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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 Floods Directive (2007/60/EC)
Second River Basin Management Plans
First Flood Risk Management Plans

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Second River Basin Management Plans - Member State: Luxembourg

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 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 (<u>Water Information System for Europe</u>). 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

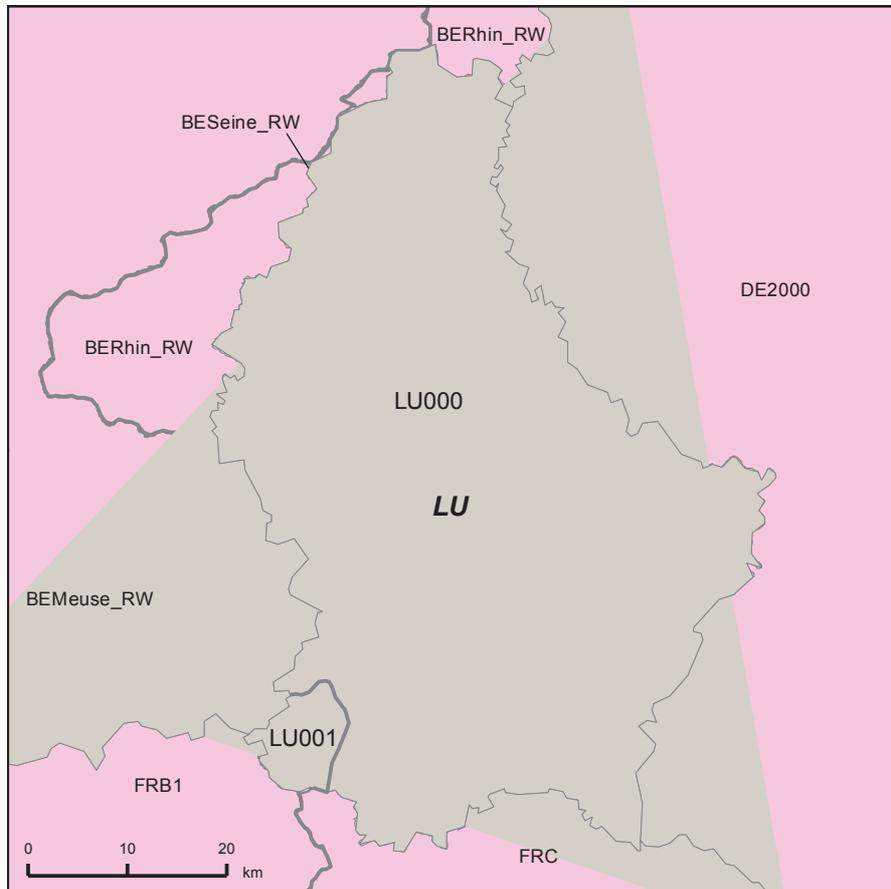
The Water Framework Directive (WFD) (2000/60/EC) requires in its Article 18 that each Member State (MS) reports its River Basin Management Plan(s) (RBMPs) to the European Commission. The second RBMPs were due to be adopted by the Member States in December 2015 and reported to the European Commission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

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

The Member State Reports reflect the situation as reported by each Member State to the European Commission in 2016 or 2017 and with reference to River Basin Management Plans (RBMP) prepared earlier. The situation in the Member States may have changed since then.

General Information

Map A Map of River Basin Districts



Source: WISE, Eurostat (country borders)

- International River Basin Districts (within European Union)*
- International River Basin Districts (outside European Union)*
- National River Basin Districts (within European Union)*
- Countries (outside European Union)*
- Coastal Waters*

The Grand Duchy of Luxembourg is surrounded by Belgium, France and Germany. The total population is 0.5 m and the total surface area is 2.597 km². Most of Luxembourg (97.3 %) belongs to the international Rhine RBD, or Moselle-Saare sub-basin of the Rhine RBD. The remaining 2.7 % (73 km²) are part of the international Meuse RBD. There are seven sub-basins (so-called ‘study areas’), six of these belonging to the Rhine RBD. There is one national

RBMP covering both the Rhine and Meuse RBD. There are no sub-basin or other sectoral plans.

The information on areas of the national RBDs including sharing countries is provided in the following table:

Table A Overview of Luxembourg's River Basin Districts

RBD	Name	Size (km ²)	Countries sharing RBD
LU000 (also LU 000)	Rhine	2525	(AT), BE, CH, DE, FR, (IT), (LI), NL
LU001 (also LU 001)	Meuse	73	BE, DE, FR, NL

Source: RBMPs reported to WISE.

Luxembourg subsequently noted that the countries in brackets share the LU000 RBD.

The share of Luxembourg in the respective international RBDs is 1 % (Rhine), and 0.2 % (Meuse).

Table B: Transboundary RBDs by category and % share in Luxembourg

RBD Name	National RBD	Countries sharing RBD	Co-ordination category	
			1	
			km ²	%
Rhine	LU RB_000	(AT), BE, CH, DE, FR, (IT), (LI), NL	2525	1.0
Meuse	LU RB_001	BE, DE, FR, NL	73	0.2

Source: WISE electronic reporting.

Luxembourg subsequently noted that the countries in brackets share the LU000 RBD.

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.

Status of second river basin management plan reporting

One RBMP for Luxembourg (Rhine, Meuse) was published on 22 December 2015. 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

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

- **Governance and public consultation**
 - Luxembourg involved stakeholders through the establishment of advisory groups.
 - Luxembourg has cooperated closely with neighboring Member States and others in the international RBDs it shares via the international commissions for water management as well as bilateral agreements.
- **Characterisation of the RBD**
 - All the national types for Luxembourg appear to have corresponding intercalibration types.
 - Type specific reference conditions were established for all biological and physicochemical quality elements. Type specific reference conditions were not reported for hydromorphological quality elements, but Luxembourg reported that it applied a German methodology and related all the national river types to a LAWA-type of the German typology. Therefore each Luxembourgish river type has its correspondent reference conditions defined by the German LAWA type.
 - For surface water and groundwater bodies, significance of pressures is linked to the potential failure of objectives and defined in terms of thresholds. For the second RBMP, a relatively high number of pressures were not reported (39 for surface waters, and 53 for groundwater) as Luxembourg did not use the same level of detail used in WISE reporting and information could not be provided at this more detailed level. The significance of pressures affecting some surface water bodies (point sources, diffuse, abstraction and other significant pressures) has been determined mainly by expert judgment and no quantitative tools were used. The same was true for diffuse and point source pressures in groundwater, where only expert judgement was used. This may indicate potential shortcomings in the assessment of these pressure types.
 - The reduction in pressures required to achieve environmental objectives has not been adequately assessed and the measures to tackle Priority Substances causing failure to achieve good status have not been reported.

- Luxembourg reported that all Priority Substances were included in the inventories for each RBD. They carried out a simple assessment (tier 1 point source information) for substances not relevant at RBD level, and a much more thorough assessment (all 4 tiers) for substances relevant at RBD level, as recommended by the CIS Guidance Document n°28. The quality of the input data is assessed as medium in all cases.
- **Monitoring, assessment and classification of ecological status**
 - The number of operational monitoring sites increased significantly since the first RBMP in the Rhine RBD, while the number of surveillance sites decreased slightly. There were no changes in numbers in the Meuse RBD.
 - According to the data reported to WISE, there would still be one gap in the elements monitored: fish in rivers in Meuse RBD¹.
 - Of the five biological quality elements used for the surveillance monitoring of rivers, four were sampled with at least the minimum recommended frequency. However, this was the case for only one of the five biological quality elements used in the operational monitoring of rivers.
 - Information on how the River Basin Specific Pollutants were selected was provided, and they were monitored at least at the minimum recommended frequency at all surveillance monitoring sites, but they were not monitored at the minimum recommended frequency in all of the operational monitoring sites.
 - Environmental Quality Standards have been set for 54 River Basin Specific Pollutants in water for rivers, but none of them was derived in accordance with the Technical Guidance Document No 27. For all substances, the analytical methods are in line with Article 4(1) or Article 4(2) of the Quality Assurance/Quality Control Directive (QA/QC Directive) (2009/90/EC) for the strictest standard applied.
 - The water bodies used for surveillance monitoring in the Rhine RBD were monitored for all required biological quality elements and physicochemical quality elements².

¹ However, Luxembourg subsequently clarified that this was a reporting error and, in fact, fish were monitored in two of the three river water bodies in the Meuse RBD.

² Fish were reported not to be monitored in the Meuse RBD but Luxembourg subsequently stated that this was a reporting error and that two of the three water bodies in the Meuse RBD are monitored for fish.

- None of the water bodies included in surveillance monitoring was reported as having been monitored for all required hydromorphological quality elements³.
- **Monitoring, assessment and classification of chemical status in surface water bodies**
 - Luxembourg monitors all 41 Priority Substances in water and monitoring frequencies are reported for each of these at the site level in both Luxembourgish RBDs. These frequencies meet the frequency requirements according to the WFD for surveillance monitoring in both RBDs but not for operational monitoring in the Rhine RBD.
 - A very small proportion of the total number of monitoring sites (3 %) are reported to be used for monitoring chemical status corresponding to a total of 13 out of 110 river water bodies in the two RBDs in Luxembourg (12 in the Rhine RBD and one in the Meuse RBD). Only 12 % of water bodies at poor chemical status were reported to be monitored in Luxembourg as a whole as part of the operational monitoring programme. Luxembourg subsequently clarified that it only reported to WISE the sites where all priority substances have been monitored. Monitoring has been carried out also at other sites, either only for some of the priority substances, or at a frequency not in line with the provisions of the WFD. These other sites haven't been reported to WISE, although the monitoring results were used to assess chemical status.
 - Monitoring of sediment and biota for status and trend assessment is not reported in the second RBMP. However, Luxembourg uses alternative standards for mercury, hexachlorobenzene and hexachlorobutadiene in water for the assessment of status. Luxembourg also monitors suspended sediment at one strategic location as part of an international monitoring programme for trend assessment. According to the Luxembourgish authorities, monitoring of biota and sediment has started and will be reported in the next RBMP.
 - All river water bodies fail to achieve good chemical status in the second RBMP due to the widespread occurrence of polycyclic aromatic hydrocarbons. The classification of chemical status is underpinned by monitoring for 11 % and 33 % of river water bodies in the Rhine and Meuse RBDs, respectively, with the remainder classified by expert judgement. This is reflected in the confidence assigned to the classification: Overall 12

³ Luxembourg subsequently explained that this was a reporting error and morphological conditions and river continuity were monitored and assessed. Hydrological regime was monitored in rivers but was not assessed in terms of ecological status/potential.

