Croatia lacks an assessment method for fish in lakes that is currently under development. The method for assessing the ecological potential of the various water categories is also still under development.

No biological quality element assessment method was reported to be sensitive to chemical pollution in rivers even though this impact was reported to be significant in both RBDs.

The RBMP give some indications on changes since the first RBMP. It says that on the basis of the new findings emerging from the research projects carried out in the period from 2009 to 2013, the need for revision of the typology for some surface water categories and for the re-determination of water bodies in accordance with the new typology has been identified. The collected findings have resulted in substantial modifications and improvements in the surface water status assessment system in relation to the first RBMP. This applies in particular to the increase in the number of quality elements for which the reference values and class boundaries, primarily the biological elements, are set.

There is limited information in the RBMP on changes between the first and second RBMP in the assessment methodologies for the biological quality elements. All changes are given in a common (ecology status and potential, chemical status, ecological status is said to be assessed through biological and chemical status) summary on surface water status. The elements of changes can be repeated as for the ecological and chemical status given above: the biggest change is use of higher number of biological elements for assessment, but overall there is a lack of spatial and temporal coverage of data. At the national level only 180 river water bodies were assessed, or approximately 13 % of all river water bodies. Coverage of biological monitoring is higher in the Danube RBD (15 % of water bodies). Only 5 % of river water bodies are rated in the Adriatic RBD. This is to be tackled with measures in this new RBMP 2016-2021.

Intercalibration of biological assessment methods and national classification systems

All five coastal water and four transitional water types were reported to have an equivalent common intercalibration type. 21 of the 28[19] river types do not have a common intercalibration type: it will be important that the results of intercalibration are adequately translated to these 21 national types. None of the 6 lake types have an equivalent common intercalibration type: this calls into question the comparability of the classification of the ecological status/potential of lakes with other Member States.

The published RBMPs indicate that Croatia did not participate in the first and second cycles of intercalibration exercises because at that time it was not a member of the European Union. Therefore, the national classification system of biological elements in surface inland waters did not have enough data to carry out the intercalibration process. However, intercalibration will be carried out subsequently as instructed by the European Commission's guide "Procedure to fit new or revised national classifications to the completed Intercalibration exercise".[20]

Assessment methods for hydromorphological quality elements

The expected hydromorphological quality elements are assessed in terms of ecological status/potential in rivers and lakes. However the classification boundaries are not related to the class boundaries of the sensitive biological quality elements in rivers. The classification boundaries for morphological conditions in lakes are related to the class boundaries of the sensitive biological quality elements. Only morphological conditions are assessed in

[19] Croatia clarified that 28 river types, not 27, are found in Croatia.
[20] https://circabc.europa.eu/sd/a/5aee6446-276c-4440-a7de-0d4dec41ed4b/IC_manual_2015_to%20be%20published.pdf

transitional and coastal waters and the class boundaries are related to the sensitive biological quality elements.

Classification methods for general physiochemical quality elements

The reported physicochemical quality elements are assessed in terms of ecological status/potential in all water categories. However, not all the relevant elements are assessed and the classification boundaries are not related to the class boundaries of the sensitive biological quality elements for some of the elements.

In rivers, only oxygenation and nutrient conditions are assessed in terms of ecological status/potential and their classification boundaries are related to the class boundaries of the sensitive biological quality elements. For lakes, three elements (transparency, oxygenation and nutrient conditions) are assessed and again all are related to the classification boundaries of the sensitive biological quality elements. Three (transparency, oxygenation and nutrient conditions) of the five elements assessed in transitional and coastal waters were also classified in relation to the sensitive biological quality elements, two (thermal and salinity conditions) were not.

The reported standards for physicochemical quality elements in rivers and lakes have not been defined for individual types separately. This holds the risk of inappropriate status classification because, for instance, different river types naturally vary in their national nutrient concentrations.

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

The RBMP indicates that river basin specific pollutants have been identified by a number of means including from the measured concentrations in water bodies arising from monitoring programmes, from estimated concentrations in water bodies derived from modelling exercises which consider production, use and emission data and on the risk posed by releases of substances from both point and diffuse sources in the RBD.

Environmental Quality Standards are reported for seven River Basin Specific Pollutants, only for water. Six of these are set for rivers, six for lakes and two in coastal and transitional waters. The standards were not reported to be derived in accordance with the 2011 Technical Guidance Document No. 27[21] for all substances in all water categories[22].

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

It is interesting to note that although standards were reported for coastal and transitional waters, River Basin Specific Pollutants were not reported as classified in these categories of water (see Figure 3.9 below). In addition, in lakes, River Basin Specific pollutants are classified only on the basis of grouping.

The analytical methods used meet the minimum performance criteria laid down in Article 4(1) of Directive 2009/90/EC[23] for the strictest standard applied for six or the seven substances and complied with Article 4(2) for the other.

Use of monitoring results for classification

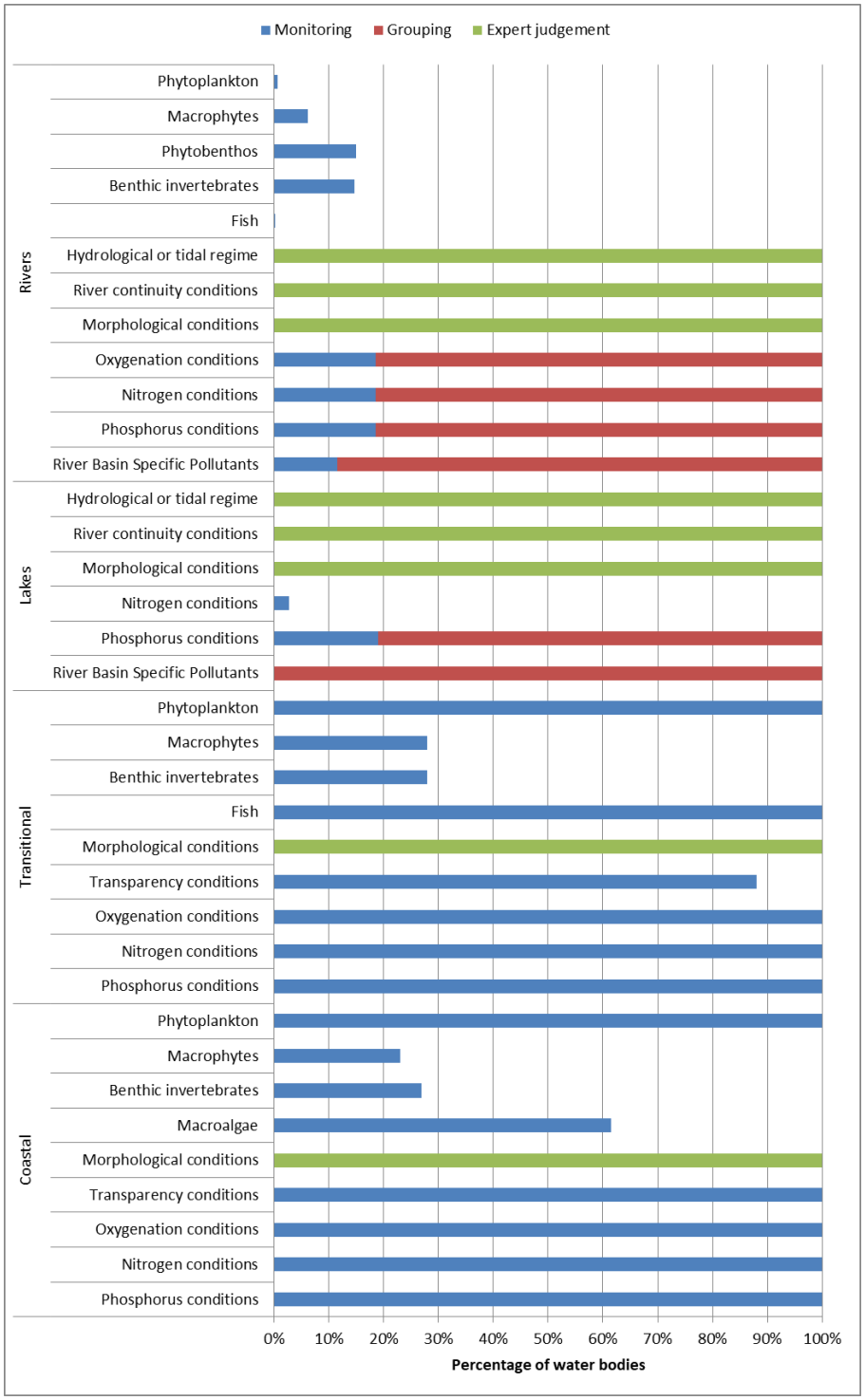
The basis of the classification of the individual quality elements is illustrated in Figure 3.9. Morphological conditions were used in the classification of all water categories, hydrological regime were also used in rivers and lakes and continuity in rivers. The classification of all hydromorphological quality elements in all categories was based on expert judgment and none was monitored. This introduces uncertainty and undermines the robustness of the classification on ecological status/potential in Croatia.

The classification of biological quality elements in all water categories was based on monitoring results though in some cases (particularly in rivers), the elements were monitored in fewer water bodies than were subsequently classified: this raises the question on how some water bodies were classified based on monitoring results when they were not monitored.
Grouping was used for classifying some physicochemical elements and River Basin Specific Pollutants in rivers and lakes. Grouping was not used for any biological quality element or hydromorphological quality element in any of the water categories. River Basin Specific Pollutants were only classified in lakes and rivers even though they are monitored in all four water categories: monitoring results were only used in the classification of rivers. This raises the question as to how grouping was undertaken when classifying lakes for these substances when none had been classified based on monitoring results.

[22] However, Croatia subsequently clarified that the environmental quality standards for arsenic, copper, zinc, chromium and their compounds have now been revised according to the Technical Guidance Document. They are also planning to revise the standards for fluorides, adsorbable organic halogens (AOX) and polychlorinated biphenyls (PCBs) in accordance with the Guidance Document.

[23] 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

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



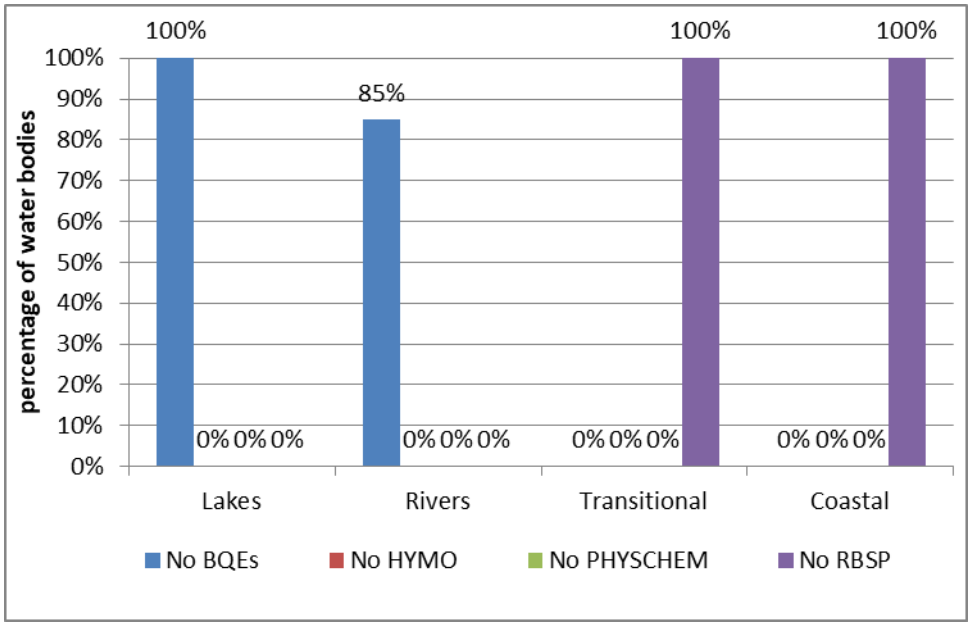
Source: WISE electronic reporting

Overall classification of ecological status (one-out, all-out principle)

The 'one-out, all-out' principle has been applied in deriving the overall classification of the ecological status of a water body.

Figure 3.10 illustrates the basis of the classification of ecological status/potential of rivers and lakes in Croatia for the second RBMP.

Figure 3.10 ***The percentage of surface water bodies in Croatia 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: Member State reporting to WISE

3.2 Main changes in implementation and compliance since the first RBMP

For the first RBMP, there were no sites for operational monitoring in coastal and transitional waters in the Adriatic RBD: for the second RBMP 29 sites and 23 sites, respectively were reported. There were also increases in the number of operational sites in river and lakes in both RBDs compared to the first RBMP. Whilst there was a decrease in the number of coastal and lake sites used for surveillance purposes in the Adriatic RBD for the second RBMP, there was no change in the number of surveillance sites in rivers in the Danube RBD and increases in lake sites in the Danube RBD, and in transitional waters and rivers in the Adriatic RBD.

For the first RBMP there was no operational monitoring in coastal and transitional waters: for the second RBMP there was. Overall for the first RBMP, 9 % of surface water bodies were

included in operational monitoring and 7 % in surveillance monitoring: the respective values for the second RBMP were 10 % and 6 %. It should be borne in mind that there was a 20 % increase in the number of surface water bodies from 1315 for the first RBMP to 1572 for the second.

There was a decrease in the proportion of surface water bodies at good or better ecological status/potential from 51 % for the first RBMP to 42 % for the second. However, the significance of the changes in status/potential need to be considered in terms of, for example, changes in the delineation of water bodies. There was a 20 % increase in the number of delineated surface water bodies from the first to the second RBMP with the largest increase being in river water bodies (1231 for the first RBMP to 1484 for the second).

3.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMP and Programme 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 (start monitoring hydromorphological parameters in lakes and transitional and coastal waters and fish in lakes).*

  Assessment: Hydromorphological quality elements are not monitored in Croatia. There has been no progress on this aspect. Fish are still not monitored in lakes. There has been progress on this aspect.

  The assessment methods for most biological quality elements are in place (except for fish in lakes, angiosperms in coastal and transitional waters, and for macroalgae in transitional waters and for ecological potential assessment). Some of these gaps are currently addressed by ongoing research projects.

  Croatia subsequently indicated that work has been and is underway to further develop methods for the status assessment of water bodies. This includes the implementation of hydromorphological monitoring and assessment in rivers and a project was initiated for implementation of hydromorphological monitoring and the development of methodologies for monitoring and assessment of hydromorphological indicators in natural lakes and transitional and coastal waters. There is also a project which would obtain adequate information regarding the status of fish populations in natural lakes.

The methods for angiosperms in transitional and coastal waters have also been developed.

In conclusion, there has been progress on this recommendation and it has been partially fulfilled.

- Recommendation: *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: Croatia reported what determinands were included as physicochemical quality elements: however the expected and required elements were not monitored in all water bodies. Some progress has been made on this aspect. Angiosperms and macroalgae are still not monitored in transitional waters but there has been some progress with regards to benthic invertebrates. However, there has been deterioration in implementation of monitoring on coastal waters where angiosperms and macroalgae were reported not to be monitored for the second RBMP. No hydromorphological quality elements in any of the four water categories were reported to be monitored.

  In conclusion, there has not been sufficient progress on this recommendation and it is not fulfilled.

- Recommendation: *Review and update the list of river basin specific pollutants*

  There was no information associated with the first RBMP on which RBSPs had been selected. Though information was found in the second RBMP on how RBSPs were selected, there was no information on how these had changed since the first plan. Croatia subsequently clarified that the first and second RBMPs used the same RBSPs.

  This recommendation is not 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 RBMP

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[24] 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 programme of measures.

Section 3.1.1. of this report summarises the characteristics of the surveillance and operational monitoring programmes in Croatia for the second RBMP.

Figure 4.1 summarises the proportion of sites used for the monitoring of chemical status in surface waters for the second RBMP. No distinction is made between sites used for surveillance and/or operational purposes.

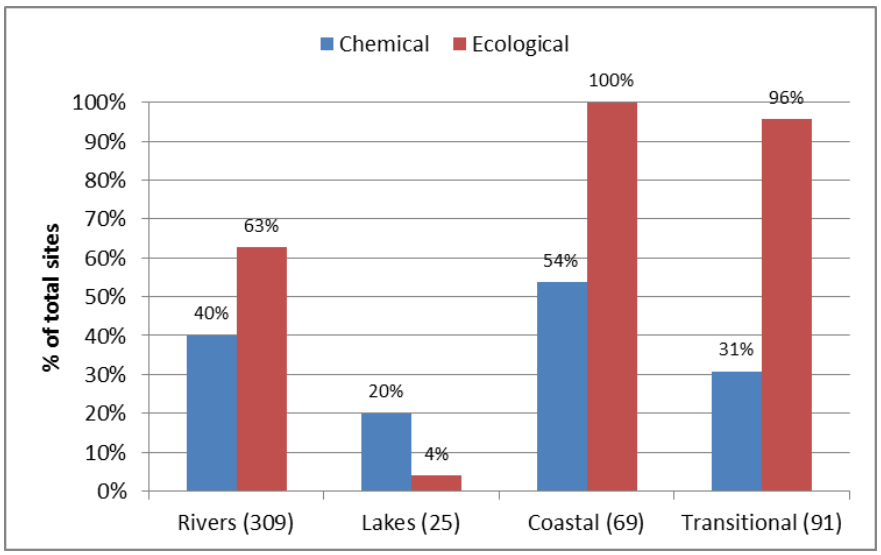
More detailed information can be found on the website of the European Environment Agency[25].

As shown, 20 %, 40 %, 54 % and 31 % of monitoring sites are used for monitoring of chemical status in lakes, rivers, coastal waters and transitional waters respectively. No territorial waters are delineated, monitored or assessed for chemical status in Croatia[26].

[24] Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L0060

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

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



Source: WISE electronic reporting

Figure 4.2 summarises the proportion of water bodies monitored for chemical status in surface freshwaters for the second RBMP. No distinction is made between sites used 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. According to the information reported to WISE, all coastal water bodies and 96 % transitional water bodies[27] (there are 25 of these) are monitored for chemical status whereas only 14 % and 7 % of lake and river water bodies respectively are monitored for chemical status. Croatia subsequently clarified that all transitional water bodies are actually monitored for chemical status.[28]

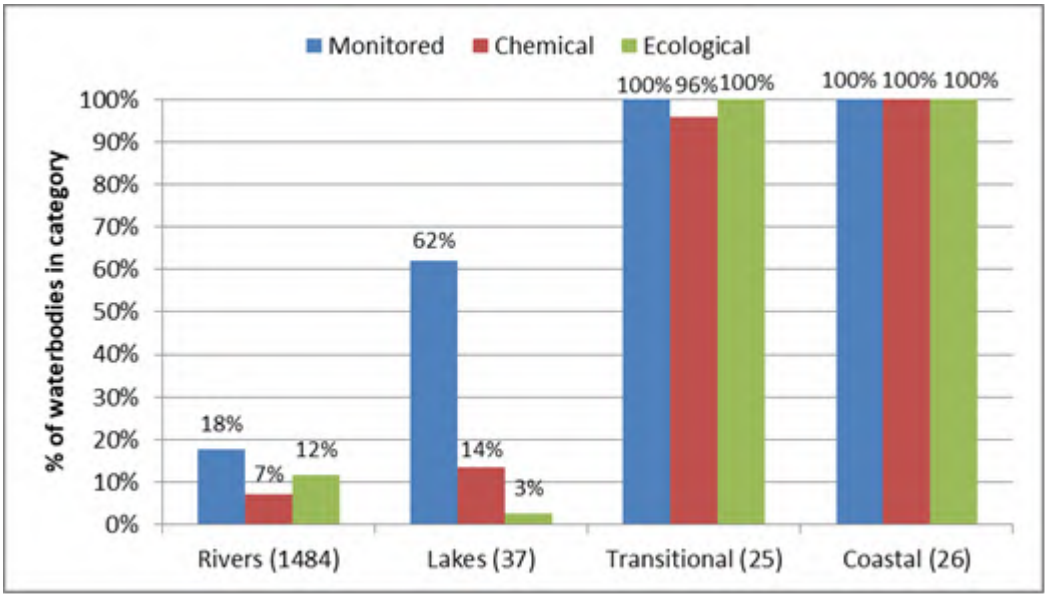
In the Danube RBD, only 17 % of river water bodies that fail to achieve good chemical status are monitored as part of the operational monitoring programme for chemical status whereas in the Adriatic RBD Croatia clarified that all coastal and transitional water bodies and 35 % of river water bodies that fail to achieve good chemical status are monitored for chemical status.