% of surface water bodies in Luxembourg were classified for chemical status with high confidence and 88 % of surface water bodies were classified with low confidence.

- Overall in Luxembourg between the two cycles, there was a large decrease in the proportion of surface water bodies with good chemical status from 70 to 0 % and a significant increase in the proportion failing to achieve good status from 30 to 100 %. The change is largely accounted for by an improvement in the monitoring programmes and the extrapolation of those results to all river water bodies.
- **Environmental objectives and exemptions**
 - Environmental objectives for ecological and chemical status of surface water bodies have been reported for both RBDs and for chemical and quantitative status of groundwater in the Rhine RBD.
 - The number of Article 4(4) exemptions has increased. Although this can inter alia be explained by the re-classification of all surface waters being in poor chemical status, the number remains significant, particularly also with regard to ecological status of surface water bodies.
- **Monitoring, assessment and classification of quantitative status of groundwater bodies**
 - There is still a gap in monitoring since one out of the six groundwater bodies has no monitoring. Luxembourg clarified however, that a monitoring site is already operational and will be integrated in the monitoring network by 2019.
- **Monitoring, assessment and classification of chemical status of groundwater bodies**
 - Due to an error in the electronic reporting, there is an indication that there is no operational monitoring even though four out of six groundwater bodies are at risk of failing good chemical status and not all WFD core parameters are monitored. Luxembourg subsequently clarified that in fact the number of surveillance monitoring sites remained at 31 for the first and second RBMP and also operational monitoring is performed at these sites.
 - It was also clarified that from the WFD core parameters only dissolved oxygen is not systematically monitored due to concerns of the representativity for measures, especially in springs.

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

- The methodology for the designation of heavily modified water bodies has not been modified since the first cycle, but the designations have been reviewed based on the availability of better hydromorphological structural quality mapping of all surface (river) waters, measures in progress, and results of new investigations concerning feasibilities of re-naturalisation actions. In addition, descriptions of the assessment of significant adverse effects of restoration measures and of other means to deliver the benefits of the modifications are provided for each heavily modified water body, although they remain general and do not use any quantified criteria as a basis.
- For the second cycle, a method has been developed to define good ecological potential. Efforts have also been made to do this in biological terms (for fish and benthic invertebrates), and mitigation measures are included in the detailed Programme of Measures. However, no information could be found on the ecological changes that the mitigation measures are designed to achieve in either qualitative or quantitative terms. According to information subsequently provided by Luxembourg, the definition of ecological potential and the mitigation measures permitting to achieve good ecological potential are under development and will be available for the third RBMP.

- **Programme of Measures**

- From WISE reporting it is not clear if Key Types of Measures (KTM) are operational for all identified significant pressures.
- National basic and supplementary measures have been mapped against a wide range of KTM. However, no information was provided on the KTM to address significant pressures and therefore a comparison could not be made.
- There is no information in WISE, on KTM used to tackle individual Priority Substances causing failure of objectives.⁴

⁴ Luxembourg clarified subsequently that KTM 21 and KTM 22 have been reported in table “KTM” and these 2 KTM will help tackling pollution related to RBSP as well as priority substances.

- There are no gap indicators or gap analyses for any of the reporting cycles. Therefore, it is not possible to measure progress in achieving WFD objectives.
- The objectives and requirements of the Floods Directive have been considered in the second RBMP and Programme of Measures: The design of new and existing structural measures has been adapted to take account of WFD environmental objectives, and clear financial commitments have been secured for the implementation of Programme of Measures in the flood protection sector. Although Luxembourg indicated that natural water retention measures have been included in the Programme of Measures, there is no evidence that such measures have been made operational. WFD Article 9(4) has not been applied to impoundments for flood protection.
- **Measures related to abstractions and water scarcity**
 - Water abstraction pressures are not reported as relevant for Luxembourg, and the Water Exploitation Index + is not calculated.
 - There is a concession, authorisation and/or permitting regime to control water abstractions and impoundments but no register of impoundments; and small abstractions are not exempted from these controls.
 - Measures promoting efficient and sustainable water use (Basic Measure Article 11(3)(c)) were implemented in the previous cycle, and new measures and/or significant changes are planned for the 2016-2021 period.
- **Measures related to pollution from agriculture**
 - There is a clear link between pressures from agriculture and measures taken.
 - A gap assessment for nutrients and pesticides has not been undertaken in all RBDs.
 - So far, five drinking water protection zones have been designated near groundwater bodies and further safeguard zones will be established.
 - Luxembourg reported that financing of agricultural measures has been secured.

- **Measures related to pollution from sectors other than agriculture**
 - KTMs have been reported for the River Basin Specific Pollutants identified as causing failure.
 - Information is missing from the RBMP on the number of basic and supplementary measures used to tackle pollution from non-agricultural sources, and links between the measures and pressures causing failure are not always presented.
 - Information on the progress expected in implementing KTMs between 2015 and 2027 is also missing from the RBMP, and there is no evidence that a gap analysis has been undertaken for non-agricultural pollutant pressures.
- **Measures related to hydromorphology**
 - The level of detail provided in the second RBMP on measures is far higher than in the first cycle. A catalogue of hydromorphological measures is used, which includes a semi-quantitative effectiveness assessment for each measure type on the different quality elements, as well as an indication of the relevance to the Floods Directive. The catalogue also includes the cost of the measures. However, for the largest share of water bodies affected by significant hydromorphological pressures, the specific sector linked to these pressures is either unknown or obsolete.
 - Indicators on the gap to be filled for significant hydromorphological pressures and KTM value indicators are not reported, as the respective data was not available at the time of the WISE reporting.
 - Ecological flows have not been derived for the relevant water bodies but there are plans to do it during the second cycle. A new supplementary measure is planned, namely to revise the Water Law to set minimum ecological flows. The implementation of measures on minimum flow is scheduled to take place by 2021.
- **Economic analysis and water pricing policies**
 - No detailed information on the application of the polluter pays principle was reported.
 - Information on the incentive function of water pricing is rather limited.

- A national approach for the calculation of cost recovery rates is used via a harmonised calculation method
- **Considerations specific to Protected Areas (identification, monitoring, objectives and measures)**
 - A significant reduction in monitoring of water bodies associated with protected areas is reported for the second cycle compared to the first cycle, although this was related to an error in the information reported to WISE. The information in WISE did not include data on monitoring under the Birds, Habitats and UWWTD, which was reported under the obligations of those Directives.
- **Adaptation to drought and climate change**
 - A climate check of the Programme of Measures has been made in the second cycle, while such a check was missing in the first cycle.
 - No national Climate Change Strategy had been developed by the time the river basin management plan was published

Recommendations

- Luxembourg should focus on international cooperation, including coordinated assessments of the technical aspects of the Water Framework Directive.
- Luxembourg still needs to continue work on apportionment of pressures among sources, so that measures can be adequately targeted.
- Luxembourg should reduce the dependence on expert judgment for assessing the significance of pressures.
- The development of assessment methods should be completed for all quality elements and use them for the assessment of ecological status/potential for next RBMP.
- Luxembourg also should ensure that Environmental Quality Standards meet the minimum requirements for the protection of freshwater and marine ecosystems from possible adverse effects, as well as of human health. Luxembourg should complete the ongoing work on the establishment of nutrient thresholds that are sufficiently protective for good ecological status.
- Luxembourg should continue improving the confidence in the assessment of surface water chemical status. Luxembourg should also continue improving the operational monitoring for status assessment to reach sufficient spatial coverage and temporal resolution for all the relevant Priority Substances. If reduced frequencies are used, Luxembourg should provide the corresponding explanations, as required by the Directive.
- Luxembourg should ensure that the trend monitoring is up and running to ensure that all the relevant substances specified in Directive [2008/105/EC](#) are monitored in order to provide sufficient data for long-term trend analysis.
- The designation of heavily modified water bodies needs to be further improved by Luxembourg by developing and applying clear criteria for significant adverse effects of restoration measures on the use or the wider environment and the lack of significantly better environmental options. This will improve the transparency of the designation process. Furthermore, a further refined methodology for the definition of ecological potential needs to be applied for the 3rd RBMP.

- A significant number of Article 4(4) exemptions remains to be applied in the second cycle. Although the WFD allows for exemptions, a thorough review of the assessment of technical feasibility and disproportionate costs is required. Efforts should be continued to ensure the implementation of an ambitious program of measures in order to ensure the timely achievement of the WFD objectives.
- It remains unclear whether there are any new physical modifications planned in Luxembourg. For the potential application of Article 4(7), Luxembourg 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.
- KTMs should be operational and cover all the pressures causing failure to objectives. In addition, all individual Priority Substances identified as causing failure should be associated with KTMs.
- Luxembourg should ensure that the RBMP clearly identifies the gap to good status, and that the Programme of Measures are designed and implemented to close that gap with transparent and meaningful information regarding the timing and the funding of the measures.
- Luxembourg should complete a comprehensive gap assessment for diffuse pollutant loads from agriculture (nutrients, agri-chemicals, sediment, organic matter) across all waters in all RBDs and link it directly to mitigation measures in the third RBMP (as per WFD Article 11(3)(h)), to facilitate the achievement of WFD objectives.
- Luxembourg should continue to review and develop a coherent strategy encompassing WFD with all relevant policies and instruments (e.g. RDP, CAP Pillar 1, Nitrates Directive, etc.) to achieve the WFD objectives, and enhance the technical feasibility of its next RBMPS, in cooperation with the farming community and Luxembourg CAP delivery authorities.
- A robust methodology should be implemented to identify River Basin Specific Pollutants and information on this methodology should be provided. It is strongly recommended to use the Technical Guidance for deriving EQSs.
- A gap analysis should be carried out as regards pollutants from non-agricultural sources, and the impact of the planned measures, such as improved urban waste water treatment, should be assessed, so that adequate supplementary measures can be identified and implemented where necessary.