[26] Croatia subsequently informed that the territorial water bodies with regard to the RBMP and planning documents prepared according to the requirements of Directive 2008/56/EC (Marine Strategy Framework Directive) will be analysed in the RBMP 2021 – 2027.

[27] Croatia informed that all 25 transitional water were monitored for chemical status.

[28] Croatia also expressed doubts as regards the value of 14 % for lakes.

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



Source: WISE electronic reporting.

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 numbers 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

According to WISE, in the Danube RBD, 36 groups of Priority Substances are monitored in water and all 41 groups of Priority Substances are monitored in water in the Adriatic RBD. However, Croatia subsequently clarified that in each RBD, 37 substances are monitored: brominated diphenylethers, chloroalkanes, tributyltin compounds and trifluralin are not monitored in any of the two RBDs.

In the Adriatic RBD, all coastal water bodies and 92 % of transitional water bodies are monitored for more than 10 Priority Substances. For the Danube RBD (lake and river water bodies only), 90 % of water bodies are not monitored for any Priority Substance. For river water bodies and lake water bodies in the Adriatic RBD, over 90 % and 75 % are not monitored for any Priority Substances respectively but the remaining 25 % of lake water bodies are monitored for more than 10 Priority Substances.

Mercury, hexachlorobenzene and hexachlorobutadiene are not monitored for status assessment in biota in Croatia.[29]

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 of 12 times per year and at least once per cycle in water were reported for 31 groups of Priority Substances at the monitoring site level for a least some sites. This is consistent with the minimum recommended frequency of the Directive for surveillance, but not for operational, monitoring. Frequencies of less than 12 times per year and at least once per cycle were reported for 41 groups of Priority Substances at some sites[30]. No explanation could be found for these reduced frequencies. However, Croatia mentioned that a supplementary measure is planned in the Programmes of Measures to improve chemical status monitoring[31].

[29] Croatia clarified that the project "Development of the methodology for monitoring elements of chemical status in biota in terrestrial surface waters and implementation of preliminary monitoring" is close to finalization.
[30] Croatia indicated that supplementary measures had been identified in the RBMP to address this shortcoming.
[31] Measure called " *Supplementary measures of the harmonization of water status 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[32] that tend to accumulate in sediment and/or biota, for the purpose of long-term trend assessment.

Spatial Coverage

Of the 14 groups of Priority Substances which the environmental quality standard Directive requires the monitoring of the long-term trend in biota and/or sediment, both RBDs in Croatia monitor in river water bodies only; lead, mercury, nickel and cadmium. In the Adriatic RBD, hexachlorobenzene is also monitored in riverine sediment as well as a number of other Priority Substances that are not part of the 14 listed specifically in the EQS Directive.

Frequencies

Monitoring should take place at least once every three years, unless technical knowledge and expert judgment justify another interval.

All substances are monitored once or twice a year and every year in the cycle which is above the minimum recommended 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."

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

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

In both RBDs in Croatia, six groups of Priority Substances are reported to be in an inventory, discharged, and also monitored (i.e. all groups of Priority Substances discharged are monitored). These substances are: anthracene, fluoranthene, lead, mercury; nickel and cadmium. As only six substances are considered in the inventories, it is unclear whether others (in particular the four non monitored substances) are discharged as well, and in which RBD.

Performances of analytical methods used

For 25 groups of Priority Substances in the Danube RBD, the analytical methods used meet the minimum performance criteria laid down in Article 4(1) of Directive 2009/90/EC for the strictest standard were applied. For 12 out of the remaining 16 groups Priority Substances reported, the analytical methods complied with the requirements laid down in Article 4(2) of Directive 2009/90/EC using best available techniques not entailing excessive costs.

According to WISE, in the Adriatic RBD, the analytical methods for endosulfan and tributyltin comply neither with Article 4(1) nor Article 4(2).

The method of dealing with measurements of Priority Substances lower than the limit of quantification is reported to be as specified in Article 5 of the Technical specifications for chemical analysis and monitoring of water status Directive (2009/90/EC).

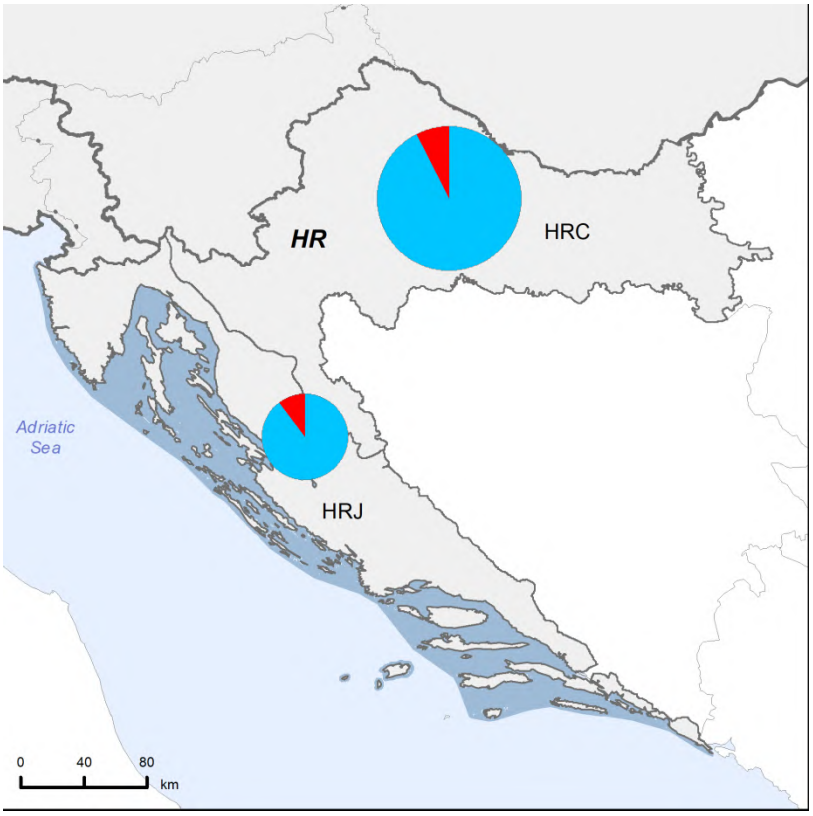
4.1.2 Chemical Status of surface water bodies

Member States are required to report the year on which the assessment of chemical status is 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. Overall the chemical assessments were carried out in the period 2012-2015 for the Adriatic RBD and 2012 for the Danube RBD.

The chemical status of surface water bodies in Croatia for the second RBMP is illustrated in Map 4.1. This is based on the most recent assessment of status and shows that overall in Croatia 92 % of water bodies are at good chemical status and 8 % are failing to achieve good chemical status.

Map 4.1 ***Chemical status of surface water bodies in Croatia 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

The chemical status of surface water bodies in Croatia for the first and second RBMP is given in Table 4.1. Overall between the two cycles, the proportion of surface water bodies with good chemical status decreased from 97 to 92 % and the proportion that failed to achieve good status increased from 3 to 8 %.

Table 4.1 ***Chemical status of surface water bodies in Croatia for the second and first RBMP. Note: the number in parenthesis next to the water category is the number of water bodies. Note: Chemical status assessment is based on the standards laid down in EQS Directive 2008/105/EC (version in force on 13 January 2009). Some Member States did not implement the Directive in the first RBMP as the transposition deadline was in July 2010, after the adoption of the first RBMP***

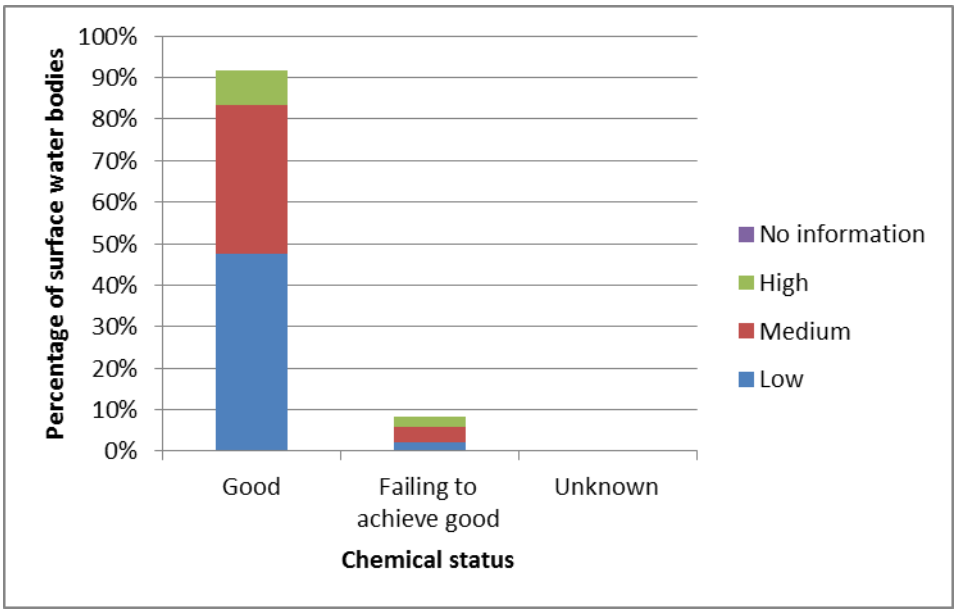
Category	Good		Failing to achieve good		Unknown	
	Number	%	Number	%	Number	%
second RBMP						
Lakes (37)	37	100 %				
Rivers (1484)	1366	92 %	118	8 %		
Transitional (25)	18	72 %	7	28 %		
Coastal (26)	22	85 %	4	15 %		
Total (1572)	1443	92 %	129	8 %		
First RBMP						
Lakes (34)	34	100 %				
Rivers (1231)	1201	98 %	30	2 %		
Transitional (28)	25	89 %	1	4 %	2	7 %
Coastal (22)	19	86 %	3	14 %		
Total (1315)	1279	97 %	34	3 %	2	0.2 %

Source: WISE electronic reporting

Figure 4.3 shows the confidence in the classification of chemical status for the second RBMP. Overall, 50 % of surface water bodies in Croatia were classified for chemical status with low confidence, 39 % with medium confidence and only 11 % with high confidence. Confidence in the classification of chemical status for the first RBMP was not reported.

Grouping is used to classify non monitored water bodies (water bodies in a same group are influenced by the same pressure type or the same combination of different pressure types and magnitude(s)). The proportion of water bodies classified with low confidence reflects the use of grouping in surface freshwaters where the extent of monitoring was more limited than for transitional and coastal waters.

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



Source: WISE electronic reporting

The assessment of chemical status for the second RBMP was expected to be based on the standards laid down in EQS Directive 2008/105/EC (version in force on 13 January 2009[33]). Some Member States did not implement the Directive in the first RBMP as the transposition deadline was in July 2010, after the adoption of the first RBMP.

More information on the chemical status in each RBD and water category can be found on the website of the European Environment Agency[34].

Directive 2013/39/EU amended the EQS Directive. In particular, it sets more stringent environmental quality standards for seven substances[35]. Member States were asked to report whether the new standards caused the status of the surface water body to appear to deteriorate. Across the two RBDs in Croatia, this was the case for 23 % of surface water bodies for fluoranthene and for 5 % of surface water bodies for nickel. Information for only six substances was reported (and was not provided for naphthalene).

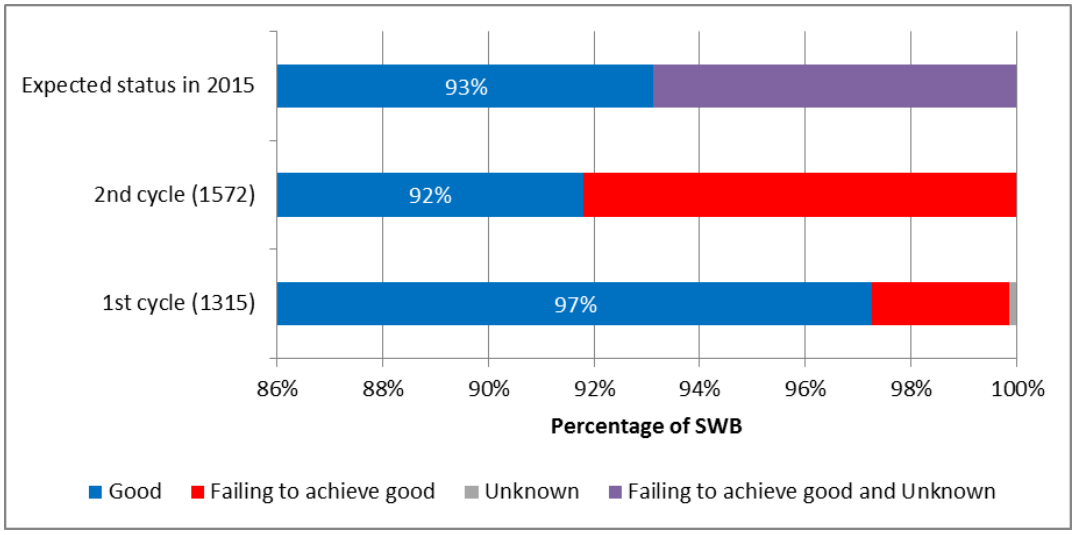
[33] Please note that following Directive 2013/39/EU, which amended the Environmental Quality Standards Directive, introduced a less stringent annual average EQS for naphthalene in transitional waters. This less stringent environmental quality standard should be taken into account for the determination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

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

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

Figure 4.4 compares the chemical status of surface water bodies in Croatia for the first RBMP with that for the second RBMP (based on the most recent assessment of status) and that expected by 2015. This shows the 5 % decrease in surface water bodies at good status and the fact that the expected status in 2015 was very similar to what was given in the second RBMP.

Figure 4.4 ***Chemical status of surface water bodies in Croatia for the second RBMP, for the first RBMP and expected in 2015. The number in the parenthesis is the number of surface water bodies for both cycles. Note the period of the assessment of status for the second RBMP was 2012-2015. The year of the assessment of status for first RBMP is not known***

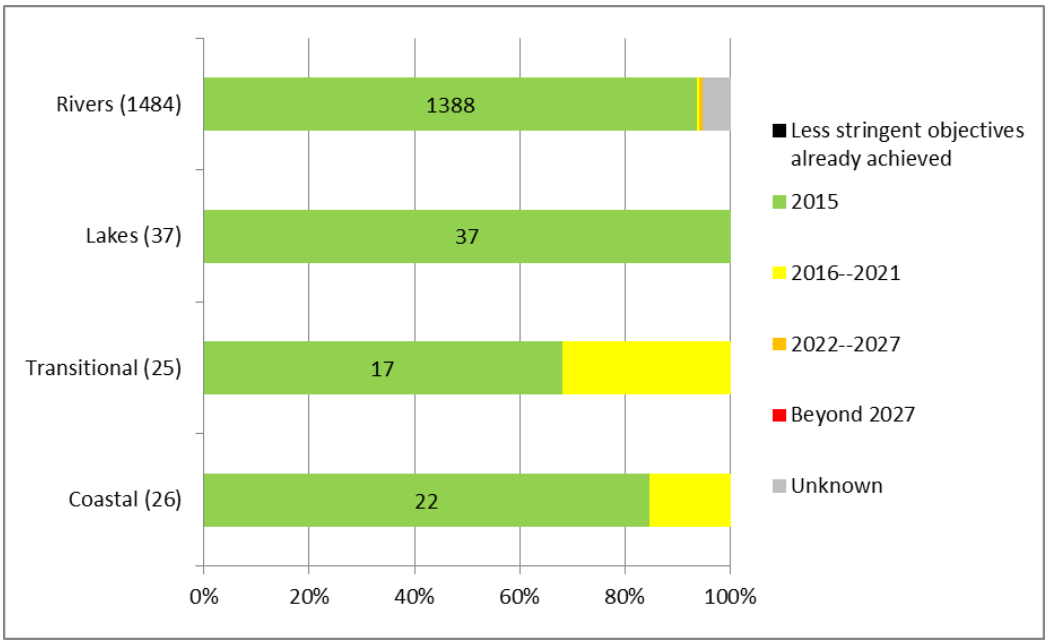


Source: WISE electronic reporting

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 WFD Article 4(5).

Member States were asked to report the expected date for the achievement of good chemical status. The information for Croatia is shown in Figure 4.5. Lakes achieved good chemical status by 2015 and coastal waters and transitional waters are expected to achieve good status by the end of the second RBMP (2021). There is some uncertainty for less than 5 % of rivers as to whether good status will be achieved by the end of the third cycle (2027) for which unknown is reported. The expected or actual improvement in the chemical status of surface water bodies at the end of the first RBMP was reported to be less than described in the RBMP.

Figure 4.5 Expected date of achievement of good chemical of surface water bodies in Croatia. The number in the parenthesis is the number of water bodies in each category



Source: WISE electronic reporting

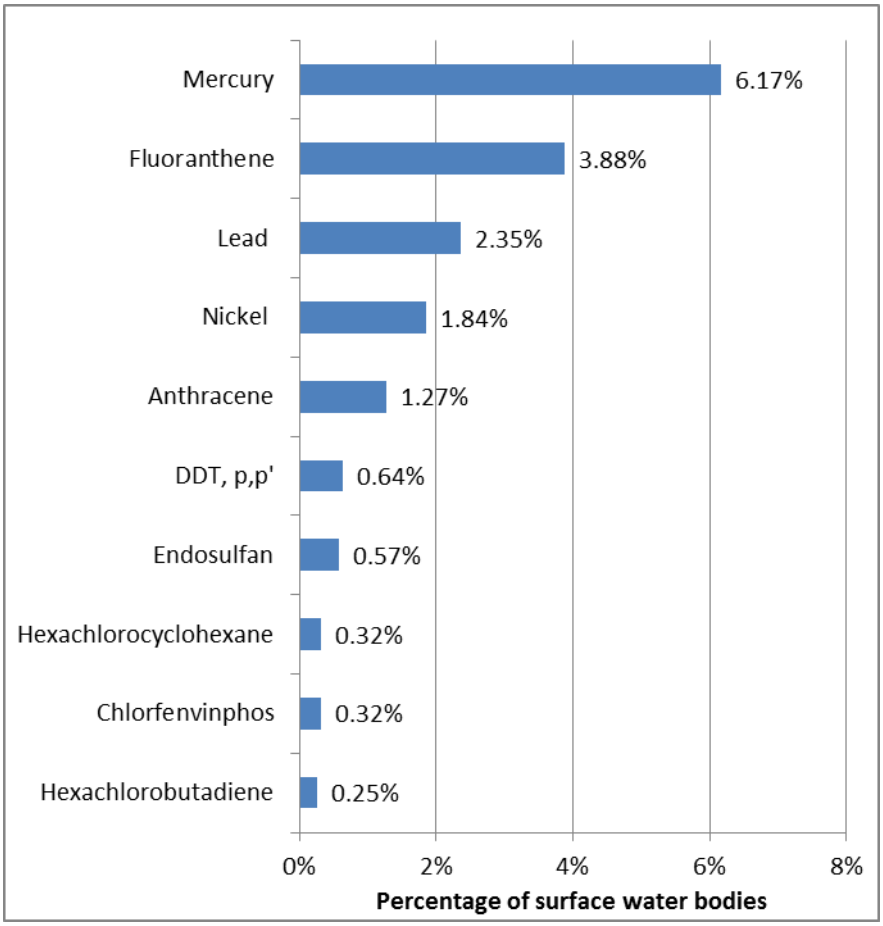
Priority substances causing the failure of good chemical status

Member States were expected to report exceedances based on the revised, more stringent Environmental Quality Standards from Directive 2013/39/EU.

The Priority Substances causing the greatest proportion of water bodies to fail good chemical status were mercury (6 % of surface water bodies); fluoranthene (4 %); lead (2 %) and nickel (2 %).

The "top-ten" substance are shown in Figure 4.6.

Figure 4.6 The top-ten Priority Substances causing failure to achieve good chemical status in surface water bodies in Croatia



Source: WISE electronic reporting

The largest proportion of exceedances were for the annual average environmental quality standard for fluoranthene (26 % of surface water bodies failing good status), lead (7 %) and mercury (6 %). In terms of exceedance of both types of standard (annual average and maximum allowable concentration), the largest proportion was for hexachlorocyclohexane (0.3 %).

Ubiquitous persistent, bioaccumulative and toxic Priority Substances

According to Article 8(a) of the EQS Directive[36], eight priority substances and groups of priority substances are behaving like ubiquitous, persistent, bioaccumulative and toxic substances[37]. 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

[36] Amended by Directive 2013/39/EU.

[37] Brominated diphenylether, Mercury and its compounds, Polyaromatic hydrocarbons (PAH), Tributyltin, PFOS, dioxins, hexabromocyclodecane and heptachlor.

deposition). In order to show the progress made in tackling other priority substances, Member States have the possibility to present the information related to chemical status separately for these substances.

The influence of ubiquitous persistent, bioaccumulative, toxic Priority Substances on chemical status was assessed as limited in Croatia. Only 1 % of surface waterbodies would improve for failing good status to good status if these substances were not taken into account.

This is illustrated in the 2018 State of Water report of the European Environment Agency. [38]

The absence of monitoring in biota may partly explain the limited exceedances found for mercury.

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

According to WISE, in the Danube RBD, four groups of Priority Substances are not monitored and not used in the assessment: trifluralin; tributyltin-cation; chloroalkanes C10-13, and brominated diphenylethers (congener numbers 28, 47, 99, 100, 153 and 154). Croatia clarified that all other substances are used in the assessment of status and monitored.

According to WISE, in the Adriatic RBD, brominated diphenylethers, endosulfan and tributyltin are monitored and used in the assessment in some water categories but not in others. Croatia subsequently clarified that in both the Adriatic RBD and the Danube RBD, brominated diphenylethers, chloroalkanes, tributyltin compounds and trifluralin are not monitored in rivers and lakes.

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.

Croatia reported that all of the environmental quality standards laid down in Part A of Annex I of the Directive 2008/105/EC from the version in force on 13 January 2009 had been applied

[38] 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

with the exception of hexachlorobutadiene, hexachlorobenzene and mercury and its compounds in both RBDs. The information reported in WISE for these substances is not entirely clear, however, Croatia subsequently confirmed that these standards used actually correspond to the standard in water present in the EQS Directive.

Use of mixing zones

Article 4 of the EQS Directive 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 standard 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 RBMP 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 not been designated in Croatia.

Background Concentrations and Bioavailability

The EQS Directive stipulates that Member States have the possibility, when assessing the monitoring results against the environmental quality standard, to take into account:

(a) natural background concentrations for metals and their compounds, if they prevent compliance with the environmental quality standard, and;

(b) hardness, pH or other water quality parameters that affect the bioavailability of metals.

No information is provided for Croatia as to whether natural background concentrations for metals and their compounds are taken into consideration where such concentrations prevent compliance with the relevant environmental quality standard. Also, no information is provided as to whether water quality parameters that affect the bioavailability of metals have been taken into account when assessing monitoring results against relevant environmental quality standards.

4.2 Main changes in implementation and compliance since the first RBMP

Between the first and second RBMP, there was a net increase in monitoring sites and surface water bodies monitored for operational purposes for chemical status assessment (an increase of 76 sites and 43 water bodies) both due to a relatively large increase in river monitoring. For surveillance monitoring, the number of sites has increased by eight and the number of water

bodies has decreased by 14 since the first RBMP. Croatia states in its RBMP that the number of monitoring sites has indeed increased as well as the number of monitored Priority Substances. It is also stated in the RBMP that more comprehensive and reliable database for the assessment of water status is being developed for the forthcoming cycle to develop a better understanding of the causes of exceedances and to better assess the effects of measures.

According to the first RBMP, not all Priority Substances could be analysed since none of the approved laboratories were equipped for the determination of certain substances.

Croatia states in its second RBMP that the system of surface water chemical assessment has been completely “normatively regulated” with the number of monitoring sites, indicators and monitoring frequencies increasing. It is reported that recently, Croatian Waters have introduced the "Monitoring Alignment Program (2016)" which is concerned with the improvement of all monitoring in the jurisdiction of Croatian Waters, including: (i) Monitoring of water status, (ii) Hydrological and meteorological monitoring, (iii) Monitoring of water pressures and emissions, (iv) Monitoring of water structures (buildings), and (v) Monitoring established in the Strategic Environmental Assessment Plans for water management documents. The monitoring program is the basis for the adoption of annual monitoring plans and water management plans established by the Water Law.

The other main change is with regard to chemical status of surface water bodies. It should be noted that there has been a re-delineation of water bodies between the two cycles and therefore a comparison of status between the two cycles should be treated with some caution (the number of water bodies reported increased from 1315 in the first RBMP to 1572 in the second RBMP and it appears that unknown water bodies in the first RBMP were categorised as Heavily Modified in the second) where, between the two cycles, there has been a decrease in the proportion of surface water bodies in Croatia as a whole with good chemical status. The proportion of water bodies at good status has decreased from 97 % to 92 % and the proportion that failed to achieve good status has increased from 3 % to 8 %.

4.3 Croatia provided no information on which substances resulted in an improvement of water bodies from failing to achieve good status to good statusProgress with Commission recommendations

The Commission recommendations based on the first RBMP and Programme 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 (start monitoring hydromorphological parameters in lakes and transitional and coastal waters and fish in lakes). 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 monitoring programme for chemical status in Croatia covers up to 54 % of monitoring sites across all surface water categories (with the exception of territorial waters). Monitoring covers all transitional and coastal water bodies but only up to 14 % of surface freshwaters (Overall about 10 % of water bodies are monitored for chemical status). The number of sites and waterbodies monitored for chemical status have increased, as well as the number of priority substances monitored, which represents a significant progress since the first RBMP. Grouping is used to assess the status of unmonitored waterbodies, but this is associated with a lower confidence in the assessment.

Monitoring for status assessment in water is undertaken for up to 37 groups of Priority Substances. All discharged substances are monitored, in accordance with the requirement of the Directive (however the inventories contain only six substances, so it is not entirely clear that all discharged substances have been fully identified). Four substances are still neither monitored nor used in the assessment of status. Monitoring is undertaken with a frequency that is consistent with the minimum recommended frequency for surveillance, but not for operational, monitoring, and no explanation could be found for the reduced frequencies. Mercury, hexachlorobenzene and hexachlorobutadiene are not monitored for status assessment in biota[39] in Croatia, which is expected to lead to the underestimation of the proportion of water bodies failing to achieve good status.

Croatia monitors some, but not all of the 14 required substances in sediment for trend assessment, at a frequency that is above the minimum recommended frequency.

As stated in Section 1.2, the RBMP imply that a more comprehensive and reliable database for the assessment of water status is being developed for the forthcoming RBMP to develop a better understanding of the causes of exceedances and to better assess the effects of measures.

[39] Croatia subsequently informed that the implementation of a project "Development of the methodology for monitoring elements of chemical status in biota in terrestrial surface waters and implementation of preliminary monitoring" is close to finalisation.

While some progress has been made with this recommendation, it is partially fulfilled.

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

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

5.1.1 Monitoring of quantitative status in groundwater

The total number of groundwater bodies in Croatia is 33 (Table 2.3). 11 groundwater bodies are not object of monitoring for quantitative status (Table 5.2). This means that 33 % of groundwater bodies are not monitored.

The RBMP and background documents indicate that in all river basin districts grouping was applied. Elements considered for grouping are similar geology, hydrogeology, stratigraphy, porosity (inter-granular, fracture, fracture-cavernous), geochemical composition (silicate, carbonate), geological forms (caves, pits, sinks, sinkhole zones), groundwater directions and flow rates (groundwater tracing analysis), groundwater feed and relation with surface flows and finally also the groundwater body position within the river basins.

The groundwater bodies cover 55,802 km² of the mainland territory and 11 larger islands with existing groundwater abstraction for public water supply purposes. There are no groundwater bodies on other islands and islets.

Table 5.1 Proportion of groundwater bodies in Croatia monitored for quantitative status

RBD	No of groundwater bodies with quantitative monitoring	Total No. groundwater bodies	% of total groundwater bodies monitored for quantitative status
HRC	13	20	65 %
HRJ	9	13	69.23 %

Source: WISE electronic reporting

Table 5.2 Number of groundwater bodies in Croatia directly monitored and purpose of monitoring

RBD	Total groundwater bodies directly monitored	Monitoring Purpose									
		AGR - Groundwater abstraction site for irrigation	CHE – Chemical status	DRI – Groundwater abstraction site for human consumption	DWD - Drinking water - WFD Annex IV.1.i	HAB - Protection of habitats or species depending on water - WFD Annex IV.1.v	NID - Nutrient sensitive area under the Nitrates Directive - WFD Annex IV.1.iv	QUA – Quantitat -ive status	SOE - EIONET State of Environ- ment monitoring	SUR – Surveillance monitoring	TRE - Chemical trend assessment
HRC	16		15	11	16	15	4	13	15	15	15
HRJ	13	2 (0)	13	11	11	13	2	9	8	13	13

Source: WISE electronic reporting. The numbers in brackets were subsequently provided by Croatia and do not match the data reported to WISE.

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

RBD	Total groundwater monitoring sites	Monitoring Purpose									
		AGR - Groundwater abstraction site for irrigation	CHE – Chemical status	DRI – Groundwater abstraction site for human consumption	DWD - Drinking water - WFD Annex IV.1.i	HAB - Protection of habitats or species depending on water - WFD Annex IV.1.v	NID - Nutrient sensitive area under the Nitrates Directive - WFD Annex IV.1.iv	QUA – Quantitat -ive status	SOE - EIONET State of Environ- ment monitoring	SUR – Surveillance monitoring	TRE - Chemical trend assessment
HRC	351		232 (233)	33	250	233	115	119	24	233	233
HRJ	54	2	45 (47)	35 (37)	36 (37)	45 (47)	11	24	8	46 (48)	45 (47)

Source: WISE electronic reporting. The numbers in brackets were subsequently provided by Croatia and do not match the data reported to WISE.

The number of groundwater bodies increased slightly from 32 in the first RBMP to 33 in the second RBMP and also the total groundwater body area increased by about 6 %. 29 groundwater bodies remained unchanged since the first RBMP.

The total number of monitored groundwater bodies remained the same; in one river basin district it increased by two and, in the other it decreased by two. The total number of monitoring sites for quantitative status is listed in Table 5.3 and shows a slight decrease from 144 in the first RBMP to 143 in the second RBMP. In the Danube RBD, the number of sites increased by 16 and in the Adriatic RBD the number of sites decreased by 17.

30 of 33 groundwater bodies are identified as Drinking Water Protected Areas, located in both RBDs.

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 32 of 33 groundwater bodies (97 %) were in good quantitative status and one (3 %) is failing good status (Figure 5.1). In terms of area, this means that about 0.5 % of the total groundwater body area is failing good quantitative status.

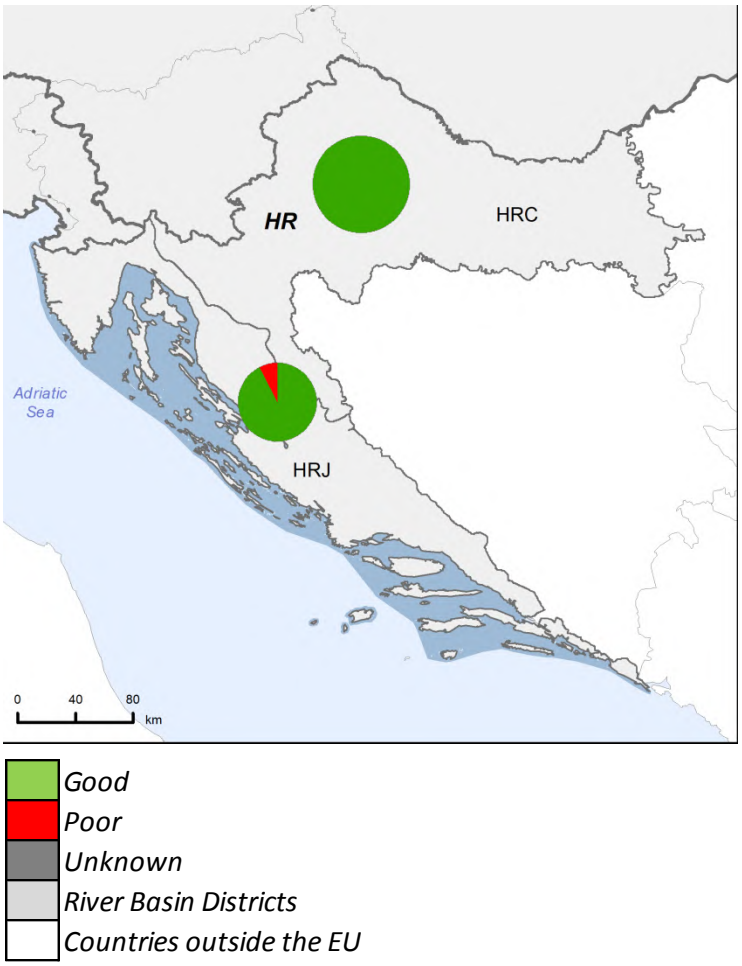
Figure 5.2 shows the confidence in status classifications. In the second RBMP, all groundwater bodies have a clear status. This situation has improved since the first RBMPs where two groundwater bodies had unknown status.

The total number of groundwater bodies failing good quantitative status decreased significantly from three in the first RBMP to one in the second RBMP (from 1.9 % to 0.5 % of the total groundwater body area). The RBMP and background documents give no reasons for this improvement.

In both river basin districts water balance was assessed by a comparison of annual average groundwater abstraction against the ‘available groundwater resource’ for every groundwater body.

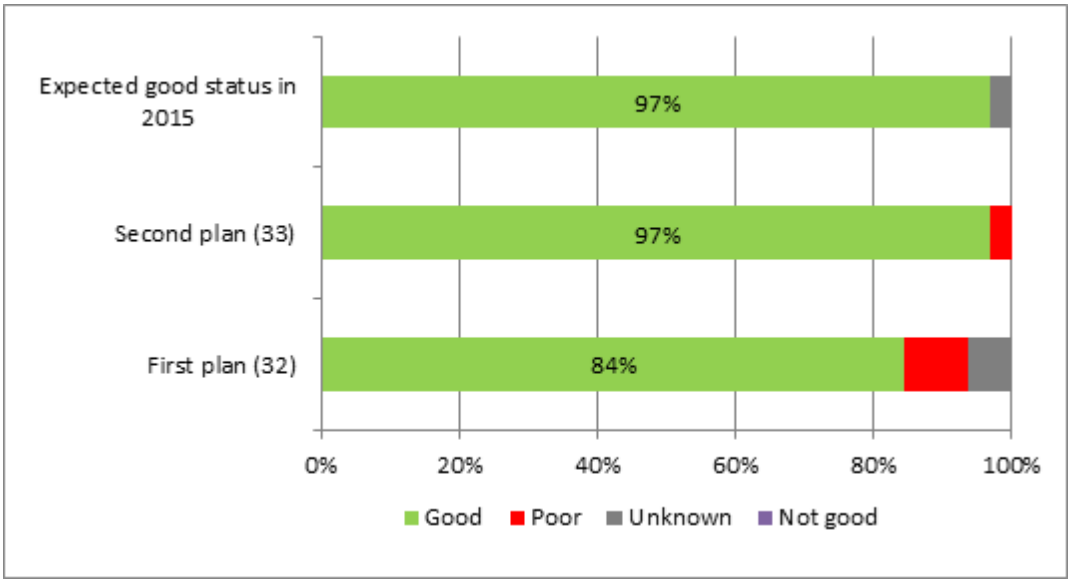
The reasons for the failure of good quantitative status of groundwater bodies are shown in Figure 5.3. For the groundwater body that is failing good status, this is due to failing the water balance test, which means that the long-term annual average rate of groundwater abstraction is exceeding the available groundwater resource therefore causing saline intrusion. The expected date of achievement of good quantitative status in this groundwater body is unknown (Figure 5.4).

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



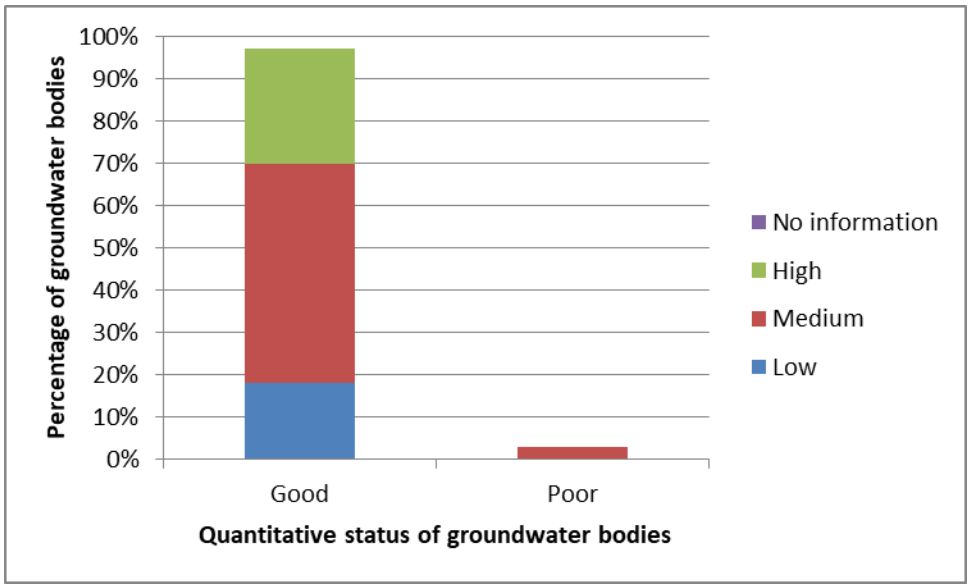
Note: Standard colours based on WFD Annex V, Article 2.2.4.
Source: WISE, Eurostat (country borders)

Figure 5.1 ***Quantitative status of groundwater bodies in Croatia for the second RBMP, for the first RBMP and expected in 2015. The number in parenthesis is the number of groundwater bodies for both cycles. Note the period of the assessment of status for the second RBMP was 2008 to 2014. The year of the assessment of status for the first RBMP is not known***



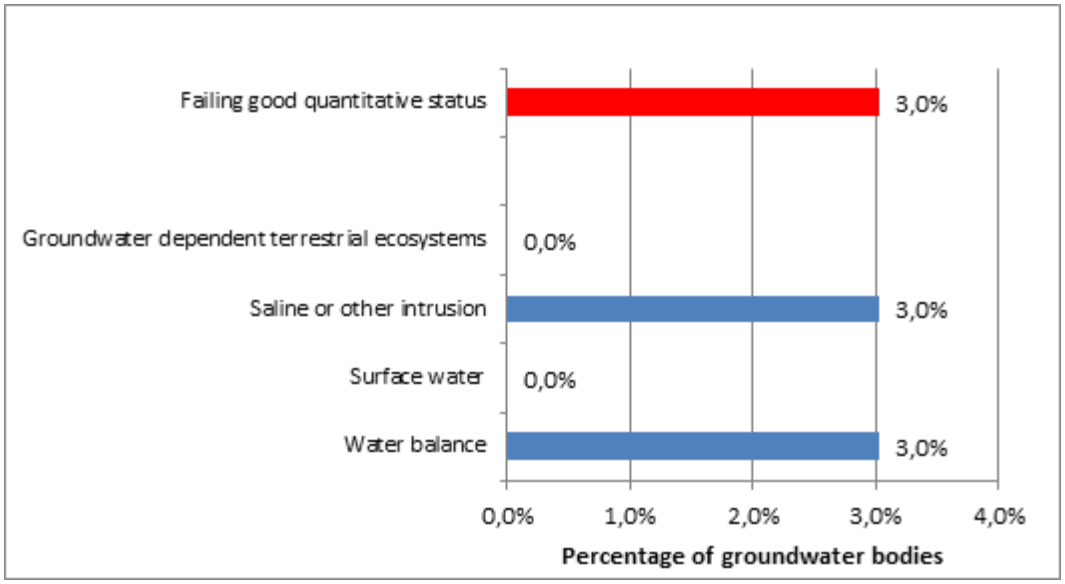
Source: WISE electronic reporting

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



Source: WISE electronic reporting

Notes:

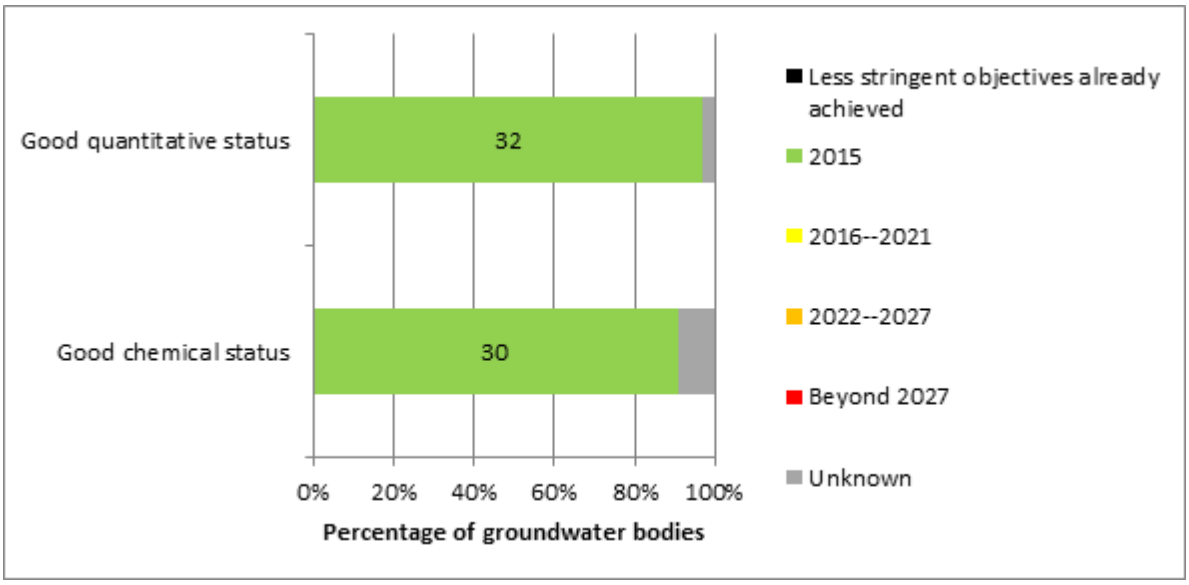
'Water balance' = long-term annual average rate of abstraction exceeds the available groundwater resource which may result in a decrease of groundwater levels.