- Luxembourg should ensure the implementation of ecological flows and all relevant hydromorphological measures during this second cycle.
- Luxembourg should apply cost recovery for water use activities having a significant impact on water bodies or justify any exemptions using Article 9(4). Luxembourg should continue to transparently present how financial, environmental and resource costs have been calculated and how the adequate contribution of the different users is ensured. It should also continue to transparently present the water-pricing policy and provide a transparent overview of estimated investments and investment needs.
- Luxembourg should continue the establishment of safeguard zones to protect drinking water sources in designated groundwater bodies until complete coverage of these zones is achieved.

Topic 1 Governance and public participation

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

1.1.1 Administrative arrangements – RBDs

Luxembourg belongs to two international RBDs, the Rhine and the Meuse. The Luxembourgish part of the international RBD Rhine is also called Moselle RDB and the Luxembourgish part of the international RBD Meuse is also called Chiers RBD.

1.1.2 Administrative arrangements – competent authorities

Luxembourg has reported two competent authorities. The Department of the Environment, Ministry for Sustainable Development and Infrastructure, is responsible for the enforcement of regulations and the coordination of implementation. The Water Management Agency is responsible for the monitoring and assessment of status of groundwater and surface water, economic analysis, pressure and impact analysis, preparation of the RBMP and Programme of Measures, public participation, implementation of measures and reporting to the European Commission.

1.1.3 River Basin Management Plans – structure and Strategic Environmental Assessment.

Luxembourg did not prepare sub-plans for its RBMP. The RBMP underwent a Strategic Environmental Assessment procedure.

1.1.4 Public participation and active involvement of stakeholders

The public and interested parties were informed by direct mailing, over the internet, invitations to stakeholders, media (papers, television and radio) and through meetings. Documents were available for the requisite six months and were available for download and also in paper copies at the Water Management Agency.

The mechanisms for the active involvement of stakeholders were the establishment of advisory groups, and the formation of alliances. The stakeholder groups actively involved were: agriculture/farmers; local/regional authorities; NGOs/nature protection; water supply and sanitation; and municipal associations and river partnerships.

The public consultation had the following impacts: addition of new information, adjustment to specific measures, changes to the selection of measures, and commitment to action in the next RBMP cycle.

1.1.5 Integration with other European Union legislation: Floods Directive⁵ and Marine Strategy Framework Directive⁶

Luxembourg did not carry out joint consultation of its RBMP and Flood Risk Management Plan.

1.1.6 International Coordination

Luxembourg's two RBDs are both part of international RBDs: the Rhine and the Meuse. For both, an international agreement was in place and a permanent co-operation body; an international RBMP had been produced for the second cycle; and explicit links had been made with national RBMP within the international RBMP (designated as category 1 cooperation). However, Luxembourg reported that there was no international co-ordination on public participation.

Luxembourg's RBMP indicates that international co-operation related to the Rhine RBD takes place via the International Commission for the Protection of the Rhine (ICPR) and the International Commissions for the Protection of the Moselle and Saar (ICPMS), which covers a major sub-basin of the Rhine IRBD. The latter Commission is particularly important as it brings together Luxembourg and its three neighbouring Member States, France, Germany and Belgium (Wallonia). In 1984, moreover, Germany and Luxembourg signed a new agreement for joint water management, including for the rivers Our, Sauer and Moselle, which form the border between the two Member States for a length of about 128 km. A first agreement has already been signed in 1816. In the Meuse international RBD co-operation took place under the international Meuse Commission (IMC). For further information see the reports on international coordination on the Water Framework Directive.

⁵ 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>

⁶ 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>

1.2 Main changes in implementation and compliance since the first cycle

The information reported to WISE does not indicate any major changes concerning Governance topics.

1.3 Progress with Commission recommendations

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

- Recommendation: *Improve the reporting into the WISE to reflect the information in the RBMPs.*

Assessment: In comparison with the first cycle, when reporting to WISE was incomplete and often duplicated information for the two RBDs, Luxembourg's reporting to WISE for the second cycle appears to be complete: the following chapters have not identified gaps in reporting to WISE. Moreover, Luxembourg has reported separately for its two RBDs.

Luxembourg has fulfilled this recommendation.

- Recommendation: *The RBMPs should be clearly structured and accessible to the public and relevant stakeholders. It would also be advisable to clearly distinguish the information and the measures that are relevant for the Rhine RBD, for the Meuse or for both. This transparency within a clear governance structure will encourage public participation in both the development and delivery of necessary measures to deliver sustainable water management.*

Assessment: The RBMP is clearly structured. The information relevant to the Rhine and Meuse RBDs is clearly distinguished in many cases where there are differences between the two RBDs. Although the PoM (Section 9 of the RBMP) focuses mainly on the national level in the RBD, tables list measures against surface water body codes, so it is possible to work out whether they belong to the Rhine or Meuse RBDs; moreover, Annex 20 of the RBMP provides details of measures separately for the Rhine and Meuse RBDs. Luxembourg has 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 the number of river water bodies (Table 2.1) and groundwater bodies (Table 2.2) remained largely constant between the first and second cycles. There was only one extra groundwater body and an 8 % increase in river water bodies in the Rhine RBD. Updates to the delineation involved: changes in the length and size of the catchment for some river water bodies; some divisions and some joining of river water bodies; two new surface water bodies; and the division of one groundwater body into two (Table 2.3).

Table 2.1 shows the differences in size distribution of surface water bodies in Luxembourg between the second and first cycles. However, the lengths of rivers were not reported for the first cycle. The minimum size criteria reported was 0.5 km² surface area for lakes but no minimum size was reported for river catchments.

The reasons for delineation of surface water bodies provided in the RBMP were: comments from the European Commission, correcting errors in geographical boundaries, revision of surface water typology, and the revision of heavily modified water body designations.

Table 2.1 *Number, length and size distribution of delineated surface water bodies in Luxembourg for the second and first cycles*

Year	RBD	Number of river water bodies	River length (km)			
			Total length	Minimum	Maximum	Average
2016	LU000	107	1 191 (1.197)	2.6	43.4 (43.26)	11.13 (11.18)
2016	LU001	3	23 (22)	4.2 (3.9)	14.44 (12.85)	7.77 (7.177)
2016	Total	110	1,214			
2010	LU000	99				
2010	LU001	3				
2010	Total	102				

Source: WISE electronic reporting. The numbers in brackets were subsequently provided by Luxembourg.

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

Year	RBD	Number	Area (km ²)		
			Minimum	Maximum	Average
2016	LU000	6	20.59	912.02	482.62
2016	LU001	0	0	0	0
2016	Total	6	20.59	912.02	482.62
2010	LU000	5	19	831	517.2
2010	LU001	0	0	0	0
2010	Total	5	19	831	517.2

Source: WISE electronic reporting

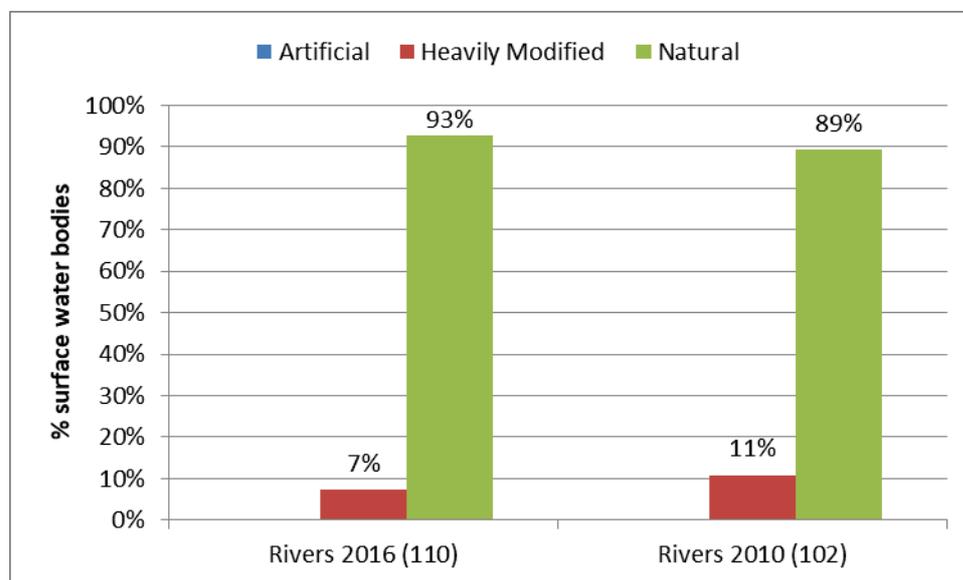
Table 2.3 *Type of change in delineation of groundwater and surface water bodies in Luxembourg between the second and first cycles*

Type of water body change for second RBMP	Groundwater Body	River Water Body
Aggregation		8
Splitting	2	41
Aggregation and splitting		5
Extended area		
Creation		
Deletion		
Change in code		
No change	4	53
Total water bodies before deletion	6	110
Delineated for second cycle (after deletion from first cycle)	6	110

Source: WISE electronic reporting.

In the second cycle, 93 % of identified surface water bodies were natural, while 7 % were designated as “heavily modified”; there were no artificial water bodies. Overall, there was a 4 % increase in natural water bodies, and a 4 % decrease in heavily modified water bodies between the first and second cycles (Figure 2.1). The RBMP described that this re-delineation was in the light of new information, including water structure maps, which indicated that three heavily modified water bodies could achieve good ecological status.

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



Source: WISE electronic reporting

One of the groundwater bodies was divided into two groundwater bodies in the Rhine RBD, changing the total number from five to six, on the basis of spatial and hydrological considerations, as well as geological and land use considerations, and including horizontal stratification in line with Common Implementation Strategy guidance.

2.1.2 Identification of transboundary water bodies

Transboundary river water bodies have been designated for the Moselle-Saar sub-unit. No transboundary groundwater bodies have been identified. Delineation was coordinated with other Member States.

2.1.3 Typology of surface water bodies

The number of surface water body types remained the same between the first and second cycles (Table 2.4). The RBMP, however, described that the surface water typology was changed from using four different methods developed and applied in the first RBMP to focusing on one methodology adapted for Luxembourg for the second cycle. The reason provided in the RBMP was that the method allowed for the validation of the typology, to make it biologically relevant for aquatic fauna and flora.

All the national types for Luxembourg appear to have corresponding intercalibration types.