'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 Croatia. 33 groundwater bodies were delineated for second RBMP



Source: WISE electronic reporting

In both river basin districts, the criterion of 'available groundwater resource' has been fully applied in accordance with WFD Article 2(27). In the Danube RBD, all environmental objectives have been considered in status assessment. In the Adriatic RBD, all environmental objectives except water balance have been considered in status assessment.[40]

In total two groundwater bodies (6 %) (both in the Adriatic RBD) are at risk of failing good quantitative status. Both groundwater bodies are at risk of failing good quantitative status due to failing the water balance test and one also due to saline intrusion. In both groundwater bodies, actual or potential legitimate uses or functions of groundwater are endangered.

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

For 30 groundwater bodies groundwater associated surface waters have been reported. They are not related to risk and they have been considered in status assessment in all river basin districts.

In total 17 groundwater bodies are linked to groundwater dependent terrestrial ecosystems. They are not related to risk and they have been considered in status assessment in all river basin districts. The needs of these ecosystems have not been considered in status assessment.

[40] Croatia subsequently clarified that water balance has actually been considered for all groundwater bodies.

5.2 Main changes in implementation and compliance since the first RBMP

The RBMP includes a chapter summarising the changes or updates for this topic. Compared to the first RBMP progress has been made in the assessment of groundwater quantitative status, as methodologies have been developed. One of the major changes was the analysis of surface water status associated with groundwater, as well as the status of groundwater dependent terrestrial ecosystems. The range of data for assessing the quantitative status of groundwater in the present plan has increased. However, due to inadequate availability of spatial and temporal data, the reliability of results is rather low. There are still areas which have limited monitoring.

The number of groundwater bodies increased slightly, from 32 in the first RBMP to 33 in the second RBMP and the total groundwater body area also increased by about 6 %. 29 groundwater bodies remained unchanged since the first RBMP.

The monitoring situation remained unchanged.

The status situation has improved. The total number of groundwater bodies failing good quantitative status decreased significantly from three in the first RBMP to one in the second RBMP (from 1.9 % to 0.5 % of the total groundwater body area). The RBMP and supporting background documents did not give reasons for this improvement.

5.3 Progress with Commission recommendations

The Commission recommendations based on the first cycle RBMP and Programme of Measures requested action on the following:

- Recommendation: *Make improvements to groundwater monitoring, investigate and address reasons for saline intrusions.*

  Assessment: The total number of monitoring sites was slightly reduced by one site to 143, with an increase of 16 sites in the Danube RBD and a decrease of 17 sites in the Adriatic RBD. Still 11 groundwater bodies (33 %) are without quantitative monitoring. In the second cycle both associated surface waters and groundwater dependent terrestrial ecosystems are considered. This recommendation is partially fulfilled.

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

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

6.1.1 Monitoring of chemical status in groundwater

The total number of groundwater bodies in Croatia is 33 (Table 2.3). In total, five groundwater bodies (15 %) are not object of surveillance monitoring (Table 5.2) and there is no operational monitoring, although five groundwater bodies are reported at risk.

The RBMP and supporting background documents indicates that in both RBDs grouping was applied. Elements considered for grouping are similar geology, hydrogeology, stratigraphy, porosity (inter-granular, fracture, fracture-cavernous), geochemical composition (silicate, carbonate), geological forms (caves, pits, sinks, sinkhole zones), groundwater directions and flow rates (groundwater tracing analysis), groundwater feed and relation with surface flows and, finally also, the groundwater body position within the river basins. The groundwater bodies cover 55,082 km² of the mainland territory and 11 larger islands with existing groundwater abstraction for public water supply purposes. There are no groundwater bodies on other islands and islets.

The number of groundwater bodies increased slightly from 32 in the first RBMP to 33 in the second RBMP and also the total groundwater body area increased by about 6 %. 29 groundwater bodies remained unchanged since the first RBMP.

The number of groundwater bodies with surveillance monitoring increased from 26 in the first RBMP to 28 in the second RBMP.[41] The number of monitoring sites is listed in Table 5.3 and shows that the number of surveillance monitoring sites has increased slightly, from 264 in the first RBMP to 279 in the second RBMP. There is still no operational monitoring; this was not reported in the first RBMP nor in the second RBMP.[42]

All substances at risk of causing deterioration in chemical status are subject to surveillance monitoring. The second RBMP and supporting background documents provide indications that at least all substances causing risk and all Annex I and Annex II substances are considered in the operational monitoring programme, but operational monitoring sites were still not reported.

[41] Croatia subsequently stated that all 33 groundwater bodies are covered by surveillance monitoring.

[42] Croatia subsequently clarified that the establishment of 65 operational monitoring stations started in 2015. As the available data from this monitoring is very limited and was not used for the preparation of the current RBMP, these stations were not reported yet.

All WFD core parameters (nitrate, ammonium, electrical conductivity, oxygen and pH) are monitored.

6.1.2 Assessment and classification of chemical status in groundwater

Map 6.1 and Figure 6.1 show the most recently assessed chemical status of groundwater bodies. It shows that 30 of 33 groundwater bodies (91 %) were in good chemical status, and the remaining three groundwater bodies (9 %) were failing good status. In terms of area, this means that about 1.5 % of the total groundwater body area is failing good chemical status. Figure 6.2 shows the confidence in status classifications. All groundwater bodies had, and still have, a clear status, in the first and in the second RBMP.

The total number of groundwater bodies failing good status decreased since the first RBMP from four (12 %) to three (9 %) (see Figure 6.1). In terms of groundwater body area, the percentage of groundwater bodies in poor status decreased from 2.6 % in the first RBMP to 1.5 % in the second RBMP. The expected date of achievement of good chemical status in Croatia is shown in Figure 5.4. The RBMP and background documents state that the improvement of status is due to changes in the pressure situation but also due to implemented measures being effective. Changes in the groundwater status only refer to nitrates, because in the first RBMP pesticides and other substances were not monitored and not assessed. In the first RBMP, poor chemical status (for nitrates) was established in the areas of Varaždin, Zagreb and Southern Istria, while in the second RBMP this is the case in the Varaždin area and in Eastern Slavonia - the Drava and Danube basin.[43] This could suggest an improvement in nitrate pollution in the area of the group of groundwater bodies of Zagreb, but a deterioration of the situation in Eastern Slavonia - the Drava and Danube basin. As stated in the current RBMP, monitoring will now include at least all substances listed in the Groundwater Directive Annex II Part B.

The reasons for the failure of good chemical status of groundwater bodies are shown in Figure 6.3. For two 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. One groundwater body is failing good chemical status due to saline or other intrusion. Figure 6.4 shows the pollutants causing failure of status.

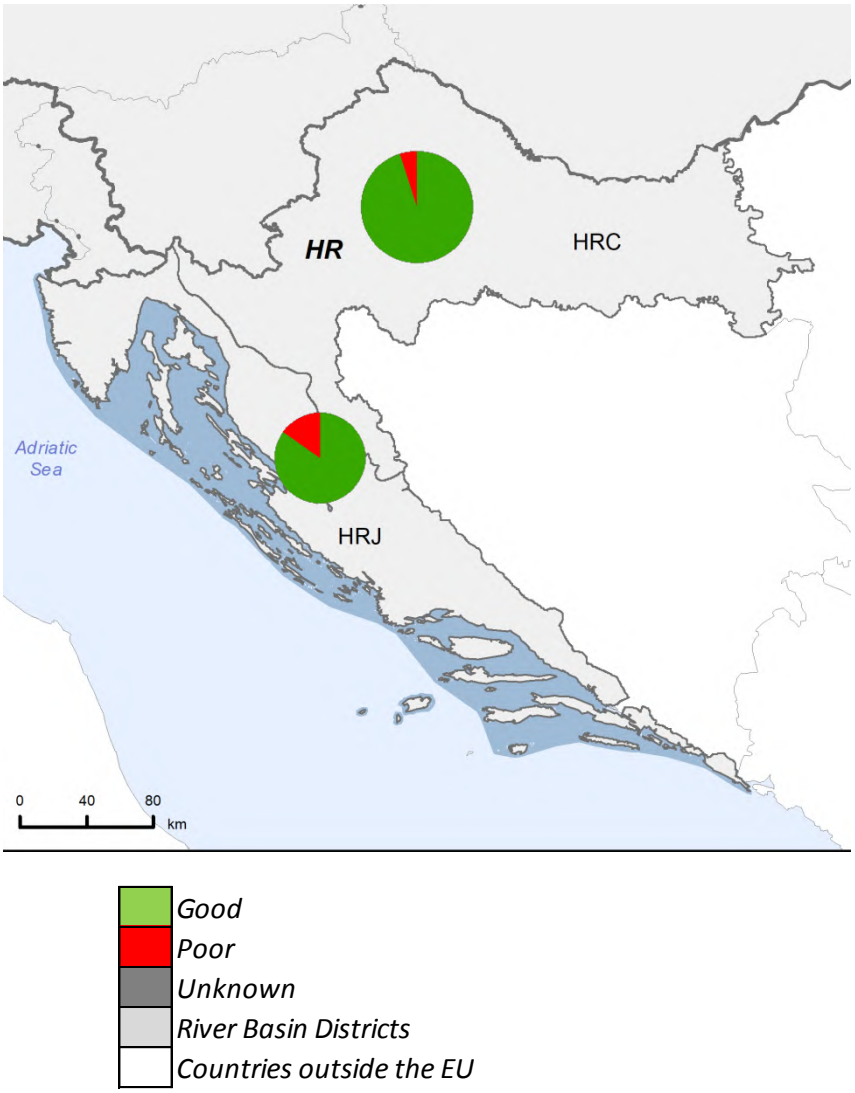
In both RBDs, the calculation of the extent of exceedance is based on the groundwater body area. In both RBDs, groundwater threshold values have been established for all pollutants or indicators of pollution causing a risk of failure of good chemical status and natural background

[43] Croatia subsequently indicated that this is also true for Southern Istria.

levels, as well as all Annex II substances, have been considered in the establishment of groundwater threshold values.

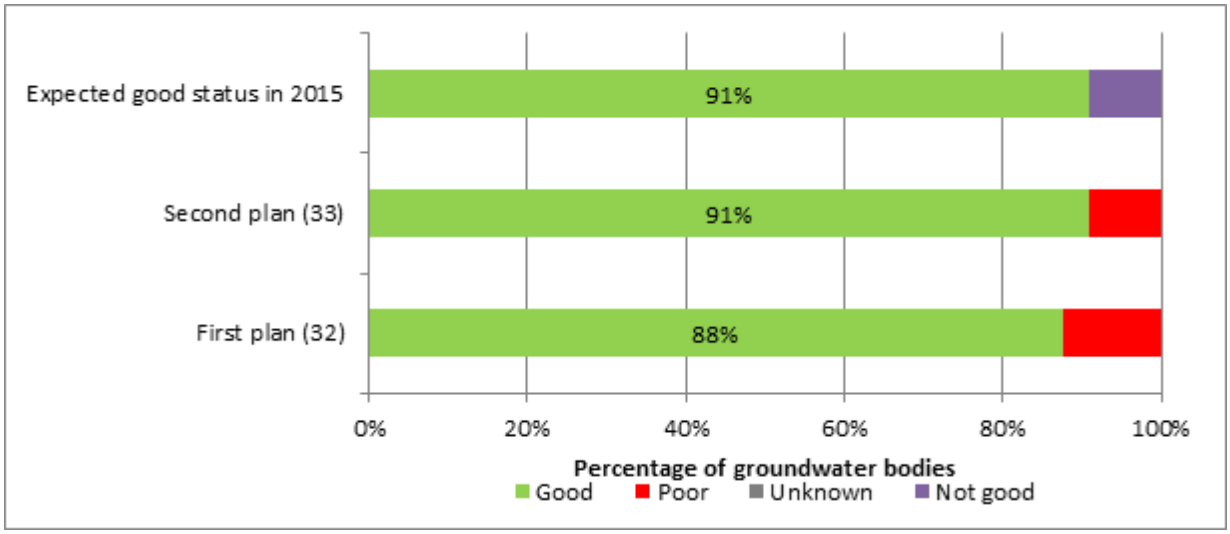
A trend assessment methodology, as well as a trend reversal methodology, is available and assessments have been performed in both RBDs.

Map 6.1 ***Map of the most recently assessed chemical status of groundwater bodies in Croatia***



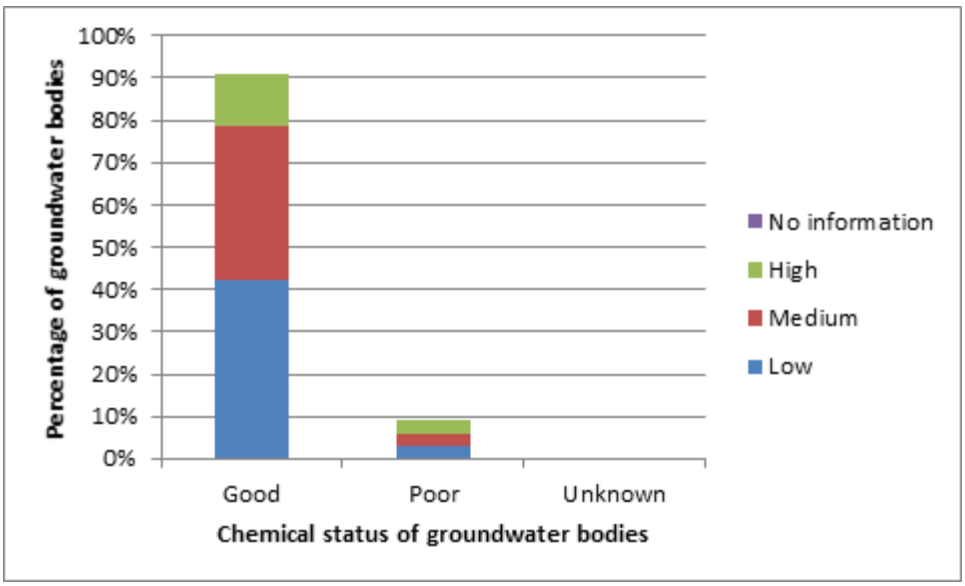
Note: Standard colours based on WFD Annex V, Article 2.4.5.
Source: WISE, Eurostat (country borders)

Figure 6.1 ***Chemical status of groundwater bodies in Croatia for the second RBMP, for the first RBMP and expected in 2015. The number in the parenthesis is the number of groundwater bodies for both cycles. Note the period of the assessment of status for the second RBMP was 2009 to 2013. The year of the assessment of status for the first RBMP is not known***



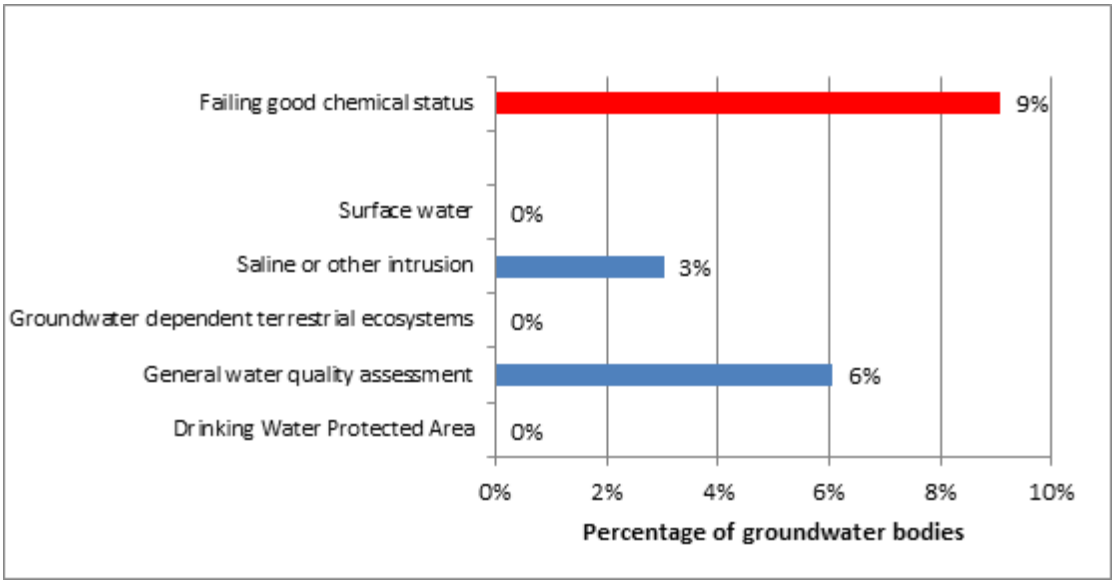
Source: WISE electronic reporting

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



Source: WISE electronic reporting

Figure 6.3 ***Reasons for failing good chemical status in Croatia 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.

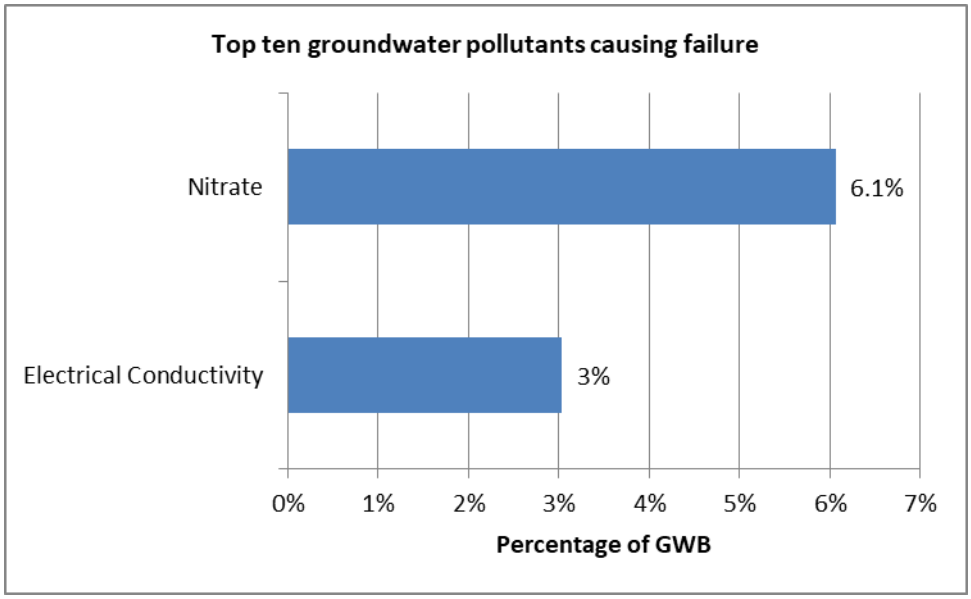
'Groundwater dependent terrestrial ecosystems' = Significant damage to terrestrial ecosystems which depend directly on the groundwater body.

'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.

Figure 6.4 ***Top groundwater pollutants causing failure of good chemical status in Croatia***



Source: WISE electronic reporting

Note: only two pollutants reported as causing failure.

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

For 30 groundwater bodies, groundwater associated surface waters have been reported. Groundwater associated surface waters have not been reported as being considered in status assessment.