The Moselle was assigned type VI, which also coincided with the German designation. In general, there is good permanent cooperation within the relevant International Commissions for the Protection of the Moselle-Saar, Rhine and Meuse.

Table 2.4 *Number of surface water body types at RBD level in Luxembourg for the first and second cycles*

RBD	Rivers	
	2010	2016
LU000	6	6
LU001	1	1
TOTAL	6	6

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.

2.1.4 Establishment of reference conditions for surface water bodies

Table 2.5 shows the percentage of surface water body types in Luxembourg with reference conditions established for the second cycle. Type specific reference conditions have been established for all relevant biological quality elements, and all physicochemical quality elements. Type specific reference conditions were not reported for hydromorphological quality elements⁷.

The reference conditions were revised and clarified following the first cycle in fact sheets, which describe the ideal conditions for good ecological status (the fact sheets are in Annex 2 of the RBMP).

⁷ Luxembourg subsequently clarified that for the evaluation of morphological quality, Luxembourg applied a German methodology and related all the national river types with a LAWA-type of the German typology. Luxembourg stated that this is why each Luxembourgish river types has its correspondent reference conditions defined by the German LAWA type. Luxembourg subsequently provided a link to the LAWA documents describing the hydromorphological reference conditions:
<https://www.umweltbundesamt.de/publikationen/strategien-zur-optimierung-von-fliessgewaesser>

Table 2.5 *Percentage of surface water body types in Luxembourg with reference conditions established for all, some and none of the biological, hydromorphological and physicochemical quality elements. Numbers in parenthesis are the number of types in each category*

Water category	Water types	Biological quality elements	Hydromorphological quality elements	Physicochemical quality elements
Rivers (6)	All	100 %	100 % ⁸	100 %
	Some			
	None			

Source: WISE electronic reporting

2.1.5 Significant pressures and impacts on water bodies

In the second cycle, “diffuse - atmospheric deposition”, “physical alteration of channel/bed/riparian area/shore” and “anthropogenic pressure” were the most dominant significant pressures affecting about 100 % of river water bodies (Figure 2.2). For groundwater bodies, the most significant pressure was “diffuse – agricultural” (83 %), followed by “point - contaminated sites” or “abandoned industrial sites” (50 %) (Figure 2.2). No data was available for significant pressures on water bodies in Luxembourg in the first cycle.

For the second cycle, it was reported that 39 pressures were not assessed for surface waters. For groundwater it was reported that 53 significant pressures were not assessed⁹. Many of which were related to surface water specific pressures such as dams and hydrological changes. However, there were some pressures that could impact groundwater which were not assessed such as “groundwater - alteration of water level or volume”. No explanation for this was found in the RBMP¹⁰. The RBMP did report that additional pressures have been considered since the first RBMP, the relationship between pressures and drivers was clarified.

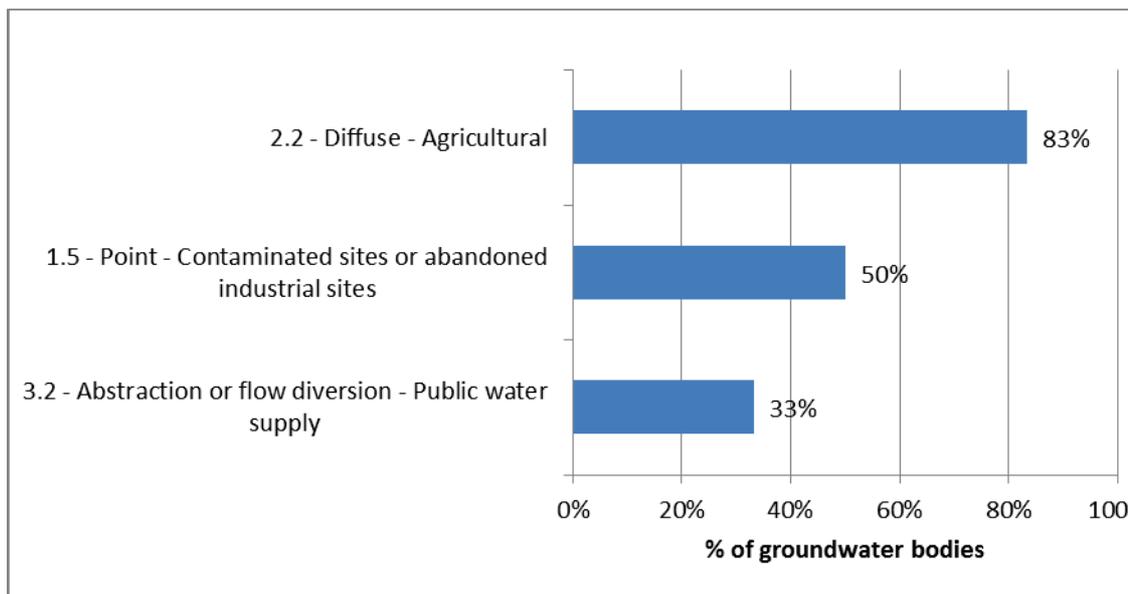
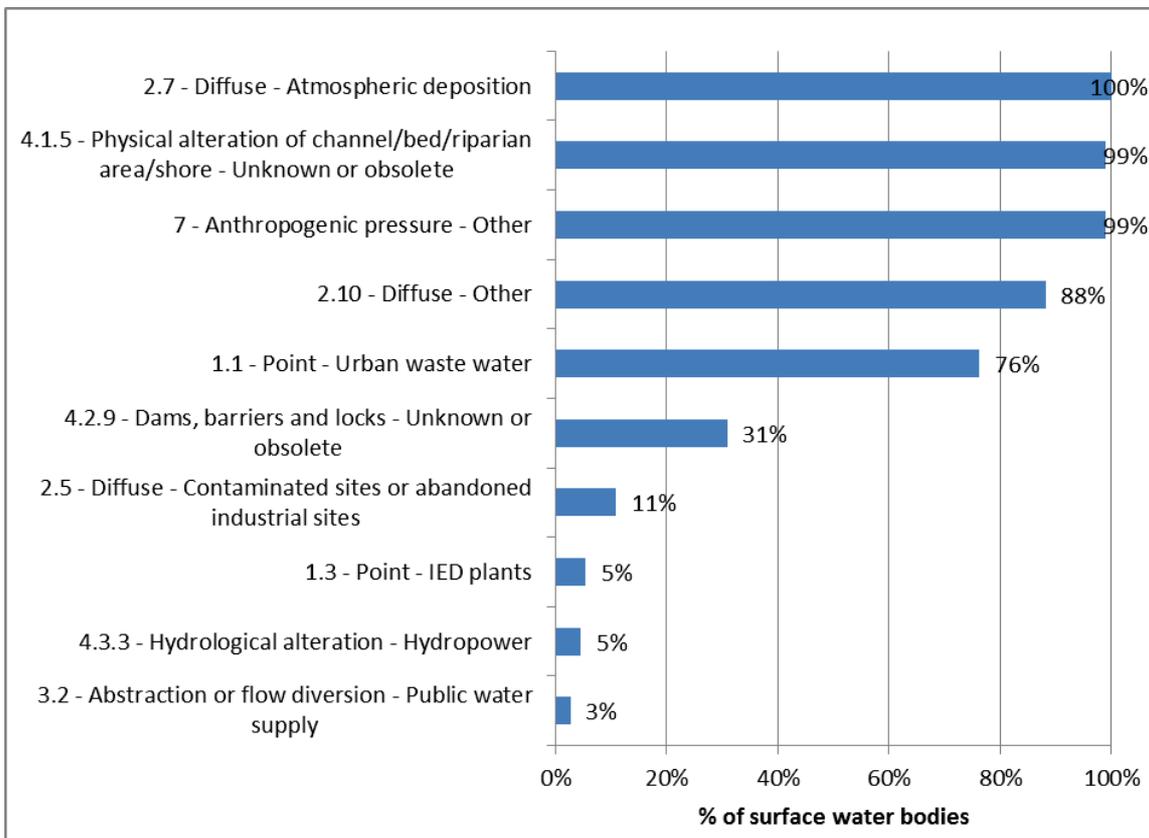
In the second cycle, the most significant impact on surface water bodies was “organic and chemical pollution” and “altered habitats due to morphological changes”, each affecting 100 % of river water bodies, followed by nutrient pollution (90 %) (Figure 2.4). For groundwater, the most significant impacts were organic and nutrient pollution (100 %), followed by chemical pollution (83 %) (Figure 2.4). Luxembourg did not report on impacts in the first cycle.

⁸ Except, in all cases, for hydrological regime.

⁹ Luxembourg subsequently clarified that it couldn't provide information for some of the pressures as it didn't use the same level of detail as the one used in WISE reporting. Therefore information was reported at a more general level. Luxembourg stated that they will try to use the categories from the WISE reporting for the next article 5 assessment in order to be able to provide more detailed information in the next reporting exercise.

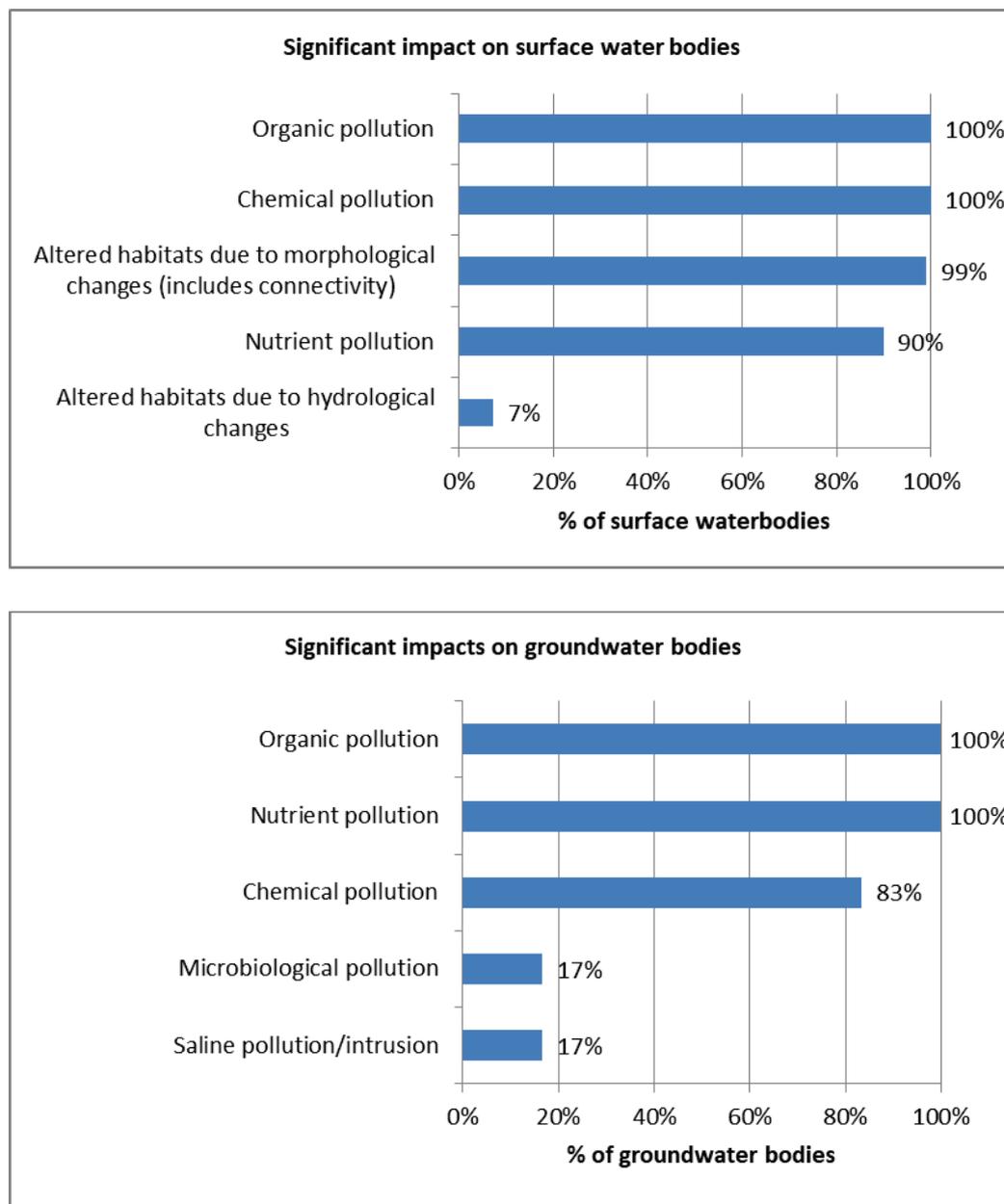
¹⁰ Luxembourg subsequently highlighted that the interaction between groundwater and surface water will be further analysed for the next RBMP.

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



Source: WISE electronic reporting

Figure 2.3 *Significant impacts on surface water and groundwater bodies in Luxembourg for the second cycle. Percentages of numbers of water bodies*



Source: WISE electronic reporting

2.1.6 Definition and assessment of significant pressures on surface and groundwater

For surface waters, expert judgement was used for defining significant pressures from point sources, diffuse sources, abstraction and other significant pressures. Expert judgement and numerical tools were used for defining water flow pressures. For surface water bodies,

significance of pressures is reported as being linked to the potential failure of objectives and is defined in terms of thresholds.

For groundwater, a combination of expert judgement and numerical tools were used for defining significant pressures from abstractions. For diffuse and point source pressures expert judgement was used. Artificial recharge pressures do not appear to have been assessed.

The criteria used to set threshold values for significant pressures for surface water and groundwater bodies were reviewed following the first RBMP, and some thresholds were made more stringent. Threshold values were set for all significant pressures and the relationship between drivers and pressures was clarified. The threshold values were used along with the status assessment, monitoring programme results to define significant pressures.

2.1.7 Quantification of the gap and apportionment of pressures

There are some inconsistencies in the pressures for which measures are planned and the significant pressures reported at the water body level.

Luxembourg has characterised the drivers for the significant pressures and linked them to activities/sectors. The drivers at a national level were urban, agriculture and forestry, navigation, hydroelectricity, flood protection, and atmospheric deposition. For groundwater bodies, the main drivers were agriculture and forestry, linked to the nitrate and pesticides pressures.

The Priority Substances causing the failure of good chemical status have been reported, but the measures to tackle these substances to achieve good status have not been reported, which is a significant gap. The RBMP reported that the reason measures are not yet in place was that further investigations of the sources are planned. This included polycyclic aromatic hydrocarbons, which are possibly from old/disused industrial or waste sites, diuron (possibly from inappropriate disposal), and isoproturon, which is expected to be reduced to some extent as a result of bans on usage in water protection zones (already in place).

2.1.8 Groundwater bodies at risk of not meeting good status

In the Rhine RBD, 67 % of groundwater bodies were reported to be at risk of failing to meet good chemical status. The pollutants putting groundwater bodies at risk of failing good chemical status have been reported. It was reported that no groundwater bodies were at risk of failing to meet good quantitative status.

2.1.9 Inventories of emissions, discharges and losses of chemical substances

Article 5 of the Environmental Quality Standards Directive (EQS Directive) 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 EQS Directive for each RBD, or part thereof, lying within their territory. This inventory should allow Member States to further target measures to tackle pollution from priority substances. It should also inform the review of the monitoring networks, and allow the assessment of progress made in reducing (resp. suppressing) emissions, discharges and losses for priority substances (resp. priority hazardous substances).

Luxembourg reported that all Priority Substances were included in the inventories for each RBD. The two step approach from the Common Implementation Strategy Guidance Document n°28¹¹ has been followed for all substances considered in the inventories. They carried out a simple assessment (tier 1 point source information) for substances not relevant at RBD level as recommended by the guidance document, and a much more thorough assessment (all 4 tiers) for substances relevant at RBD level. The quality of the input data is assessed as medium in all cases.

2.2 Main changes in implementation and compliance since the first cycle

Overall, the number of groundwater bodies and river water bodies remained largely the same between the first and second cycles. There was one extra groundwater body and an 8 % increase in river water bodies in the Rhine RBD. In the second cycle, 93 % of identified surface water bodies were natural with 7 % being designated as heavily modified and no artificial water bodies.

The number of surface water body types remained the same between the first and second cycles, but the typology was applied using an updated methodology moving from using four different methods developed and applied in the first RBMP to focusing on one methodology.

Overall, there was a 4 % increase in natural water bodies and a 4 % decrease in heavily modified water bodies between the first and second cycles because it was realised that some of them could achieve good ecological status. The criteria used to set threshold values for significant pressures for surface water bodies and groundwater bodies were reviewed since the first RBMP and some thresholds were made more stringent.

¹¹ CIS Guidance N° 28 - Preparation of Priority Substances Emissions Inventory
http://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm

2.3 Progress with Commission recommendations

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

- Recommendation: *Complete the inventory of chemical emissions with detailed information on pressures from priority and priority hazardous substances including small emitters and diffuse sources. This improved inventory is expected to support the design of relevant and more detailed measures for the reduction / phasing out of emissions of these substances as appropriate.*

Assessment: Luxembourg reported that all of Priority Substances were included in the inventories for each RBD. The two step approach from the Common Implementation Strategy Guidance Document n°28¹² has been followed for all substances considered in the inventories. They carried out a simple assessment (tier 1 point source information) for substances not relevant at RBD level as recommended by the guidance document, and a much more thorough assessment (all 4 tiers) for substances relevant at RBD level. The quality of the input data is assessed as medium in all cases. Therefore, this recommendation has been fulfilled.

- Recommendation: *Where there are currently high uncertainties in the characterisation of the RBDs, identification of pressures, and assessment of status, these need to be addressed in the current cycle, to ensure that adequate measures can be put in place before the next cycle.*

and

- Recommendation: *Ensure that the RBMPs clearly identify the gap to good status, and that the Programme of Measures is designed and implemented to close that gap with transparent and meaningful information regarding the scope, the timing and the funding of the measures.*

and

- Recommendation: *Improve knowledge about the link between pressures and impacts in designing and making operational the measures for the second RBMPs cycle in order to: Refine the significance of the pressures by quantifying those which are likely to prevent*

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

the achievement of environmental objectives. Apportion pressures by their source and identify the responsible sectors/areas. Assess the reduction in pressures required to achieve environmental objectives.

Assessment: For the second cycle, it was reported that 39 pressures were not assessed for surface waters, and 53 for groundwater, which was not explained in the RBMP¹³. The criteria used to set threshold values for significant pressures for surface water bodies and groundwater bodies were reviewed following the first RBMP and some thresholds were made more stringent. Threshold values were set for all significant pressures and the relationship between drivers and pressures was clarified. The threshold values were used, along with the status assessment and monitoring programme results, to define significant pressures. This shows some progress towards fulfilling the part of the recommendations, relating to defining significance in relation to the environmental objectives.

Pressures have been apportioned by their source, and responsible sectors/areas have been identified. However, expert judgement is still largely used for defining significant pressures from point sources, diffuse sources, abstraction, and other significant pressures for surface waters, which means that this may be less robust¹⁴ compared to using a combination of quantitative tools and expert judgement. The Priority Substances causing the failure of good chemical status have been reported, but the measures to tackle these substances to achieve good status have not been reported.

Overall, there appears to be some progress in implementing these recommendations; however they have been partially fulfilled.

¹³ Luxembourg subsequently explained that the same level of detail used at national level was not the same one used in WISE reporting and therefore the information had to be reported at a more general level.

¹⁴ Luxembourg subsequently highlighted that for a small country such as Luxembourg, their experts know the water bodies (such as their characteristics, industries implemented in their basin, measures planned, projects to be established there in the future etc.) very well. In many cases this knowledge leads to a more detailed analysis of pressures as the one done with models as these are often not detailed enough. Luxembourg also stated that the delineation of the national water bodies is small scaled and allows to adequately judge the pressures on each one of them and they believe that this would not be possible to the same extent with a modelling approach.

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.

Separate surveillance and operational monitoring programmes were reported for rivers (the only surface water category delineated) in both RBDs. There were also other separate monitoring programmes in both RBDs, for example, for eutrophication and river gauging.

Monitoring sites

Table 3.1 compares the number of monitoring sites used for surveillance and operational purposes between the first and second RBMPs.