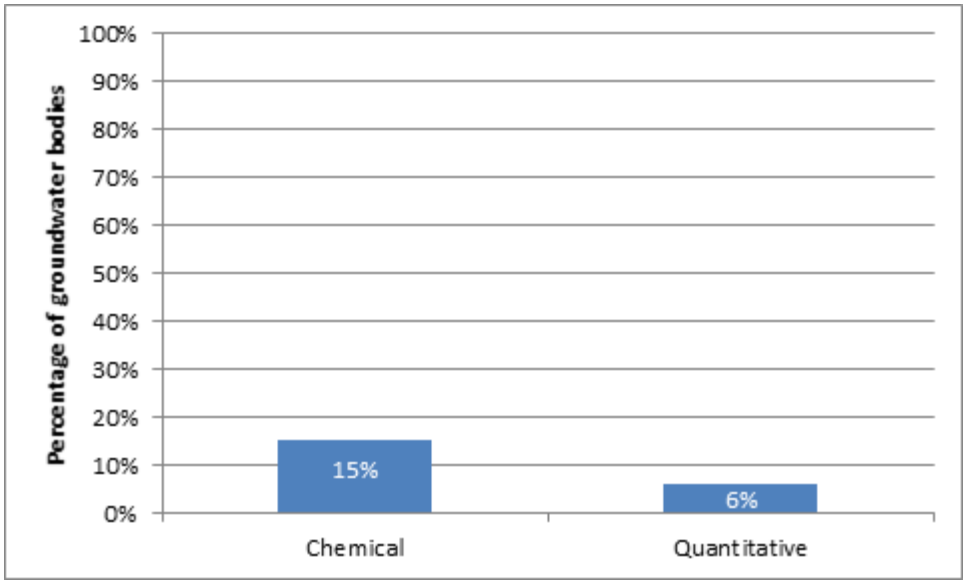
In total, 17 groundwater bodies are linked with groundwater dependent terrestrial ecosystems. Groundwater dependent terrestrial ecosystems have not been considered in status assessment in both RBDs.[44]

Groundwater associated aquatic ecosystems and groundwater dependent terrestrial ecosystems have been considered in the establishment of groundwater threshold values.

Figure 6.5 shows the percentage of groundwater bodies at risk of failing good chemical status and good quantitative status.

[44] Croatia subsequently clarified that groundwater associated surface waters as well as groundwater dependent terrestrial ecosystems have been considered in status assessment in both RBDs.

Figure 6.5 Percentage of groundwater bodies in Croatia at risk of failing good chemical status and good quantitative status for the second RBMP



Source: WISE electronic reporting

6.2 Main changes in implementation and compliance since the first RBMP

Each RBMP consists of a dedicated chapter summarising the changes or updates for this topic. Compared to the first RBMP, progress has been made in the assessment of groundwater chemical status. Methodologies have been developed. One of the major changes was the analysis of surface water status associated with groundwater, as well as the status of groundwater dependent terrestrial ecosystems. The range of data for assessing the chemical status of groundwater in the second RBMP has increased; however, due to still inadequate spatial and temporal availability of data, the reliability of results is rather low.

The number of groundwater bodies increased slightly, from 32 in the first RBMP to 33 in the second RBMP and the total groundwater body area also increased by about 6 %. 29 groundwater bodies remained unchanged since the first RBMP.

The monitoring improved slightly but operational monitoring was still not in place and surveillance monitoring was not complete. All WFD core parameters are subject to monitoring.

Croatia subsequently clarified that all groundwater bodies are now covered by surveillance monitoring and operational monitoring sites were put in place in the meantime.

The status situation improved as the number of groundwater bodies in poor status decreased from four to three. The RBMP and background documents explain that the improvement of

status is due to changes in the pressure situation but also to implemented measures being effective. The status assessment of the first RBMP just focussed on nitrates, while in the second RBMP other substances were included. No trend assessment is reported to be applied. However, Croatia stated that a study on trend assessment has been published in 2016.

6.3 Progress with Commission recommendations

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

- Recommendation: *Make improvements to groundwater monitoring, investigate and address reasons for saline intrusions.*

  Assessment: Operational monitoring was still not fully in place and not being used for the second RBMP. The number of groundwater bodies covered by surveillance monitoring increased slightly from 26 groundwater bodies in the first RBMP to 28 in the second RBMP. There is still no consideration of groundwater dependent terrestrial ecosystems in status assessment, although there is one groundwater body where damage of such ecosystems is causing risk of failing the environmental objectives.

  Croatia subsequently clarified that that operational monitoring sites have been established in 2015, that associated surface waters and groundwater dependent terrestrial ecosystems have both been considered in status assessment in both RBDs.

  Therefore this recommendation is partially fulfilled.

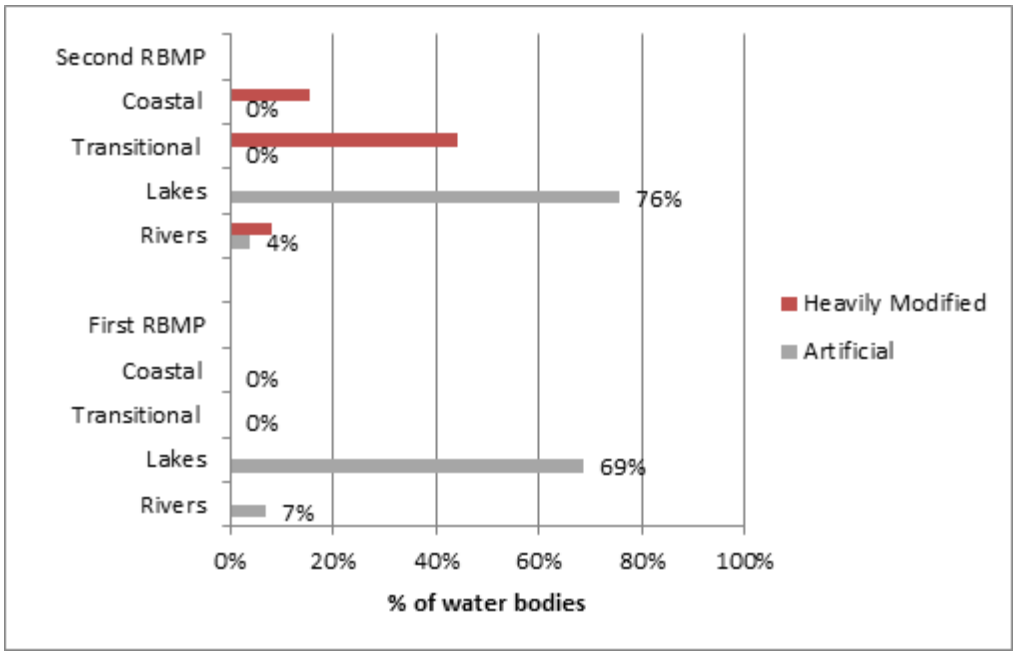
Topic 7 Designation of Heavily Modified and Artificial Water Bodies and definition of Good Ecological Potential

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

7.1.1 Designation of Heavily Modified and Artificial Water Bodies

In the second RBMP, 135 heavily modified water bodies have been designated in the two RBDs. Artificial water bodies are identified in both RBDs (Figure 7.1). 12 heavily modified water bodies are reservoirs and were originally rivers. These are designated as river heavily modified water bodies.

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



Source: WISE electronic reporting

The main water uses for which river water bodies are designated as heavily modified are flood protection, agriculture-land drainage and navigation. For a considerable number of river heavily modified water bodies (76), the use for designation is not specified in WISE ("other"). For some river heavily modified water bodies (20), hydropower is the main water use. For the

Four coastal heavily modified water bodies, navigation and urban development are the main uses. For the transitional heavily modified water body, wider environment and urban development are the main uses linked to designation, followed by agricultural land drainage.

The main physical alterations of river heavily modified water bodies are channelisation, straightening, bed stabilisation, bank reinforcement and weirs, dams, reservoirs. For the coastal heavily modified water bodies, the main alterations are land reclamation, coastal modifications, ports. For the transitional heavily modified water body, the main alterations are channelisation, straightening, bed stabilisation, bank reinforcement and land reclamation, coastal modifications and ports.

In general, the information provided on artificial water body and heavily modified water bodies does not describe the methodology used and is of a general nature. The RBMP and background documents available do not give any detailed information on criteria to define substantial changes in character due to physical modifications. As part of the pressure and impact analysis, the RBMP describes that the impact of physical interventions is estimated by means of a numerical model based on recorded hydromorphological pressures and expert judgement regarding the impact of an individual pressure on hydromorphological indicators. Concerning the designation process of heavily modified water bodies, no information is provided on how the significant adverse effects of restoration measures on the use and the wider environment have been defined or how other means to achieve the beneficial objectives served by the modifications of the heavily modified water bodies have been assessed.

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

Good ecological potential is reported as not defined. There are ongoing projects to develop a good ecological potential methodology. Croatia will build a methodology for the evaluation of good ecological potential, in accordance with the WFD and relevant Common Implementation Strategy Guidance, including the identification of mitigation measures for each water body.

For rivers, one methodology is reported to assess benthic invertebrates and fish, which is sensitive to altered habitats due to hydrological and morphological changes. The same methodology is reported to assess fish in lakes. For coastal waters, two methods are reported as sensitive to hydrological and morphological changes for macroalgae and benthic invertebrates. For transitional waters, one method is reported as sensitive to hydrological and morphological changes for macrophytes.[45]

[45] Croatian authorities have reported that activities on the establishment of a higher quality connection between biological and hydromorphological elements of ecological status of waters are ongoing.

7.2 Main changes in implementation and compliance since the first RBMP

The first RBMP covered the period 2013-2015 and did not include the number of finally designated heavily modified water bodies; it only made suggestions for the selection of candidate heavily modified water bodies. However, in the second RBMP, there is still reference to candidate artificial water bodies and heavily modified water bodies, which suggests that designations are not yet verified. Furthermore, the RBMP indicates that future monitoring will further determine artificial water bodies and heavily modified water bodies.

In the Danube RBD, there are in the second RBMP six more lake water bodies and 20 less river water bodies designated as artificial, compared to the first cycle RBMP. In the Adriatic RBD, there are two additional river artificial water body designations.

7.3 Progress with Commission recommendations

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

- Recommendation: *Ensure the appropriate designation of heavily modified water bodies and develop a methodology for establishing good ecological potential. These methodologies should be documented in the RBMPs.*

  Assessment: The information provided on artificial water bodies and heavily modified water bodies does not describe the methodology used and is of a general nature. The RBMP and background documents available do not give any detailed information on criteria to define substantial changes in character due to physical modifications, nor ways to assess significant adverse effects of restoration measures and other means to achieve the beneficial objectives of the heavily modified water bodies. It seems that heavily modified water bodies and artificial water bodies are still identified as candidates while further methodological development and verifications via monitoring are pending. In addition, no methodology is yet established for defining good ecological potential. Therefore, this recommendation has not been fulfilled yet.

Topic 8 Environmental objectives and exemptions

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

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[46]), groundwaters (good chemical and quantitative status by 2015), and for Protected Areas (achievement of the objectives of the associated Directive by 2015 unless otherwise specified).

Environmental objectives for ecological and chemical status of surface water and for qualitative and quantitative status in groundwater have been reported in all RBD and are defined on water body level, but there are remaining unknowns.

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

Assessments of the current status of surface and groundwater bodies in Croatia 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).

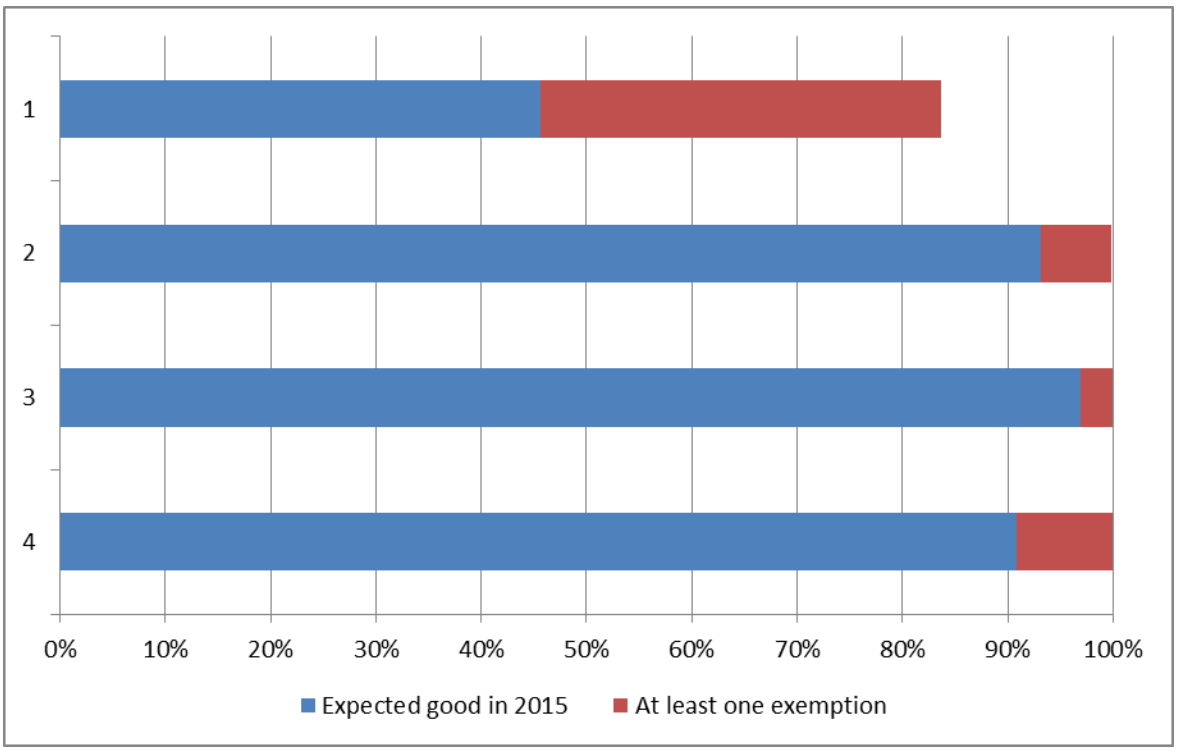
For the second RBMP, Member States are required to report the date when they expect each surface and groundwater body to meet its environmental objective. This information is summarised for Croatia elsewhere in this report: for ecological status/potential of surface waters (Chapter 3); chemical status of surface waters (Chapter 4); quantitative status of groundwater bodies (Chapter 5); chemical status of groundwater bodies (Chapter 6).

[46] 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 explained in the RBMP. 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 Croatia for the four main sets of environmental objectives.

Figure 8.1 ***Water bodies in Croatia 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***



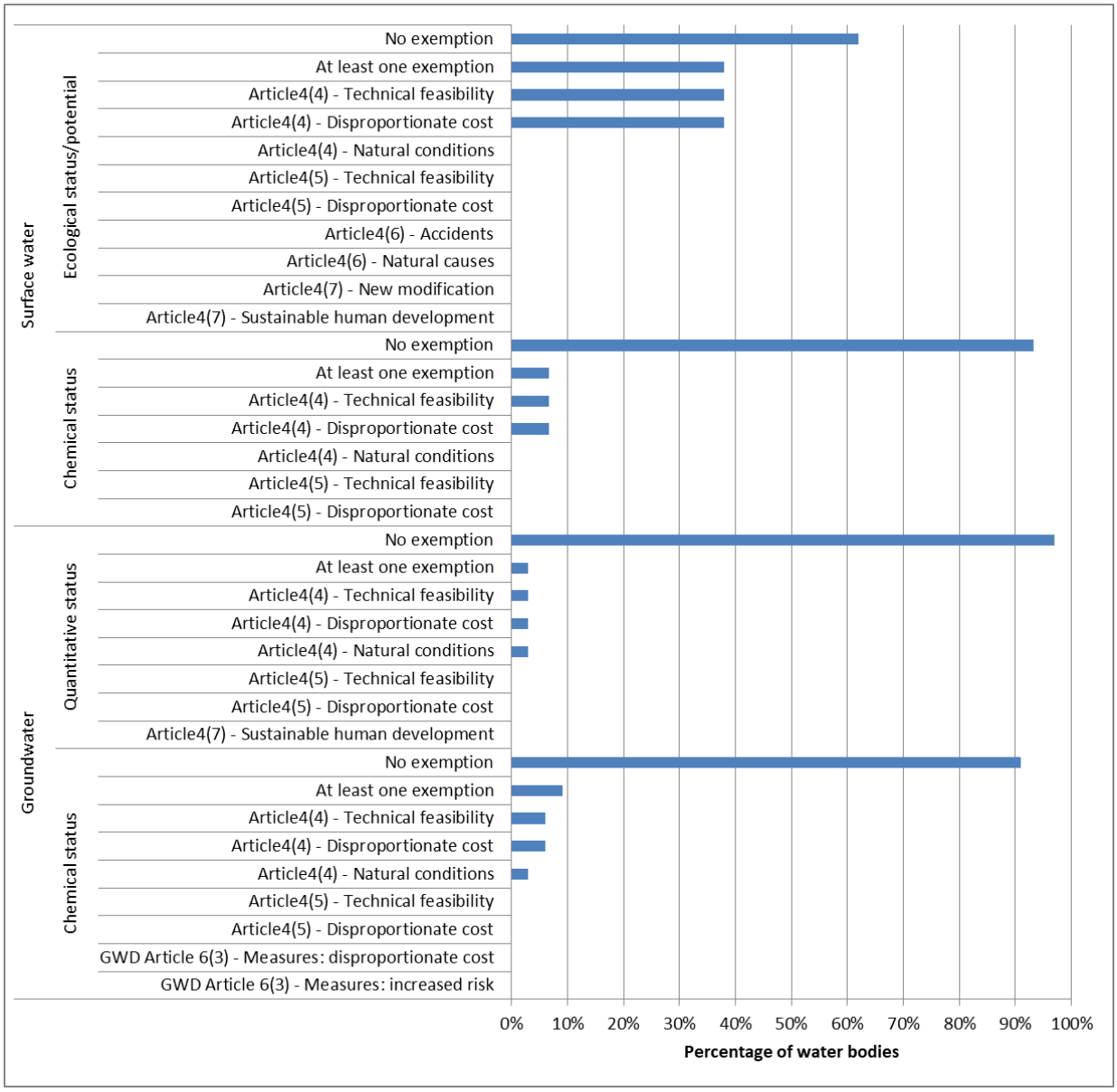
Source: WISE electronic reporting. For some water bodies the date for achievement of good status is unknown.

Article 4 of the WFD allows under certain conditions 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 WFD Article 4 include the provisions in Article 4(4) - extension of deadline, Article 4(5) - lower objectives, Article 4(6) - temporary deterioration, and Article 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.

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 objective in Croatia.

Figure 8.2 ***Type of exemptions applied to surface water and groundwater bodies for the second RBMP in Croatia. 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 reporting

Application of Article 4(4)

In the first cycle no exemptions were reported to WISE. In the second cycle, Article 4(4) was applied to surface water and groundwater. The justifications for surface water and groundwater in relation to Article 4(4) refer to technical feasibility, disproportionate costs and natural conditions. Disproportionate costs are justified in groundwater by affordability and a cost-benefit analysis and in surface water by affordability and distribution of costs.

For several surface water bodies in both RBDs, the pressure and impact analysis has identified that there is a possibility of failing to achieve good ecological status due to hydromorphological elements. For these, an exemption under Article 4(4) has been indicated, but the justification has not been further defined. The required analyses could not be performed since the relevant data was missing; this concerns primarily data related to incomplete biological and hydromorphological monitoring and an undeveloped ecological potential classification system[47].

The main impacts relating to exemptions for surface water are organic, chemical and nutrient pollution and altered habitats due to hydromorphological changes. In groundwater, the main impacts relating to the exemptions are nutrient pollution and, in the Adriatic RBD, lowered water tables and saline pollution/intrusion. The main pressures to surface water come from a broad range of activities including urbanisation, industry, transport, agriculture, aquaculture and activities causing changes in hydromorphology. For groundwater, the main pressures are abstraction for public water supply and agriculture as well diffuse pollution by agriculture. The main drivers behind these are, in the case of groundwater, in all RBDs agriculture and urban development, and, in the Adriatic RBD, also climate change and tourism. The main drivers for pressures in surface water are urban development, transport, industry, flood protection, fisheries and aquaculture, hydropower and agriculture.

Table 8.1 shows the pressures responsible for Priority Substances in Croatia failing to achieve good chemical status for surface water bodies where exemptions have been applied. Table 8.2 shows the pressures responsible for Priority Substances in Croatia failing to achieve good chemical status for groundwater bodies where exemptions have been applied.