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

	Rivers	
	Surv.	Op.
2nd RBMP		
LU_000	3	215
LU_001	2	3
<i>Total by type of site</i>	5	218
<i>Total number of monitoring sites</i>	223	
1st RBMP		
LU_000	4	99
LU_001	2	3
<i>Total by type of site</i>	6	102
<i>Total number of monitoring sites</i>	108	

Source: WISE electronic reporting

There are differences in the numbers of monitoring sites reported to WISE and that obtained from the published first RBMP. Using the most recent data for the first RBMP, it seems that there has been a large increase in the number of operational sites in the Rhine RBD, from 99 in the first RBMP to 215 in the second.¹⁵ The number of operational sites (3) for the other RBD (Meuse) was the same for both RBMPs. In terms of surveillance sites, the only difference from the first to the second RBMPs was a decrease in the Rhine RBD, from four for the first RBMP to three for the second. Table 3.2 gives the number of sites used for different monitoring purposes for the second RBMP. In addition to operational and surveillance monitoring, a number of other monitoring purposes was reported in relation to some types of Protected Areas and international monitoring obligations, and in particular a large number of sites used for investigative monitoring.

¹⁵ Luxembourg subsequently stated that for the first RBMP more stations were monitored, however they were not reported as some of them were not WFD compliant.

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

Monitoring Purpose	Number of sites
BWD - Recreational or bathing water - WFD Annex IV.1.iii	11
CHE - Chemical status	13
ECO - Ecological status	222
INT - International network of other international convention ¹⁶	2
INV - Investigative monitoring	405
NID - Nutrient sensitive area under the Nitrates Directive - WFD Annex IV.1.iv	16
OPE - Operational monitoring	218
RIV - International network of a river convention (including bilateral agreements) ¹⁷	3
SUR - Surveillance monitoring	5
Total sites irrespective of purpose	514

Source: WISE electronic reporting

Quality elements monitored (excluding River Basin Specific Pollutants)

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

The same biological quality elements monitored for the first RBMP were reported to be monitored for the second RBMP. This means there is still one gap in the elements monitored: fish in rivers in the Meuse RBD¹⁸. Hydromorphological quality elements and general physicochemical quality elements were only reported at an aggregated level for the first RBMP. For the second RBMP, river continuity and morphological conditions were reported not to be monitored.¹⁹ All required general physicochemical quality elements were monitored in rivers in Luxembourg for the second RBMP.

¹⁶ 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>

¹⁷ Luxembourg subsequently clarified that the two sites reported for monitoring purpose INT should have been reported under RIV, taking the RIV total to five sites.

¹⁸ Luxembourg subsequently clarified that this was a reporting error. Fish were assessed in two of the three water bodies in the Meuse RBD but this was not included in the reporting to WISE.

¹⁹ Luxembourg subsequently clarified that morphological conditions and river continuity were monitored and evaluated for every water body, but it was not reported in WISE. The evaluation of morphological conditions

Table 3.3 *Quality elements monitored for the second RBMP in Luxembourg (excluding River Basin Specific Pollutants). Note; quality element may be used for surveillance and/or operational monitoring*

Biological quality elements									
	Phytoplankton	Macrophytes	Phytobenthos	Benthic invertebrates	Fish	Angiosperms	Macroalgae	Other aquatic flora	Other species
Rivers	Yes	Yes	Yes	Yes	Yes			No	

Hydromorphological quality elements ⁷		
Hydrological or tidal regime	Continuity conditions	Morphological conditions
Yes	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
Rivers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No

Source: WISE electronic reporting

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 6-year period covered by a RBMP. For phytoplankton, this should be done twice during the monitoring year and for the other biological quality elements once during the year. Operational monitoring should take place at intervals not exceeding once every six months for phytoplankton and once every three years during the 6-year cycle for the other biological quality elements. Greater intervals may be justified on the basis of technical knowledge and expert judgement.

In Luxembourg as a whole, four of the five biological quality elements used for the surveillance monitoring of rivers were sampled at least at the minimum recommended frequency at all of the sites where they were monitored. The exception was macrophytes, for which 75 % of the sites met this frequency. In contrast, only one of the five biological quality elements used in the operational monitoring of rivers was sampled at least at the minimum frequency. For fish only 17 % of sites were sampled at this frequency.

and river continuity was not done at the level of monitoring stations, but on the basis of a detailed structural quality survey.

The RBMP specifically mention the following changes from the first to the second RBMP: (i) the quality element phytoplankton was added to the monitoring programme in all relevant water bodies and the results included in the assessment of ecological status/potential; (ii) other aquatic flora has only been monitored since 2007 and has therefore been fully included only in the assessment for the second RBMP; ²⁰(iii) the second intercalibration phase set new limit values and reference values (2013/480/EU²¹), and therefore the reference and limit values for benthic invertebrates, macrophytes and diatoms were adjusted accordingly; (iv) the benthic invertebrates have been evaluated using the French “Indice Biologique Global Normalisé” (IBGN) since 2007, therefore the calculation continued to be as an “IBGN-equivalent” value to allow comparison with earlier results.

River Basin Specific Pollutants and matrices monitored

Member States were not asked to report to WISE on which River Basin Specific Pollutants have been identified or which ones are specifically monitored. However, information was reported on the individual chemical substances monitored in surface and groundwater. Information on monitored River Basin Specific Pollutants in surface waters was derived by removing Priority Substances from the list of monitored chemical substances in surface waters.

On this basis, 54 River Basin Specific Pollutants are monitored in Luxembourg, all in water. All were monitored at 14 sites²². Member States were also asked to report River Basin Specific Pollutants at the generic quality element level for the second RBMP. Luxembourg reported (at the generic level) that 400 sites were used for the monitoring of River Basin Specific Pollutants for investigative purposes. 173 sites were reported to be used for surveillance and/or operational monitoring.

Information in the first RBMP was also reported at a generic quality element level. From the reported information it appears that there has been a significant increase in the number of sites from the first RBMP (Table 3.4).

²⁰ Luxembourg subsequently clarified that the reporting of “other aquatic flora” was a reporting error and no “other aquatic flora” was monitored.

²¹ Commission Decision of 20 September 2013 establishing, pursuant to Directive 2000/60/EC of the European Parliament and of the Council, the values of the Member State monitoring system classifications as a result of the intercalibration exercise and repealing Decision 2008/915/EC (notified under document C(2013) 5915) Text with EEA relevance <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32013D0480>

²² Luxembourg subsequently stated that River Basin Specific Pollutants were monitored at other sites also, but at some of these monitoring sites only some of the RBSP were monitored (mainly metals) and in some cases the frequency was lower than the frequency indicated in the WFD.

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 Luxembourg. Note the data from both cycles may not be fully comparable as different definitions were used and also not all Member States reported information at a site level, meaning that there were no equivalent data for the first RBMP*

RBMP		Number of stations (River water bodies)
1 st	Sites used to monitor non-priority specific pollutants and/or other national pollutants – reported at the quality element level	136
2 nd	Sites used to monitor River Basin Specific Pollutants – reported at the quality element level	173

Sources: WISE electronic reporting. Data does not take into account whether sites are used for ecological and/or chemical monitoring

Annex V of the WFD provides guidance on the frequency of monitoring of the different quality elements: once every three months is recommended for “other pollutants”, which are taken here to equate to river basin specific pollutants. Surveillance monitoring should be carried out for each monitoring site for a period of one year during the 6-year period covered by a river basin management plan. For river basin specific pollutants this should be done four times for the surveillance year, and for operational monitoring four times a year for each year of the cycle.

For all sites and all River Basin Specific Pollutants monitored for surveillance purposes, these were sampled at least at the minimum recommended frequency. In terms of operational monitoring none of the sites for all River Basin Specific Pollutants was sampled at least at the minimum recommended frequency. However, reported as being sampled at least at the minimum recommended frequency. However Luxembourg subsequently informed the Commission that there were errors in the reporting and that some of the sites were monitored at the minimum recommended frequency.

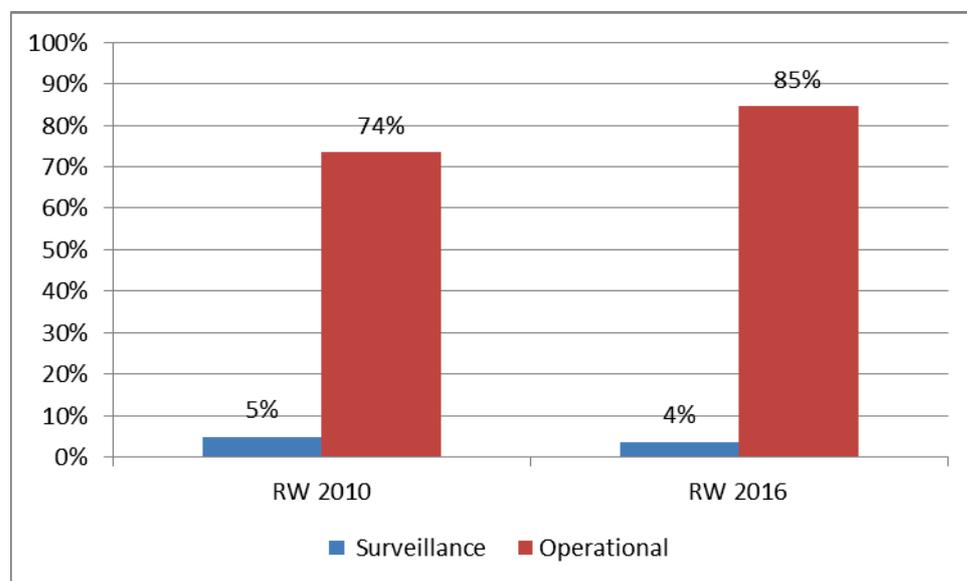
Surveillance monitoring of surface water bodies

All three river water bodies in the Rhine RBD used for surveillance monitoring were monitored for all required biological quality elements and general physicochemical quality elements. All required general physicochemical quality elements were monitored in the one river water body in the Meuse RBD used for surveillance but this was not the case for the biological quality elements. None of the water bodies included in surveillance monitoring in

both RBDs was reported as having been monitored for all required hydromorphological quality elements²³.