[47] Croatia subsequently clarified that the relevant procedure will be conducted and status of water bodies will be clarified in the third RBMP.

Table 8.1 ***Pressure responsible for Priority Substances in Croatia failing to achieve good chemical status 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 exemptions
	Number	Number	Number
1.1 - Point - Urban waste water	5	81(83)[48]	81(83)
1.5 - Point - Contaminated sites or abandoned industrial sites	1	1	1
2.1 - Diffuse - Urban run-off	3	6	6
2.10 - Diffuse - Other	1	1	1
2.2 - Diffuse - Agricultural	4	8	8
2.4 - Diffuse - Transport	8	121	121
2.6 - Diffuse - Discharges not connected to sewerage network	6	241	241
2.7 - Diffuse - Atmospheric deposition	1	1	1
2.9 - Diffuse - Aquaculture	2	2	2

Source: WISE electronic reporting

Table 8.2 ***Pressure responsible for pollutants in Croatia 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) – Disproportionate cost	Article 4(4) - Natural conditions	Article 4(4) - Technical feasibility
2.2 - Diffuse - Agricultural	1	2		2
3.1 - Abstraction or flow diversion - Agriculture	1			1
3.2 - Abstraction or flow diversion - Public water supply	2	2	1	1

Source: WISE electronic reporting

Application of Article 4(5)

Article 4(5) was not applied.

Application of Article 4(6)

No exemptions according to Article 4(6) have been applied.

[48] Croatia subsequently clarified that there are 83 exemptions associated with pressures from point discharges of urban waste water. The corrected data are in brackets in this table.

Application of Article 4(7)

No exemptions according to Article 4(7) have been applied, although the 2015 Commission Staff Working Document[49] indicated that new hydropower projects were under consideration[50].

Application of Article 6(3) of the Groundwater Directive

No exemptions according to Article 6(3) of the Groundwater Directive[51] have been applied.

8.2 Main changes in implementation and compliance since the first RBMP

In the first cycle, no exemptions were reported to WISE. In the second cycle, Article 4(4) was applied to surface water and groundwater. Article 4(5), Article 4(6) and Article 4(7) were not applied in the second cycle.

8.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMP and Programme of Measures requested action on the following:

- Recommendation: *Justify adequately new hydromorphological modifications, such as navigation projects or new hydropower plants. They should be supported by a proper strategic assessment of cumulative effects, an assessment of alternative options, and include all necessary mitigation measures.*

  Article 4(7) has not been applied in the second cycle in Croatia. Therefore the fulfilment of this recommendation cannot be assessed.

- Recommendation: *Exemptions should be adequately justified at water body level.*

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

[50] Croatia subsequently clarified that since the requirement for the implementation of Article 4.7 is prescribed under the Water Act, there was no need to specifically emphasize the obligation to implement Article 4.7 for each individual facility whose construction is planned under each individual sectoral or physical strategy in the RBMP. The practice requires that, under the SEA procedure for the Plan's environmental impact the procedure of the assessment of a project's impact on the status of the environment (water) must be performed. If the objectives for aquatic environment cannot be achieved, the procedure of determining the overriding public interest must be carried out. It is further stated that no preparation of any Feasibility Study or Environmental Impact Assessment Study has been initiated to date for any hydropower facility, and that, considering the proscribed length of such procedure, it is estimated that there is no realistic possibility that a start of the construction of such facility can be expected in the period until 2021.

[51] 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 http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02006L0118-20140711

Assessment: Environmental objectives for ecological and chemical status of surface water and for qualitative and quantitative status in groundwater have been reported in all RBD and are defined on water body level, but there are remaining unknowns.

- Recommendation: *Establish an improved and harmonised approach to exemptions in the second RBMP. The methodology should include calculations of disproportionate costs, assessment methods for adverse effects and better environmental options.*

  Assessment: Several exemptions under WFD Article 4(4) have been indicated, but the justification has not been further defined. The required analyses could not be performed since the relevant data was missing, primarily data related to incomplete biological and hydromorphological monitoring and an undeveloped ecological potential classification system. This recommendation has not yet been fulfilled

- Recommendation: *Croatia should set additional objectives for protected areas, monitor them and assess what additional measures are required to achieve those additional objectives (Species and Habitats, Drinking Water, Bathing Water).*

  Assessment: Please see Chapter 15 for the assessment of this recommendation.

Topic 9 Programme of measures

The aim of this chapter is to provide an overview of the Programme 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 Types of 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 Types 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 RBMP

9.1.1 General issues

An indication as to whether or not measures have been fully implemented and made operational is when they have been reported as being planned to tackle significant pressures (at the Key Types of Measure level). Significant pressures are also reported at the water body level. It would therefore be expected that there would be measures planned in the RBMP to tackle all significant pressures. With a few exceptions, most of the significant pressures in both RBDs are covered by KTMs, indicating that these are operational. For the Danube RBD, KTMs have been reported for all significant pressures in groundwater, and for, all significant

pressures on surface water except 'Anthropogenic – unknown'. For the Adriatic RBD, there is no KTM for diffuse pollution from agriculture in groundwater, whilst for surface waters, a few pressures are not covered by KTMs including point and diffuse pressures from contaminated sites, diffuse pressures from urban run-off, atmospheric deposition and others, hydromorphological alterations - physical loss of part or all of water body hydromorphological alterations - others, anthropogenic pressures - unknown and anthropogenic pressures - historical.

Croatia has mapped 589 national basic measures against 22 pre-defined KTMs and two national KTMs. The two national KTMs have only been reported as KTM991 and KTM992 but these titles provide no details of the actual measures they represent - 22 % of the national basic measures have been mapped against KTM992 and 9 % against KTM991. A further 9 % have been mapped against KTM6 – "Improving hydromorphological conditions of water bodies other than longitudinal continuity". Nineteen national supplementary measures have been mapped against seven predefined KTMs and the nationally defined KTM991. Five of the national supplementary measures have been mapped against KTM14 - "Research, improvement of knowledge base reducing uncertainty" and four against KTM991. The national basic measures do not include measures for Article 11(3)(f): Controls, including a requirement for prior authorisation of artificial recharge or augmentation of groundwater bodies. Links to further information on Article 11(3)(c-k) basic measures for all RBDs are provided as is an inventory of basic measures, including supplementary measures, with codes and mapped against types of measure.

The number of KTMs reported as operational and tackling significant pressures is much lower than the number against which national measures have been mapped, i.e. eight KTMs for the Danube RBD and 11 KTMs for the Adriatic RBD, compared with 24, including two nationally derived KTMs, against which national measures have been mapped. This may indicate that more measures, not operational in the first RBMP, are planned for the second and third RBMP.

For groundwater, nitrate is reported as causing one water body in each RBD to fail to achieve good status. It has been reported that measures under KTM 3 – "Reduce pesticides pollution from agriculture" are in place to address this, but measures under KTM2 – "Reduce nutrient pollution from agriculture" would seem more appropriate[52]. In the Adriatic RBD, electrical conductivity is listed as causing one groundwater body to failing to be of good status, and measures in KTM 13 – "Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc.)" are reported to be in place to address this.

[52] Croatia clarified that the incorrect KTM had been reported.

No information has been provided on the number of water bodies failing to achieve good status due to River Basin Specific Pollutants in either RBD, but KTMs have been reported as in place to address them. In the Danube RBD, measures under KTM14 – "Research and improvement of knowledge base are reported to be addressing pollution from arsenic and its compounds". In both RBDs, 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" is reported to be in place to address copper and zinc and their compounds. In the Danube RBD, this KTM is also reported as addressing pollution from fluoride and AOX.

The number of surface water bodies to fail to achieve good chemical status as a result of Priority Substances are reported for both RBDs. 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" are reported as being in place to address 11 of the 16 Priority Substances causing failures in the Danube RBD and seven of the 14 substances causing failure in the Adriatic RBD. Chlorpyrifos, chlorfenvinphos, DDT(p,p.), and total benzo(g,h,i)-perylene + Indeno(1,2,3-cd)-pyrene are reported as causing surface waters to fail to be of good status in both RBDs, but no measures are reported as being in place to control them in either RBD. In the Danube RBD, no measures are in place to control simazine which is causing one water body to fail to be of good status, and in the Adriatic RBD no measures are reported to be in place to control tributyltin-cation (causing failure in four water bodies), hexachlorocyclohexane or pentachlorobenzene (both causing failure in five water bodies).

Croatia has reported indicators (most in terms of water bodies failing environmental quality standard, others for length of waterbody requiring measure) of the gap to achieving good status for significant pressures on groundwater and surface water, including individual River Basin Specific Pollutants and Priority Substances, in both RBDs for 2015 and 2021. No indicators for 2027 have been reported. Indicators of the level of implementation needed for each KTMs have been reported as, for example, the number of new or upgraded treatment plants, or the surface area to be covered by measures. The expected improvements between 2015 and 2021 are generally very modest, in some cases zero, and as indicated from some higher indicator values for KTMs in 2021, it seems that some measures have been delayed until the third RBMP. KTM14 – "Research and improvement of knowledge base to reduce uncertainty" has been applied to a large number of pressures, mainly related to hydromorhological alterations, including dams and barriers, but also to diffuse pollution from discharges not connected to sewer. The situation is similar in both RBDs, but, as discussed above, some pressures are not being addressed in the Adriatic RBD.

Cost-effectiveness analysis is an appraisal technique that provides a ranking of alternative measures on the basis of their costs and effectiveness, where the most cost-effective has the highest ranking. This methodology should be applied to the prioritisation of the measures within the Programme of Measures; however, Croatia has reported that cost-effectiveness analysis has not been carried out in either RBD. The prioritisation of measures within the Programme of Measures was further investigated in the RBMP and background documents and it was found that the RBMP did not make any prioritisation of measures. The RBMP states that some prioritisation will be done within the expected national "Climate Change Adaptation Strategy and Action Plan". Other prioritisation will be done after 2021 using Cost Benefit Analysis and after all basic measures are implemented. Basic measures will be implemented according to available finances and according to prioritisation given by the other national plans and programs from which some of the measures are taken (i.e. various sectoral plans).

A critical factor in the success of the implementation of the Programme of Measures is the availability of funding to support the investments required. Croatia reported that €880 m had been invested in Article 11(3)(a) requirements (measures required to implement Community legislation for the protection of water) for the first Programme of Measures and €250 m in measures under Articles 11(3)(b-l), Article 11(4) and Article 11(5) (all other measures). For the second Programme of Measures (2015-2021) a capital investment of €5 350 m will be required for Article 11(3)(a) measures with annual operational and maintenance costs of €30 m. A capital investment of €708 m will be required for measures under Articles 11(3)(b-l), Article 11(4) and Article 11(5) (all other measures) with annual operation and maintenance costs of €50 m. Depreciation has been included in the costs for Articles 11(3)(b-l), Article 11(4) and Article 11(5) (all other measures) but not for Article 11(3)(a) measures. For the first Programme of Measures €35 m of European Union funding was received and it is anticipated that €1300-1800 m will be received for the second Programme of Measures. Croatia has reported that a clear overall financial commitment has been secured for the implementation of the Programme of Measures in both RBDs. On a sectoral basis, commitments have been secured in RBDs for Urban, but not for Agriculture, Industry and Aquaculture, whereas Transport, Hydropower, Energy, Recreation and Flood Protection, were not considered to be relevant.

Joint consultation on the RBMP and the Marine Strategy was reported for the Adriatic RBD, and co-ordination of the preparation of all RBMP and Programme of Measures with the Marine Strategy Framework Directive[53] for both RBDs. However, there was no consideration of the

[53] 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

need for additional or more stringent measures beyond those required by the WFD[54] in order to contribute to the achievement of the relevant Marine Strategy Framework Directive objectives in coastal and marine environments, hence no additional or more stringent measures are indicated. KTMs that are relevant to the Marine Strategy Framework Directive are listed for all RBDs, with an indication of the type of measure and numbers, but not indicating the pressures they are addressing. These include a number of KTMs/national measures not reported as being applied to tackle significant pressures but which have had national basic measures mapped against them, e.g. KTM5 – "Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams)" and KTM6 – "Improving hydromorphological conditions of water bodies other than longitudinal continuity", KTM 9- "Water pricing policy measures for the implementation of the recovery of cost of water services from households", KTM 10 - "Water pricing policy measures for the implementation of the recovery of cost of water services from industry", KTM 11 - "Water pricing policy measures for the implementation of the recovery of cost of water services from agriculture", KTM 17 – "Measures to reduce sediment from soil erosion and surface run-off", KTM 18 – "Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases", KTM 19 – "Measures to prevent or control the adverse impacts of recreation including angling", and KTM 20 – "Measures to prevent or control the adverse impacts of fishing and other exploitation/removal of animal and plants".

Croatia has reported that the RBMP and Floods Directive[55] Flood Risk Management Plans have been integrated in both RBDs. Joint consultation of RBMP and Flood risk Management Plans were carried out and the objectives and requirements of the Floods Directive have been considered in the second RBMP and Programme of Measures. Win-win measures in terms of achieving the objectives of the WFD and Floods Directive, drought management and use of Natural Water Retention Measures (NWRM) have been included in the Programme of Measures, and 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.

However, whilst KTM23 – "Natural water retention measures" has been mapped to national measures, there is no evidence that this measure has been made operational nor has any information been provided in respect of the pressures it is aimed to address in either RBD. Financial commitments for the implementation of Programme of Measures in the flood protection sector was marked "not applicable", and WFD Article 9(4) has not been applied to

[54] Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L0060

[55] 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

impoundment for flood protection and as such it would be an activity/use which should be subject to cost recovery under Article 9 where relevant.

9.1.2 Measures related to other significant pressures

There is no information in relation to significant other pressures (none seem to have been identified).

9.1.3 Mapping of national measures to Key Types of Measure

It was expected that Member States would be able to report their Programme 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 Croatia. Also shown is the number of RBDs for which the 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 Croatia

Key Type of Measure	National basic measures	National supplementary measures	Number of RBDs where reported
KTM1 - Construction or upgrades of wastewater treatment plants	14		2
KTM10 - Water pricing policy measures for the implementation of the recovery of cost of water services from industry	24		2
KTM11 - Water pricing policy measures for the implementation of the recovery of cost of water services from agriculture	28		2
KTM12 - Advisory services for agriculture	14	2	2
KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc.)	38		2
KTM14 - Research, improvement of knowledge base reducing uncertainty	78	10	2
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	34	6	2
KTM16 - Upgrades or improvements of industrial wastewater treatment plants (including farms).	4	4	2
KTM17 - Measures to reduce sediment from soil erosion and surface run-off	12		2
KTM18 - Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases	20		2
KTM19 - Measures to prevent or control the adverse impacts of recreation including angling	4		2
KTM2 - Reduce nutrient pollution from agriculture	20	2	2
KTM20 - Measures to prevent or control the adverse impacts of fishing and other exploitation/removal of animal and plants	2		2
KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure	78	4	2
KTM24 - Adaptation to climate change	54		2
KTM3 - Reduce pesticides pollution from agriculture.	14	2	2

Key Type of Measure	National basic measures	National supplementary measures	Number of RBDs where reported
KTM4 - Remediation of contaminated sites (historical pollution including sediments, groundwater, soil)	2		2
KTM5 - Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams)	70		2
KTM6 - Improving hydromorphological conditions of water bodies other than longitudinal continuity	110		2
KTM7 - Improvements in flow regime and/or establishment of ecological flows	94		2
KTM8 - Water efficiency, technical measures for irrigation, industry, energy and households	58		2
KTM9 - Water pricing policy measures for the implementation of the recovery of cost of water services from households	40		2
KTM99 - Other key type measure reported under Programme of Measures - KTM991	106	8	2
KTM99 - Other key type measure reported under Programme of Measures - KTM992	260		2
Total number of Mapped Measures	**589**	**19**	**2**

Source: Member States' reporting to WISE

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

Key Type of Measure	Basic Measure Type														
	Accidental pollution	Controls water abstraction	Cost recovery water services	Efficient water use	Hydromorphology	IPPC IED	Nitrates	Other	Point source discharges	Pollutants diffuse	Pollutants direct groundwater	Protection water abstraction	Recharge augmentation groundwaters	Surface Priority Substances	Urban Waste Water
KTM1 - Construction or upgrades of wastewater treatment plants									6	1					6
KTM10 - Water pricing policy measures for the implementation of the recovery of cost of water services from industry		5	7	7											
KTM11 - Water pricing policy measures for the implementation of the recovery of cost of water services from agriculture		5	6	6			3			3					
KTM12 - Advisory services for agriculture							4			4		2		1	
KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc.)		1	3	3							2	13			
KTM14 - Research, improvement of knowledge base reducing uncertainty		5			8	4	5	11	6	5	2	2			6
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	9		2			5	8
KTM16 - Upgrades or improvements of industrial wastewater treatment plants (including farms).						2			2						
KTM17 - Measures to reduce sediment from soil erosion and surface run-off							1	5		1					
KTM18 - Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases								10							
KTM19 - Measures to prevent or control the adverse impacts of recreation including angling								2							
KTM2 - Reduce nutrient pollution from agriculture							5	4		4		1			
KTM20 - Measures to prevent or control the adverse impacts of fishing and other exploitation/removal of animal and plants								1							
KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure	5					9		5	17	4	6	1			17
KTM24 - Adaptation to climate change		16				1			2	2	7				2
KTM3 - Reduce pesticides pollution from agriculture.							1	3		1		1		2	
KTM4 - Remediation of contaminated sites (historical pollution including sediments, groundwater, soil)								1							
KTM5 - Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams)					16			19							
KTM6 - Improving hydromorphological conditions of water bodies other					15			40							

than longitudinal continuity															
KTM7 - Improvements in flow regime and/or establishment of ecological flows		15			16			16							
KTM8 - Water efficiency, technical measures for irrigation, industry, energy and households		15	7	7					1			6			1
KTM9 - Water pricing policy measures for the implementation of the recovery of cost of water services from households		5	15	15											
KTM99 - Other key type measure reported under PoM	5	1			4	12	11	112	24	15	7	3	3	5	24

Source: Member States' reporting 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.
'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.
'Recharge augmentation groundwaters' = Article 11(3)(f): Controls, including a requirement for prior authorisation of artificial recharge or augmentation of groundwater bodies.
'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 to be filled to achieve WFD objectives have been reported 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 the first RBMP

The level of implementation of the first RBMP of Programme of Measures was reported in WISE by Croatia as “some measures completed” for both RBDs. Obstacles were reported as “Governance”, “Lack of finance”, and “Lack of mechanisms” for both RBDs. Improvements seem to have been achieved in the co-operation with Member State and non-Member State (both RBDs are international). Progress also seems to have been made in identifying significant pressures and mapping national measures/KTMs, and in performing gap analyses.

A summary of changes or updates for this Topic could not be found for either of the second RBMP.

9.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMP and Programme of Measures requested action on the following:

- Recommendation: *Review the pressures and impacts analysis and status assessment in the second RBMP and ensure that the measures are based on the updated pressures and impacts analysis and status assessment of water bodies.*

  Assessment: A large number of significant pressures have been listed as causing failure of objectives for both RBDs, and KTMs have been listed and implemented or planned to address most of these pressures. With respect to measures, it appears that this recommendation has been addressed.

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

  Assessment: Gap analyses have been reported for both RBDs for 2015 and 2021, none for 2027. Gap indicators are reported in many cases as number of water bodies failing environmental quality standards, and also in terms of KTMs, e.g. number of new or upgraded treatment plants, or area to be covered by measure. The predicted achievements for 2021 are generally very modest (or none) and in some cases the gaps (in terms of measures) are higher in 2021, indicating that measures were delayed until the third RBMP. This recommendation has been partially addressed.

- Recommendation: *Besides basic measures, supplementary measures that are necessary to achieve the objectives set should also be included in the second RBMP.*

  Assessment: Nineteen national supplementary measures have been mapped against KTMs. This is a small number of measures in comparison to the number of national basic measures that have been adopted. This recommendation has been partially addressed.

Topic 10 Measures related to abstractions and water scarcity

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

10.1.1 Water exploitation and trends

No information is reported to WISE by Croatia regarding water quantity, including water abstractions or the Water Exploitation Index +, nor has it been reported to support the European State of the Environment Report in relation to Water Quantity. However, the RBMP 2016-2021 includes that information. In relation to the first River Basin Management Plan, data on the abstraction of water for all known uses of water resources were collected and analysed. Data are provided in tables of abstracted water quantity through a controlled abstraction by usage and springs (sources) (data from 2012) as well as quantities of uncontrolled water abstraction by usage. Water scarcity issues are not considered relevant at the international level. Detailed information is provided on the number of water bodies failing good status due to abstraction pressures, and the exact area to be considered for implementing water pricing policies for agriculture. Water resources planning in relation to abstractions is partially included in the RBMP, even if no separate water resource allocation and management plans are developed.