Overall in Luxembourg, the number of delineated river water bodies increased from 102 in the first RBMP to 110 in the second. The total number and proportion of river water bodies included in surveillance monitoring decreased from five (5 %) for the first RBMP to four (4 %) for the second. In contrast the proportion of river water bodies included in operation monitoring increased from 74 % in the first RBMP to 85 % in the second. Overall, 86 % of river water bodies were reported to be included in surveillance and/or operational monitoring (Figure 3.1). Luxembourg subsequently informed the Commission that due to errors in the reporting the number of water bodies monitored might differ from what was reported. The proportion of surface water bodies in different status classes in which there was surveillance monitoring (Figure 3.2) indicates that no surface water bodies in good status are included, and therefore not as required by the WFD.

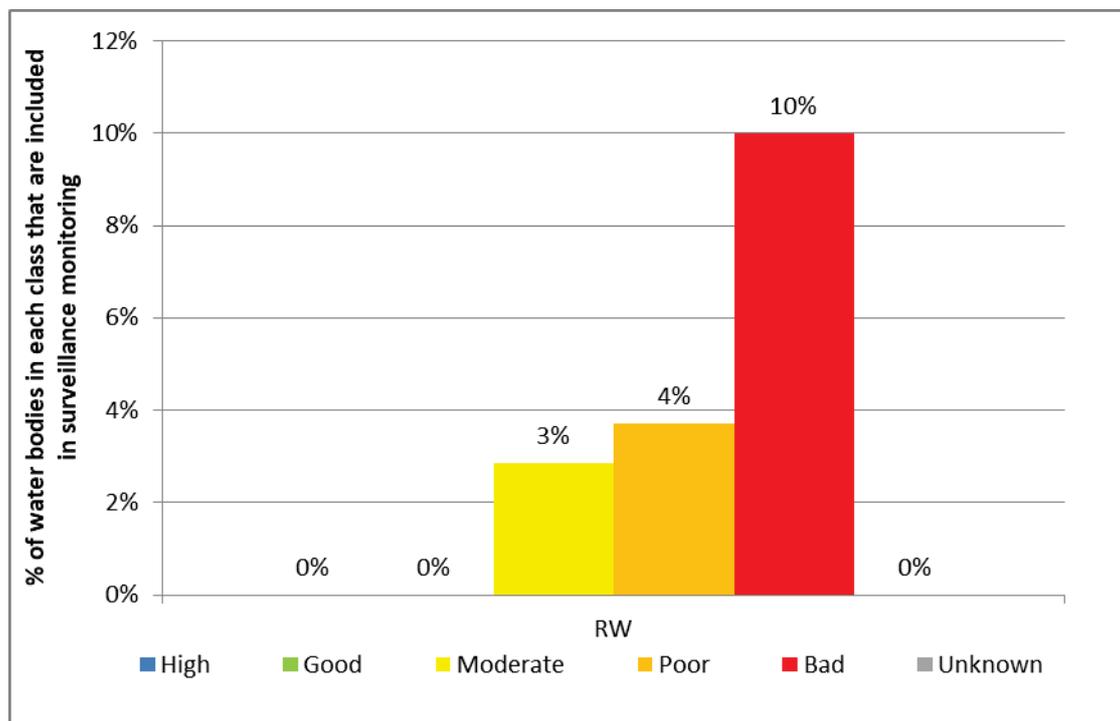
Figure 3.1 *Percentage of water bodies included in surveillance and operational monitoring in Luxembourg for the first RBMP and second RBMP. Note no differentiation is made between water bodies included in ecological and/or chemical monitoring*



Source: WISE electronic reporting, Luxembourg subsequently noted that wrong water body codes have been reported for some monitoring stations.

²³ Luxembourg subsequently indicated that there was an error in their reported data and that all of the water bodies included in surveillance monitoring had been monitored for the required hydromorphological quality elements.

Figure 3.2 *Proportion of water bodies in each ecological status/potential class which are included in surveillance monitoring in Luxembourg*



Source: WISE electronic reporting

Operational monitoring of surface water bodies

The biological quality elements predominantly used for operational monitoring were macrophytes, phytoplankton and benthic invertebrates (in 94 % of water bodies included in operational monitoring). 84 % of water bodies in less than good status/potential were included in operational monitoring: the only three water bodies in good or high status/potential were included in operational monitoring but not in surveillance monitoring²⁴.

Transboundary surface water body monitoring

Six transboundary river water bodies were reported by Luxembourg. Five river monitoring sites were reported to be part of an international network and/or a river convention network.²⁵

Use of monitoring results for classification

Grouping has not been used for the classification of ecological status/potential at the quality element level. Around 10 % of water bodies were classified by expert judgment for general

²⁴ Luxembourg subsequently clarified that these values are not accurate as some water body codes were incorrectly reported for some monitoring stations.

²⁵ Luxembourg subsequently clarified that all five monitoring sites are included in a river convention network.

physicochemical quality elements and River Basin Specific Pollutants. The biological quality elements were overwhelmingly classified using monitoring results. There are often discrepancies between the number of water bodies directly monitored for biological quality elements in the Rhine RBD and those classified using monitoring results. For example, benthic invertebrates were monitored in 87 river water bodies and 103 were reported as having been classified using monitoring results: grouping was reported not to have been used. Luxembourg subsequently informed the Commission that due to errors in the reporting the number of water bodies monitored might differ from what was reported. A more significant discrepancy is in terms of hydromorphological quality elements where hydrological regime was directly monitored but was not used in the classification of ecological status/potential²⁶. Conversely river continuity and morphological conditions were reported to be classified using monitoring results even though no water body was reported to be monitored. However, Luxembourg subsequently clarified that river continuity and morphological conditions were monitored, but it was not reported in WISE.

3.1.2 Ecological Status/potential of surface water

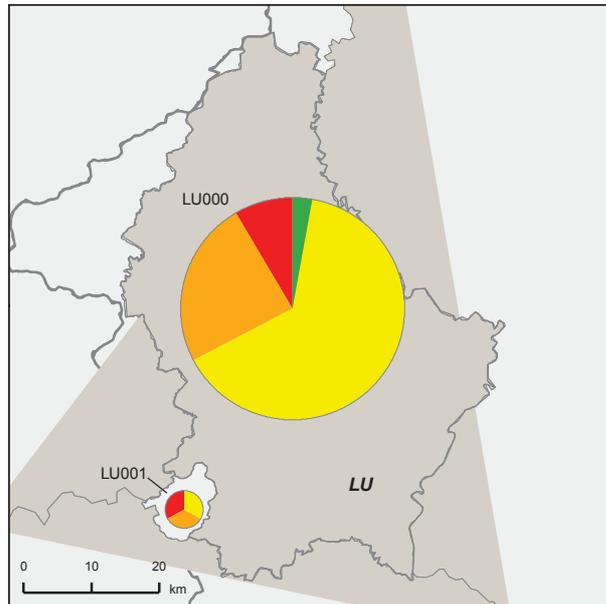
The ecological status/potential of surface water bodies in Luxembourg in the second RBMP is illustrated in Map 3.1.

The total number of river water bodies increased from 102 in the first RBMP to 110 in the second. The proportion of river water bodies in good status/potential decreased from 7 % in the first RBMP to 3 % in the second. Correspondingly, the proportion of less than good increased from 93 % to 97 %. There has been an improvement in the confidence of the classification from the first to the second RBMP: 61 % were classified with high confidence in the first RBMP and 100 % in the second (Figure 3.3).

The proportion of river water bodies in poor status was reduced from about 10 % in the first RBMP to 8 % in the second, and river water bodies in bad status from about 30 % in the first RBMP to 23 % in the second. There were increases in the proportion of moderate status, with about 53 % in the first plan and 66 % in the second (none were classified as high status) (Figure 3.4).

²⁶ Luxembourg subsequently stated that hydrological regime was not evaluated as the methodology was not ready, but it will be evaluated for the next RBMP.

Map 3.1 *Ecological status or potential of surface water bodies in Luxembourg 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)*

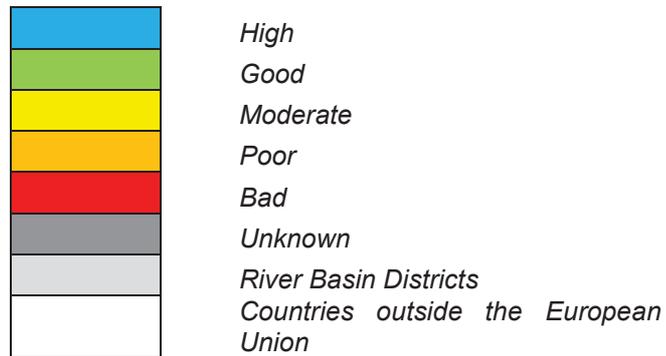
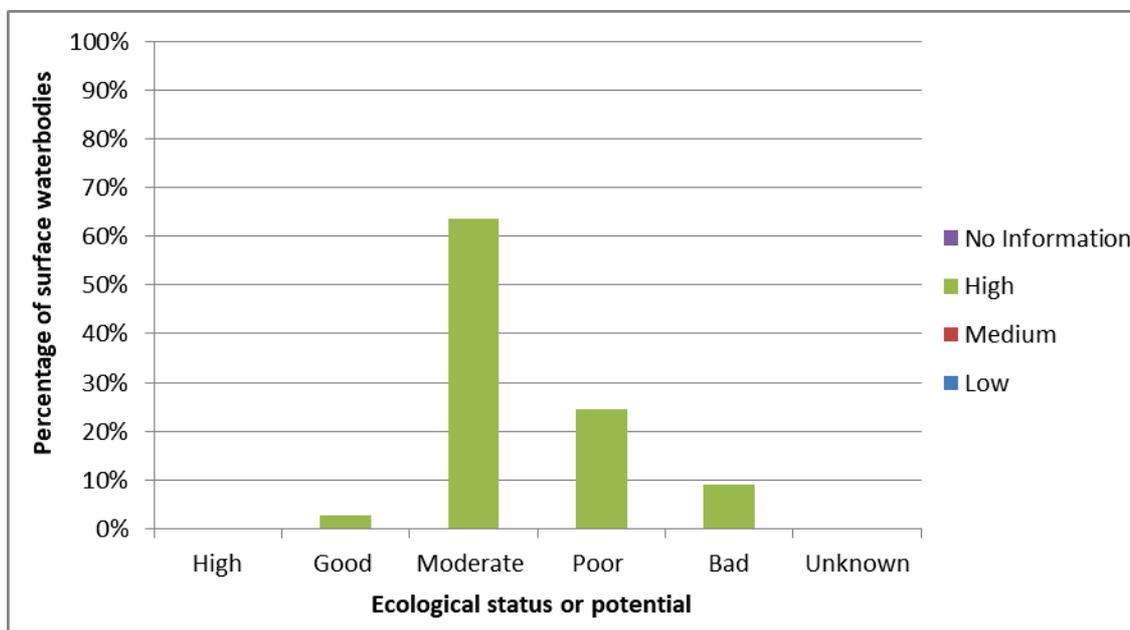