10.1.2 Main uses for water consumption

Some information has been reported for water consumption: approximately 50 % is for the public water supply. Public water supply has estimated losses of 42 % (48 % on HRJ and 36 % on HRC river basin districts). More significant water abstraction pressures have been identified for urban, industrial and agricultural uses.

In the RBMP, there are data for water consumption that can be considered as given by sectors. However, water consumption related data are actually given in terms of the *number of licences issued* and by *types of purpose for which water consumption has been used* (those include: public water supply, irrigation, sale of water, technological water, cooling, aquaculture, recreational and health, hydropower).

10.1.3 Measures related to abstractions and water scarcity

Regarding basic measures (Article 11(3)(e)), in Croatia there is a permitting regime and a register of abstractions for surface water and groundwater and a concession, authorisation and/or permitting regime to control water impoundment but no register of impoundments; and

small abstractions are exempted, even if 6 % of surface water bodies in the Danube RBD and 10 % in the Adriatic RBD face significant water abstraction pressures[56].

The RBMP explains that water abstraction control (from surface and groundwater) is regulated by the national "Water Act", which stipulates that for each use of water exceeding the scope of the general or free use, a permit is necessary in the form of: (a) concession agreement for the economic use of water, or (b) water-permit for water use (Water Act, Article 157).

Users which are licensed to abstract water are obliged to keep a record and regularly report to Croatian Waters (Water Act, Article 80, Ordinance on the Register of Abstracted and Used Amount of Water (Official Gazette 81/10)).

The RBMP does not provide any information about the fixed or required time period for water abstraction permit reviews. Additionally, the Water Law does not have any information about "review of all existing permits and assessment of their compatibility with the WFD[57]". However, a table is included in the RBMP (Programme of Measures) on 'Implementing measures for water abstraction control' that does foresee measures for stopping the issuing of new water abstraction permits on water bodies with insufficient water flow quantities, reduction of existing permits for surface water abstraction until at least moderate conditions of water flow quantities are achieved, and restriction of issuing new permits for surface water abstraction until at least moderate conditions of water flow quantities are achieved.

Measures under Article 11(3)(c) for sustainable and efficient water use have been implemented in the previous cycle but new measures and/or significant changes are planned. These include: (1) Measures for improvement of water abstraction control; (2) Implementing measures for water abstraction control. All measures are similar and relevant for both RBDs. 'Measures for improvement of water abstraction control' are mostly management measures for better knowledge and transparency on issued water permits, as well as water metering related measures (use of metering devices for all types of water use/abstraction, use of metering devices on all buildings already connected to municipal water structures). 'Implementing measures for water abstraction control' are a set of measures with very wide scope of intervention including: water metering at source of abstraction, water permitting measures (new rights, existing rights regulation according to water body status), abstraction monitoring, abstraction pressures monitoring, irrigation issues, better technological water use efficiency.

[56] Croatia subsequently explained that "register of impoundment" and "small abstractions" are defined in the National Water Act ("abstractions not subject to authorisation"). A new authorisation regime is expected in the coming new Water Act.

[57] Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L0060

Measures for the prior authorisation of artificial recharge or augmentation of groundwater bodies (Article 11(3)(f)) are not envisaged in Croatia as no activities are carried out which would result in pressures on groundwater augmentation.

Both RBDs (Danube and Adriatic) implement complementary measures associated to KTM7 – "Improvements in flow regime and/or establishment of ecological flows". Measures associated to other KTMs are only foreseen for the Adriatic RBD, for abstraction pressures from agriculture, including KTM 11 - "Water pricing policy measures for the implementation of the recovery of cost of water services from agriculture" and KTM12 – "Advisory services for agriculture" in an area of 59 km^2.

Water reuse is not a measure foreseen, although it is considered to have a lower environmental impact than other alternative water supplies in both RBDs.

10.2 Main changes in implementation and compliance since the first RBMP

The assessment of the first RBMP indicated that it made few references to water scarcity or drought. The implementation described in the previous section therefore represents the main changes since then.

10.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMP and Programme of Measures requested action on the following:

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

  Assessment: Regarding basic measures (Article 11(3)(e)), in Croatia there is a concession, authorisation and/or permitting regime to control water impoundment but no register of impoundments; and small abstractions are exempted, even when in the Danube and Adriatic RBDs, 6 % and 10 % of surface water bodies respectively, face significant water abstractions. Measures of this type are planned to be implemented and might respond to the recommendation. This recommendation is partially fulfilled.

- Recommendation: *Ensure that abstraction controls are in place by the time of the second RBMPs.*

  Assessment: Statistics on abstractions per sector are partially available in the RBMP, but no historic trends on their evolution. The Programme of Measures foresees specific

actions such as improving the Water information system, updating the register of water rights, establishing verification controls, imposing obligatory installation of water meters for all abstractions, monitoring abstractions and assessment of data.

This recommendation is therefore considered as partially fulfilled as the planned measures are yet to be implemented.

Topic 11 Measures related to pollution from agriculture

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

The types of pressures from agriculture have not changed since the first RBMP. The main pressures are organic, chemical and diffuse pollution as well as altered habitats. While in the first RBMP only basic measures have been applied, in the second cycle supplementary measures have also been applied. A gap assessment was missing in the first RBMP but has been performed now for diffuse nutrient pollution.

For the Danube RBD, for KTM2 – "Reduce nutrient pollution from agriculture" (groundwater) and KTM12 – "Advisory services for agriculture" (surface water and groundwater) the areas covered by a measure are given. For the Adriatic RBD, the information is given only for surface water for KTM12 – "Advisory services for agriculture". General binding rules have been identified by Member States as being in place for nutrients, pesticides and phosphorus.

Pesticides and nutrients are addressed by the basic measures in both RBDs but the implementation of basic measures under Article 11(3)(h) for the control of diffuse pollution (i.e., nutrients, especially nitrates) from agriculture at source (11 measures) only covers Nitrate Vulnerable Zones.

There is mixed information regarding establishment of mandatory safeguard zones around drinking water protection areas in both RBDs in Croatia. The second- RBMP provides a summary of implementation of the first cycle (2013-2015) stating that all drinking water springs have been identified but not yet protected since there are still no guidelines for establishment of safeguard zones. Furthermore, it is stated that those guidelines are expected to be issued by the end of 2016. However, later in the second RBMP it is written and shown in a map of Croatia that there are zones of sanitary protection of water springs intended for human consumption (Sl.A.22.). This suggests that safeguard zones have been established. Then, further in section 5.2.2. "Water protection measures intended for human consumption", an explanation that zones of sanitary protection of water sources intended for human consumption are regulated by the "Water Act" and the "Law on Water for Human Consumption" (Official Gazette 56/13 and 64/15). It is also stated that the manner of establishing the sanitary protection zone, the mandatory measures and the restrictions imposed therein, the time limits for the adoption of the decisions on protection and the procedure for the adoption of those decisions, are regulated by the "Ordinance on Conditions for Determination of the Sanitary Protection Zone" (Official Gazette, Nos 66/11 and 47 / 13). The conclusion seems to be that

not all the work regarding establishment of the mandatory safeguard zones around drinking water protection areas has been finished.

Furthermore, the RBMP states that "When developing the Strategic Water Conservation Program for Human Consumption with the Implementation Plan, it is necessary to include: (among others) measures that will limit the use of mineral and organic fertilizers and plant protection products in agriculture in the immediate vicinity of the source, but also restrict the capacity of livestock production".

As regards drinking water protection, two basic measures have been taken in the agriculture sector, aiming at "water bodies intended for human consumption". The first one (S4) aims at educating agricultural producers, who use agricultural land within the *secondary sanitary protection zone*[58], about compulsory restrictions for this zone (considering soil and agriculture related activities). The second measure (S5) aims at strengthening the control over the implementation of regulations related to agricultural production in the *second sanitary protection zone* around the spring (considering soil and agriculture related activities).

Additional control measures on land (not just in safeguard zones but in the wider catchment) have been introduced in the second RBMP (2016-2021) to prevent nitrogen, phosphorus or pesticides from entering drinking water sources. This RBMP dedicates a specific section to "Control measures for diffuse sources of contamination" where agriculture (especially nitrates) is recognised as one of the most important sources of diffuse water contamination. It further explains that Article 50 of the "Water Act" prescribes the determination of "vulnerable areas" for which reinforced measures to protect water from nitrate contamination coming from agricultural origin and the adoption of an Action program (or several programs) to reduce nitrate pollution of agricultural origin would be further enforced. The "Decision on the Determination of Vulnerable Areas in the Republic of Croatia" identified vulnerable areas covering 9 % of the territory of the Republic of Croatia.

Based on the above Decision, pursuant to Article 5 of the Nitrates Directive[59], Croatia adopted an "Action program for the protection of water from pollution by nitrates of agricultural

[58] Croatia has clarified that sanitary protection zones are established for the purpose of protection of the spring and other drinking water reservoir areas against pollution. In Croatia bodies of local (cities, municipalities) and regional (counties) self-administrating units are responsible for protection of drinking water springs according to sanitary protection zones rules and with prior consent issued by Hrvatske vode (according to Water Act, Article 91). Sanitary protection zones are established according to conditions prescribed in the *Ordinance on the conditions for establishment of sanitary protection zones for springs* (Official Gazette 66/11 and 47/13).

[59] 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

origin" This Action Program will be implemented for a period of four years after accession to the European Union. The measures set out in the Action Program are mandatory in vulnerable areas, while in other areas they are considered as a recommendation.

Since accession to the European Union, the "Ordinance on Good Agricultural Practice in the Use of Fertilizers" (OG 56/08) has been in force. This Ordinance sets out the general principles of good agricultural practice in the use of fertilizers and soil improvers and the conditions of use and treatment of fertilizers, especially the use of nitrogen fertilizers. The implementation of this Ordinance is mandatory in vulnerable areas and considered as a recommendation in other areas.

The RBMP itself has few measures related to better management and control of diffuse sources of pollution coming from agriculture, mostly related to manure and nitrates.

Farmers/Farmers' Unions have been consulted under the Public Consultation process in all basins.

Financing of agricultural measures is not secured in both RBDs. From the second RBMP, it can be concluded that sources of funding will be national and international. Considering national sources, the main source of funding are Croatian Waters' revenues coming from various national "water charges" (water subsidies and compensation for water management) with the possibility of co-financing from the state budget and "other" domestic and foreign sources. Other sources of financing include: loans from the Development Bank of the Council of Europe (CEB) (mostly for projects somehow related to flood protection), cross-border co-operation programs, European Union funds (Structural, Cohesion, Rural Development, Fisheries, LIFE or RTD), and other available domestic and international sources of funding.

11.2 Main changes in implementation and compliance since the first RBMP

The types of pressures from agriculture have not changed. While in the first RBMP only basic measures have been applied, now also supplementary measures have been applied. A gap assessment was missing in the first RBMP but has been performed for the Adriatic RBD for the second RBMP.

11.3 Progress with Commission recommendations

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

- Recommendation: *Determine effectiveness of basic measures and what needs to be done in addition. Based on this gap analysis Croatia should take measures in addition to the action programme for nitrates and on the use of plant protection products, if necessary. Those measures should be part of the next RBMPs.*

  Assessment: Several parts of the recommendation have been considered. A gap assessment has been performed, but it is not clear from the data reported to WISE what the contribution from the implementation of the Nitrates Directive would be. Implementation of basic measures under Article 11(3)(h) is part of the second RBMP, but the rules only apply in a mandatory way in Nitrate Vulnerable Zones[60]. Article 11(3)(g) for measures to reduce point sources is applied in all basins through basic and supplementary measures. It is not possible to assess whether measures are voluntary or mandatory.

- Recommendation *Review existing controls to ensure that agriculture practices do not cause hydromorphological pressure and update controls where necessary for inclusion in the PoM of the second RBMPs.*

  Assessment: Article 11(3)(i) measures to reduce hydromorphological pressures from agriculture are part of the Programme of Measures in both RBDs. Instruments to control hydromorphological pressures are outlined in the Water Act (Article 143.-148.) and the Environmental Protection Act. However, the second RBMP states that a lack of adequate hydromorphological and biological monitoring significantly hinders the preparation of a higher quality Programme of Measures to control and reduce hydromorphological pressures on water bodies.

[60] Croatia clarified that a new project is implemented with the aim of determining priority areas for groundwater monitoring within intensive agricultural areas. Based on the outcomes of this project vulnerable areas will be revised.

Topic 12 Measures related to pollution from sectors other than agriculture

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

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 measures (KTM) 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 in both Croatian RBDs. These KTMs include:

KTM1 "Construction or upgrades of wastewater treatment plants"

KTM14 "Research, improvement of knowledge base reducing uncertainty"

KTM16 – “Upgrades or improvements of industrial wastewater treatment plants (including farms)”, and

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

The WFD specifies that the Programme 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 (see Chapter 9 in this report). Quantitative information on basic and supplementary measures used to tackle pollution from non-agricultural sources (number of measures per KTM) has been provided for both Croatian RBDs. Quantitative information on types of basic measures to tackle pollution from non-agricultural sources (number of measures per KTM) is provided for seven measure types for both Croatian RBDs.

Croatia 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 waste water point source

discharges (Basic measures Article 11(3)(g)) was reported for both Croatian RBDs for surface and groundwater. A register of waste water discharges (Basic measures Article 11(3)(g)) is available in both RBDs in Croatia for surface and groundwater. Small waste water discharges are exempted from controls in both Croatian RBDs. Some direct discharges to groundwater are authorised in accordance with Article 11(3)(j) in both Croatian RBDs.

Croatia reported that there are measures in place to eliminate/reduce pollution from Priority Substances and other substances in both RBDs.

12.2 Main changes in implementation and compliance since the first RBMP

The first RBMP cited the following measures to address chemical pollution:

- water permits for discharge of waste waters;
- production, placing on the market and use of chemicals requiring prior registration and in certain cases approval; many specific substances, including certain pesticides, have been prohibited or limited;
- a water fee for the production and import of plant protection products; and,
- limiting the use of certain pollutants on agricultural land in accordance with the Ordinance on Protection of Agricultural Land from Pollution.

As regards measures planned for all Priority Substances causing failure in the second cycle, there is no consistent information in the WISE reporting or second RBMP, i.e., no detailed information on substance-specific measures.

All River Basin Specific Pollutants causing failure to achieve good status in the two RBDs (Danube and Adriatic) are covered by KTMs. In the Danube RBD, five River Basin Specific Pollutants are causing failure (Arsenic and its compounds, copper and its compounds, zinc and its compounds, fluoride and AOX); in the Adriatic RBD, two River Basin Specific Pollutants (copper and its compounds, zinc and its compounds) are relevant.

Similarly, in both Croatian RBDs, pollutants which are causing failure in groundwater are covered by KTMs. In the Danube RBD, there is one pollutant (nitrate) causing failure in groundwater. In the Adriatic RBD there are two pollutants (Nitrate, electrical conductivity).

12.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMP and Programme of Measures requested action on the following:

- Recommendation: "*Provide in the second RBMP all the information on the level compliance and timing to reach compliance of agglomerations, including information on funding, in accordance with Directive 91/271/EEC (article 15 and following). Prioritize the agglomerations with more than 2 000 PE in terms of the WFD principles and of financing in the second RBMP but should also assess the pressures due to waste water from small agglomerations (less than 2 000 PE) in the second RBMP cycle."*

  Assessment: Measures to mitigate pollution loads are planned until 2027. For the period 2016 to 2021, measures are to be implemented in all water bodies where pollution loads have been reported (irrespective of the status of water); this includes the implementation of: (a) Urban Waste Water Treatment Directive (basic measures), (b) Nitrate Directives (basic measures), (c) IED Directives (basic measures). The period 2022-2027 includes measures to be implemented in water bodies for which it is estimated that after 2021 (and after the implementation of basic measures) the minimum water status will still not be achieved, and includes implementation of the Urban Waste Water Treatment Directive (with supplemental measures for settlements <2 000 p.e. where the situation needs improvement).

  According to the Water-Utilities Directive Implementation Plan (*Plan provedbe vodnokomunalnih direktiva*), basic pollution prevention measures (from urban areas) include the construction or upgrading of waste water collection and treatment systems at 281 agglomerations greater than 2 000 p.e. at estimated current potential loads. Outside of the basic measures program are 473 agglomerations of less than 2 000 p.e. according to the estimated current potential burden (data from 2014), which accounts for about 13 % of the population of the Republic of Croatia. The "Multi-annual Program of Construction of Municipal Water Facilities" includes investments in public drainage for 281 agglomerations with more than 2 000 p.e., where improvement of the public drainage and waste water treatment system is planned by 2023. The Multi-annual Program of Construction of Municipal Water Facilities foresees investments related to: construction or renovation of wastewater collection and sewerage systems; construction of new or upgrade of existing wastewater treatment plants to ensure the required degree of purification for the required projected capacity, with deadlines that generally follow those defined by the Water-Utilities Directive Implementation Plan.

The total estimated cost of construction of the public sewerage system in 281 agglomeration amounts to HRK 21 893 m, of which the cost of construction of treatment plants is HRK 6 716 m. The recommendation was partly fulfilled.

- Recommendation: "*Ensure the compliance of Article 5 UWWTD for more stringent treatment, especially in big cities*."

  Assessment: Concerning very large urban agglomerations (i.e. more stringent treatment, especially in big cities), the RBMP does not provide much information. The highest urban agglomerations mentioned in the Plan are those of 15 000 p.e. within Chapter 5 "Summary of PoM", where it is stated: The starting point for planning supplementary measures is the status of water that can be expected after all basic measures have been implemented, regardless of their implementation time.

  The described approach has been made operational by analysing the two main scenarios for controlling/reducing pollutant emissions and quantifying the effects of these scenarios on water status. Scenario 1 contains the basic measures for controlling/reducing emissions that will be implemented by 2021. Including:

  (a) construction and upgrading of municipal wastewater collection and purification systems for all agglomerations of more than 15 000 p.e. and all agglomerations of more than 10 000 p.e., which discharge waste water into a sensitive area, according to the water-utility Directive implementation plan and other current plans and programs (i.e. project 'Inland water', 'Adriatic project', 'ISPA' and 'IPA' projects and other national projects);

  (b) complete alignment of industrial/technological waste water discharge with the prescribed standards (Ordinance on the limit values for waste water) for all IPPC/IED plants and other industrial and other plants for which a waste water discharge is issued;

  (c) consistent application of the applicable regulations governing the production, circulation and use of chemicals, including biocidal products and plant protection products, which prescribe a prohibition or restriction for most of the priority and other pollutants to assess the chemical status of water;

  (d) consistent application of the measures for the implementation of the Nitrates Directive.

Scenario 2: starts with the same set of regulations as Scenario 1 and implies their complete implementation, regardless of allowed adjustment periods. It includes:

(a) building and upgrading systems for collecting and appropriate treatment of municipal wastewater for all agglomerations covered by the Water-Utilities Directive Implementation Plan (294 agglomerations greater than 2 000 p.e. according to the estimated current potential load) - alignment with the 'Ordinance on the limit values for waste water' for all existing waste water treatment plants (IPPC/IED and other installations);

(b) implementation of the Action Program for the reduction of pollution of nutrients from agricultural production in vulnerable areas;

(c) consistent alignment with European regulations regulating the production, circulation and use of chemicals, including biocides and plant protection products, provided that no forbidden active substances for the assessment of chemical status of water will be renewed in the future.

The measures relate to the control of both point and diffuse sources of pollution and their effects on the improvement of physico-chemical and chemical elements of water quality. In conclusion, the RBMP does not consider stringent treatment for very big urban agglomerations, probably because all types of agglomerations (regardless of size) will get the same degree of implementation of measures until at least good water status is achieved. This recommendation is not considered fulfilled.

- Recommendation: "*Assess the need to take additional measures on point source pollution beyond the requirements of the UWWTD and IED to fulfil the WFD objectives*."

  Assessment: The RBMP indicates in general terms that for water bodies that are assessed as not achieving good status after the implementation of the basic measures, supplementary measures will be applied. The selection of supplementary measures and their implementation obligation will follow after investigative monitoring. In addition, a detailed water status analysis will check the effects of basic measures for all sources of pollution affecting the status of these water bodies. Supplementary measures include: (a) A supplementary measure of the monitoring of water status; and, (b) Supplementary Control Measures for Point and Diffuse Sources of Pollution. This recommendation cannot be considered fulfilled because the assessment (additional monitoring) has not yet been carried out.

Topic 13 Measures related to hydromorphology

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

Significant hydromorphological pressures are reported for both RBDs. The significant hydromorphological pressures are assigned to specific sectors, especially flood protection, agriculture, navigation and hydropower. However, there is also a significant number of water bodies where the sector/driver is indicated as "other", i.e. not specified as one of the key sectors in the WISE reporting.

Operational KTM to address the significant hydromorphological pressures are reported for both RBDs, but the only KTM reported in this respect is KTM 14 - "Research, improvement of knowledge base reducing uncertainty". KTM 5 - "Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams[61])" is not reported, quantitative management objectives in terms of river continuity are reported as established in both RBDs.

According to information in the RBMP, hydromorphological pressures are not addressed yet by specific technical measures. The only measures planned are related to monitoring and research. Almost half of the hydromorphologically degraded surface water bodies have been identified as artificial water bodies or heavily modified water bodies. Measures to partially mitigate hydromorphological impacts related to artificial water bodies and heavily modified water bodies will be planned after defining the standards for assessing their ecological potential (a process which is still ongoing). For the remaining hydromorphologically degraded water bodies, restoration measures will be planned after performing specific biological studies to check the impact of the modified hydromorphological elements on status.

In terms of basic measures, there is an authorisation and/or permitting regime in place to control physical modifications in all RBDs, which covers changes to the riparian area of water bodies according to WFD[62] article 11(3)(i) in both RBDs. There is also a register of physical modifications of water bodies.

[61] Croatia subsequently clarified that the demolishing of old dams is included in the RBMP, although it was not reported in WISE.

[62] Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L0060

Win-win measures in terms of achieving the objectives of the WFD and Floods Directive[63], drought management and use of Natural Water Retention Measures (NWRM) are reported to be included in the Programme of Measures of both RBDs. The design of new and existing structural measures, such as flood defences, storage dams and tidal barriers, is also reported to have been adapted to take into account WFD objectives in both RBDs.

Ecological flows have not been derived for the relevant water bodies in any of the RBDs but there are plans to do it during the period of the second RBMP. The RBMP mention ecological flows in the context of future measures (under the second RBMP) but they do not explicitly clarify the timeframe of these measures. The activities on ecological flows are ongoing and awaiting the completion of relevant research.

Indicators on the gap to be filled for significant hydromorphological pressures are reported for 2015 and 2021 but not for 2027. From the information available, it can be concluded that there will be some minor reduction in the length or number of water bodies where hydromorphological alterations are preventing the achievement of objectives until 2021. However, it is unclear how this will be achieved, considering that the only measures reported to tackle hydromorphology are related to research studies.

13.2 Main changes in implementation and compliance since the first RBMP

In the first RBMP, measures for existing hydromorphological pressures were not included. In the second RBMP, hydromorphological pressures are still not addressed by specific technical measures, as the only activities planned are related to research and monitoring.

13.3 Progress with Commission recommendations

The Commission recommendations based on the first RBMP and Programme of Measures requested action on the following:

- Recommendation (report 2012): *Review existing controls to ensure that agricultural practices do not cause hydromorphological pressure and update controls where necessary for inclusion in the Programme of Measures of the second RBMP.*

  Assessment: No specific information was found in the second RBMP, specifically clarifying whether controls for impacts of agriculture on morphology (controls on drainage, protecting the bank structure, etc.) exist. The category of "measures for control and decrease of hydromorphological impacts on waters" does not refer to

[63] 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

agriculture but it is noted in the description of measures of a generic nature. Most of the measures are of research/monitoring/advisory type. Therefore, based on the information found, the recommendation is not fulfilled.

- Recommendation: *Include hydromorphological measures in the Programme of Measures of the second RBMP.*

  Assessment: In the second RBMP, hydromorphological pressures are still not addressed by specific technical measures, as the only activities planned are related to research and monitoring. Croatia subsequently informed that for determining measures for the reduction of hydromorphological pressures, it is required to establish quality connections between biological and hydromorphological water status indicators. Research projects in this respect are ongoing. Therefore, this recommendation is not fully fulfilled.

- Recommendation: *Ensure that an ecological flow consistent with good status is established and review the existing permits where relevant.*

  Assessment: Ecological flows have not been derived yet for relevant water bodies but there are plans to do so in the period of the second RBMP. A systematic review of all existing permits and checking their compatibility with the WFD was announced by Croatia for the first half of 2017. The RBMP states that a measure of control and issue of water right permits for abstraction and use of water is under implementation as well as a measure related to the improvement of the register of issued water right permits and concessions. As related activities are still ongoing, this recommendation is not fully fulfilled.

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

  Assessment: KTM23 – "Natural Water Retention Measures" has not been applied in the second RBMP and none of the RBMP and background documents includes information on Natural Water Retention Measures. Some information on measures regarding natural retention and flood areas can be found in the Flood Risk Management Plan which, in Croatia, is integrated with the RBMP. Overall, however, as there is no direct reference to the consideration of Natural Water Retention Measures in the RBMP, this recommendation is not fully fulfilled.

- Recommendation (report 2015*): Review all existing permits and where necessary, amend them to ensure that they are compatible with the WFD objectives.*

  Assessment: As mentioned above, a systematic review of all existing permits and checking their compatibility with the WFD was announced by Croatia for the first half of 2017. The RBMP states that a measure of control and issue of water right permits for abstraction and use of water is under implementation as well as a measure related to the improvement of the register of issued water right permits and concessions. As related activities are still ongoing, this recommendation is not yet fulfilled.

Topic 14 Economic analysis and water pricing policies

14.1 Assessment of implementation and compliance with WFD requirements in the second RBMP and main changes in implementation and compliance

There are some changes since the first RBMP in Croatia. Water services are defined as "public water supply" and "water collection services". At the moment, Croatia has no plans to apply a broader definition. The application of Article 9(4) is reported in WISE for a long list of "other" water services (urban development, industry, agriculture, aquaculture, recreation, flood protection, hydropower, transport, other).

In both the Danube and the Adriatic RBDs, the cost recovery rate stands at 75 %. For each RBD, information is provided on the percentage of cost recovery by sector, which in this case includes population/households, industry and agriculture.

The rate is based on volumetric charging and environmental and resource costs are stated to be calculated and internalised.

The RBMP claims that the established mechanisms ensure adequate contribution of water users to cost recovery for water services, including environmental and resource costs, and also taking into account the Polluter Pays Principle.

For eight water uses, the environmental and resource costs are described in a mostly quantitative way; where cost recovery of environmental and resource costs does not reach 100 % (agriculture, irrigation, fisheries and aquaculture, recreation/transport/others), it is planned to do so for the 3rd RBMP.

Additional incentive pricing measures are foreseen in the updated Water Services Act, including generalisation of metering for all uses (amendment planned for adoption by the end of 2016).

The economic analysis is reported as updated.

14.2 Progress with Commission recommendations

The Commission recommendations based on the first RBMPs and Programme of Measures 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 water tariff and the water fees lead to adequate recovery of the costs of water services. Measures that foster introduction of individual metering where shared metering is in place should be proposed.*

  Assessment: The Water Act defines water services as "public water supply" and "water collection services". Article 3(29) of the Water Act defines water supply as abstraction (from surface and/or groundwater), treatment and distribution. Article 3(28) defines water collection as wastewater collection and treatment.

  The application of WFD Article 9(4) is reported in WISE for a long list of "other" water services (urban development, industry, agriculture, aquaculture, recreation, flood protection, hydroenergy, transport, other).

  At the moment, Croatia has no plans to apply a broader definition of water services and refers to the outcome of Case C-525/12[64] before the European Court of Justice between the European Commission and Germany on the question of inadequate cost recovery from water services.

  In both RBDs the cost recovery rate stands at 75 %. For each RBD, information is provided on cost recovery by sector, which in this case includes population/households, industry and agriculture.

  The rate is based on volumetric charging and environmental and resource costs are stated to be calculated and internalised.

  The RBMP claims that the established mechanisms are ensuring adequate contribution of water users to cost recovery for water services, including environmental and resource costs, and also taking into account the Polluter Pays Principle.

  The description of the methodologies used is presented in a background document called "Economic Analysis - The basis for RBMP 2016-2021". The document contains an economic analysis of water uses and covers the calculation/estimate of cost recovery from water services (including environmental and resource costs) as well as the calculation/estimate of the contributions of significant water users to environmental and resource costs.

[64] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62012CJ0525

For eight water uses, the environmental and resource costs are described in a mostly quantitative way; where cost recovery of environmental and resource costs does not reach 100 % (agriculture, irrigation, fisheries and aquaculture, recreation/transport/others),[65] it is planned so for the third cycle RBMP:

- Urban development,
- Industry,
- Flood protection,
- Hydropower,
- Agriculture,
- Irrigation,
- Fisheries and aquaculture,
- Recreation, transport and various others.

The methodologies and conclusions are not entirely clear, but it seems that environmental and resource costs are calculated using a cost-based approach for the defined water services, i.e. considering the costs of measures to reduce impacts on the water environment. Environmental and resource costs are considered to have been fully internalised via existing policy instruments (e.g. wastewater charges, water abstraction charges, licensing regimes, planning processes).

Additional incentive pricing measures are foreseen in the updated Water Services Act, including generalisation of metering for all uses (amendment planned for adoption by the end of 2016).

The recommendation is therefore partially fulfilled.

- Recommendation: *Ensure that abstraction controls are in place by the time of the second RBMPs.*

  Assessment: In Croatia water pricing in agriculture, including self-abstraction, applies volumetric charges on the basis of metering. Agriculture users that hold a water use permit or a concession are required to measure their water consumption. For agriculture users that do not measure their water use, the quantities are estimated according to the agricultural land area managed by the user.

[65] Croatia subsequently clarified that the fact that cost recovery of environmental and resource costs does not reach 100 % (agriculture, irrigation, fisheries and aquaculture, recreation/transport/others) was detected during the preparation of River Basin Management Plan, and therefore measures 15, 16, 17, 18 and 19, as given in the PoM, were foreseen to address the issue.

The Water Act sets out that a person may freely use small water springs and groundwater on their land provided that these do not breach the rules on general use of water issued by local authorities. Only those persons required to obtain a permit (or a concession agreement) by the Water Act are required to carry out metering.

The RBMP concludes that in practice significant quantities of water are used for agriculture without any control and that this may have consequences on the local water conditions (availability and status).

Additional incentive pricing measures are foreseen in the updated Water Act, including generalisation of metering for all uses (amendment was planned for adoption by the end of 2016 and was updated in 2018).

The recommendation was partially fulfilled at the time of publication of the second RBMP.

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

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

Surface water Protected Area types have been identified for all relevant Directives in Croatia for the second cycle (Table 15.1) (WFD Article 7, Bathing Water, Birds, Habitats, Nitrates, Urban Waste Water and for economically significant aquatic species (fish and shellfish). Protected Areas associated with groundwater bodies have also been identified for all relevant Directives (WFD Article 7, Habitats, Birds and Nitrates). The status of waterbodies associated with Protected Areas is also reported (Figure 15.1).

Table 15.1 Number of Protected Areas of all types in each RBD of Croatia associated with for surface and groundwater

Protected Area type	Number of Protected Areas Associated with[66]				
	Rivers	Lakes	Transitional	Coastal	Groundwater
Abstraction of water intended for human consumption under Article 7	22	1			227 (240)
Recreational waters, including areas designated as bathing waters under Directive 76/160/EEC[67]	4	1	24 (30)	876 (882)	
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)[68]	26	13	5	3	27
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)[69]	243	20	12 (13)	224	540
Nutrient-sensitive areas, including areas designated as vulnerable zones	11	2	1		11

[66] Croatia subsequently informed the Commission that the reported information in WISE was not accurate. The data in brackets is the corrected data supplied by Croatia.

[67] 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

[68] 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

[69] 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

Protected Area type	Number of Protected Areas Associated with[66]				
	Rivers	Lakes	Transitional	Coastal	Groundwater
under Directive 91/676/EEC (Nitrates Directive[70])					
Nutrient-sensitive areas designated as sensitive areas under Directive 91/271/EEC (Urban Wastewater Treatment Directive[71])	20	2	8	57	
Areas designated for the protection of economically significant aquatic species	43	1	7	15	
Other	77	10	7 (8)	15	131

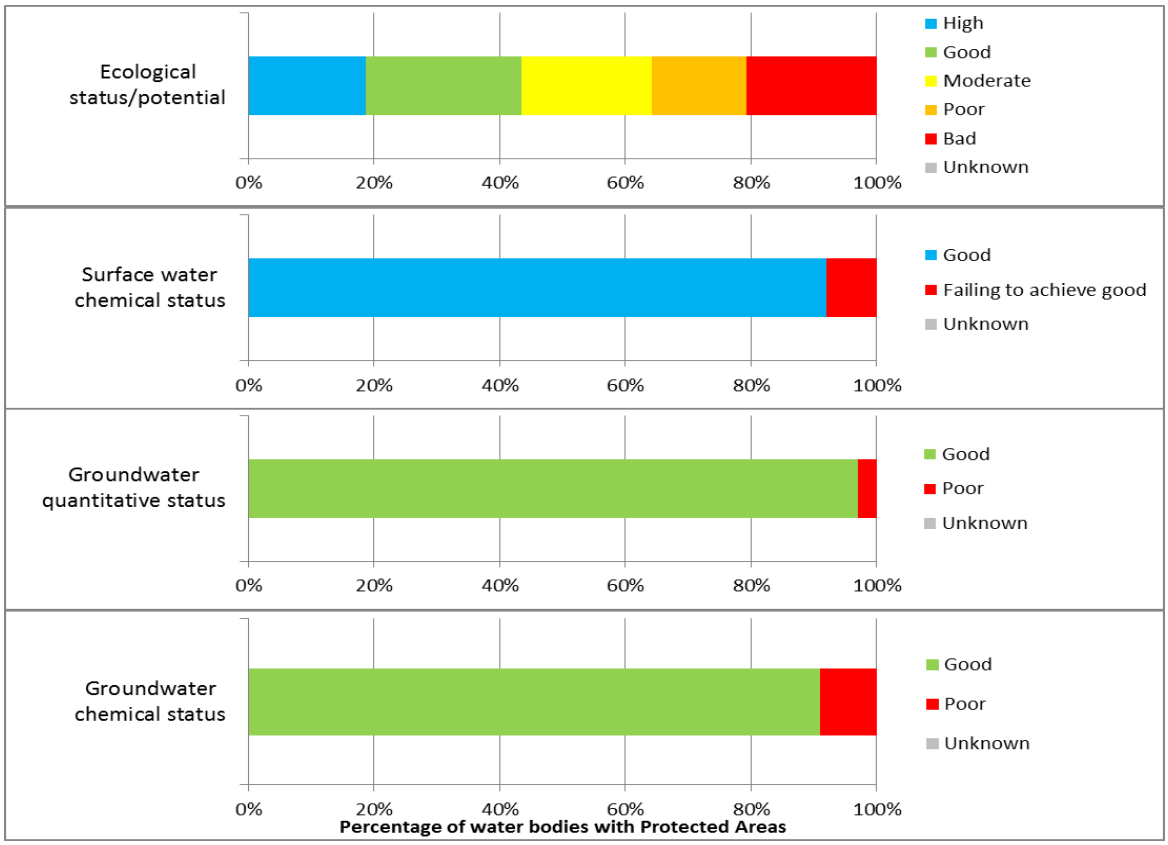
Source: Member States reporting to WISE

A good overview of the status of water bodies associated with Protected Areas is reported (Figure 15.1) with the status classification reported with mostly low or medium confidence.

[70] 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

[71] 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

Figure 15.1 Status of water bodies associated with Protected Areas for Croatia. Note: based on status/potential aggregated for all water bodies associated with all Protected Areas



Source: WISE electronic reporting

Regarding the setting of specific objectives, only the Protected Areas designated for economically significant species (shellfish) have had specific objectives set. For all other Protected Area types, either no objectives were set (WFD Article 7 Protected Areas – both surface and groundwater abstraction) or it is stated that the achievement of good ecological status is also sufficient to meet the objectives of the specified directive (Birds and Habitats).

Monitoring sites of surface water associated with Protected Areas are only reported for those under Article 7 of the WFD, the Nitrates and Habitats Directives and for areas designated for shellfish (Table 15.2). Similarly, no data are reported on monitoring sites of groundwater associated with Protected Areas, except for those under Article 7 of the WFD, the Nitrates and Habitats Directives. Further information on the purpose of monitoring sites for surface water and groundwater status assessment can be found in Chapters 3 to 6 of this report.

There are gaps in the reported monitoring programmes for designated Protected Areas on the basis of the monitoring sites associated with them and the number of monitoring sites is low in relation to the number of Protected Areas reported.

Table 15.2 Number of monitoring sites associated with Protected Areas in Croatia.

Protected Area type	Number of monitoring sites associated with Protected Areas in				
	Rivers	Lakes	Transitional	Coastal	Groundwater
Abstraction of water intended for human consumption under Article 7	1				286
Nutrient-sensitive areas, including areas designated as vulnerable zones under Directive 91/676/EEC (Nitrates Directive)	52	1			126
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)	189	8	42	13	278
Areas designated for the protection of economically significant aquatic species			6	9	

Source: WISE electronic reporting

Exemptions under Article 4(4), justified on the grounds of disproportionate costs, have been applied to water bodies associated with nearly 20 % of Protected Areas and for all types of Protected Areas except Drinking Water areas and Bathing Waters, for which no exemptions are applied.

15.2 Main changes in implementation and compliance since the first RBMP

Croatia reports fewer Protected Areas in the second RBMP (2464) compared to the first RBMP (over 2700): there are fewer Drinking Water Protected Areas but more areas designated under the Habitats Directive. All types of Protected Areas were reported in both cycles. Croatia did not report information to WISE, nor in the first RBMP, on monitoring programmes for types of Protected Areas. Such information is reported in the second RBMP, although not for all Protected Area types. Croatia reported no information on additional objectives and measures in the first cycle and there has been little progress in this regard for the second RBMPs.

15.3 Progress with Commission recommendations

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

- Recommendation: *Croatia should set additional objectives for protected areas, monitor them and assess what additional measures are required to achieve those additional objectives (Species and Habitats, Drinking Water, Bathing Water).*

  Assessment: The reported data from the second cycle RBMP shows that additional objectives have only been set for Protected Areas designated for shellfish. Moreover, for Drinking Water Protected Areas (both surface and groundwater) no additional objectives have been set[72] and for Birds and Habitat Directives it is stated that the achievement of Good Ecological status is assumed to be sufficient to also fulfil the objectives of the other directives. Monitoring programmes for all reported Protected Area types have not been reported and the number of monitoring sites reported is low in relation to the number of Protected Areas. The information reported in relation to additional measures is unclear[73].

  The recommendation has been partially fulfilled.

[73] Croatia subsequently highlighted that the implementation of supplementary measures in Croatia is obligatory, i.e. they are implemented just like basic measures. Croatia stated that for the protected areas, it is foreseen to implement measures in addition to the basic measures.

Topic 16 Adaptation to drought and climate change

16.1 Assessment of implementation and compliance with WFD requirements in the second RBMP

Climate change was considered in both RBDs but it is stated that the guidance on how to adapt to climate change (Common Implementation Policy Guidance Document No. 24[74]) was not used. Climate change is also mentioned as a driver for exemptions under Article 4(4) for groundwater in the Adriatic RBD. Climate change was considered only when detecting climate change signals and for flood risk management. KTM 24 - "Adaptation to climate change" is not made operational to address significant pressures in the RBDs, although some national measures are mapped against KTM 24 - "Adaptation to climate change" in both RBDs. No specific sub-plans addressing climate change are reported.

No information is reported regarding the relevance of droughts in Croatia. No exemptions have been applied following Article 4(6) due to prolonged droughts.

No Drought Management Plans have been reported for Croatia.

16.2 Main changes in implementation and compliance since the first RBMP

Croatia has only considered climate change in a very limited way in the first RBMP and the situation has not changed. For example, climate proofing of measures was not done in either the first or second RBMPs. No assessment can be made for droughts, as there is no information from the first RBMP.

16.3 Progress with Commission recommendations

There was no Commission recommendation based on the first RBMP and first Programme of Measures relating to this topic.

[74] https://circabc.europa.eu/sd/a/a88369ef-df4d-43b1-8c8c-306ac7c2d6e1/Guidance%20document%20n%2024%20-%20River%20Basin%20Management%20in%20a%20Changing%20Climate_FINAL.pdf