Figure 3.3 *Confidence in the classification of ecological status or potential of surface water bodies in Luxembourg based on the most recently assessed status/potential*



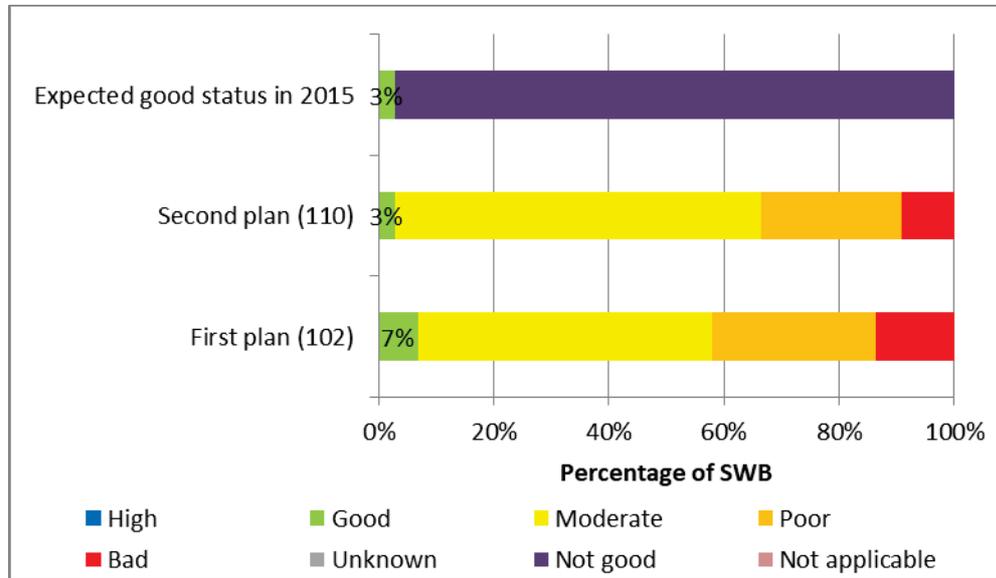
Source: WISE electronic reporting

A similar picture emerged for ecological potential, where the proportion of heavily modified water bodies in good ecological potential was reduced from 9 % to zero from the first to the second RBMP, whilst the proportion with moderate ecological potential remained about the same, and the proportion in the class of bad potential were significantly reduced, from 45 % to 25 %, whilst the proportion in the class of poor potential increased from about 18 % to 50 %.

The RBMP indicates that the changes are due in part to changes in the designation of water bodies (91 natural water bodies in the first RBMP and 102 in the second , 11 heavily modified water bodies in the first RBMP and eight in the second), but most importantly due to a more complete dataset and more stringent assessment, in particular more biological quality elements and a higher number of water bodies monitored, and assessment of the ecological status on the basis of the worst case results in terms of biological and general physicochemical quality elements.

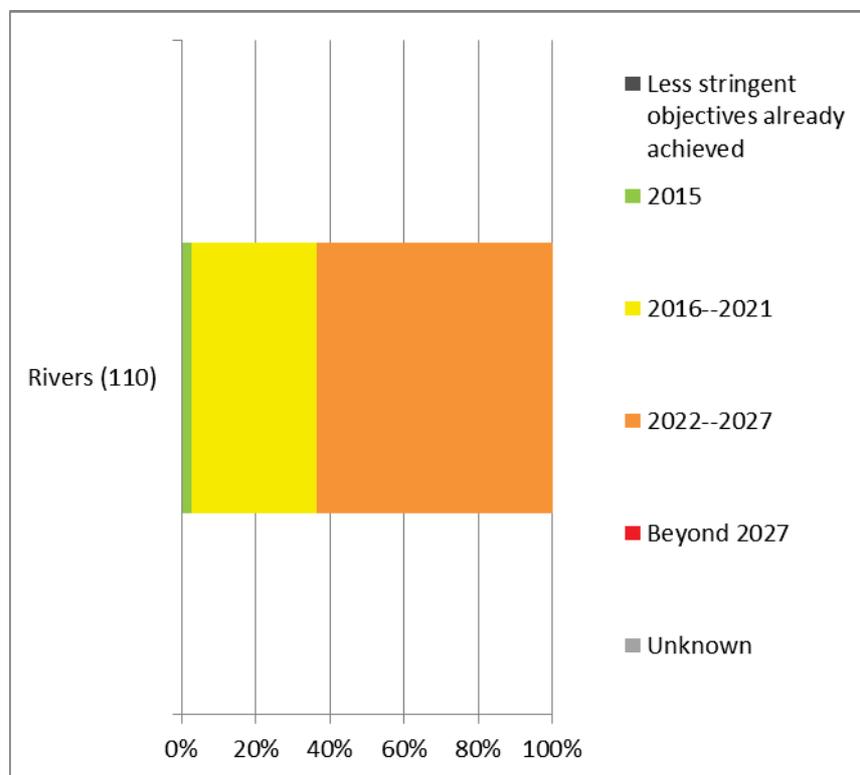
Luxembourg reports that the majority of their river water bodies will reach good status/potential for the third RBMP (Figure 3.5).

Figure 3.4 *Ecological status or potential of surface water bodies in Luxembourg for the second RBMP, for the first RBMP and expected in 2015. The number in parenthesis is the number of surface water bodies for each cycle. Note the period of the assessment of status for the second RBMP was 2008 to 2015. The year of the assessment of status for first RBMP is not known*



Source: WISE electronic reporting

Figure 3.5 *Expected date of achievement of good ecological status/potential of surface water bodies in Luxembourg. The number in parenthesis is the number of water bodies in each category*



Source: WISE electronic reporting

Classification of ecological status in terms of each classified quality element

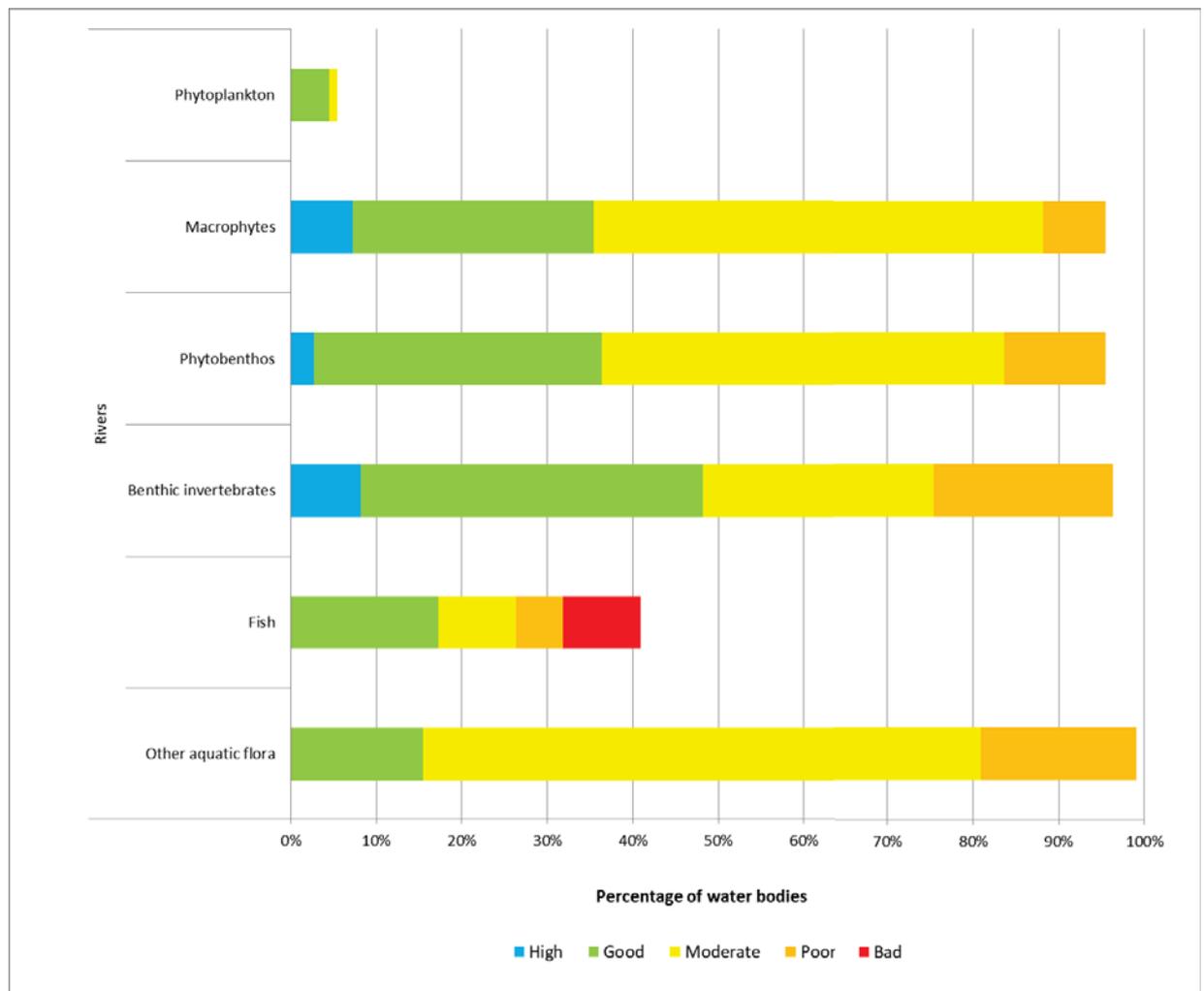
Over 95 % of river water bodies were classified for benthic invertebrates, phytobenthos and macrophytes but for only 41 % for fish (Figure 3.6). Phytoplankton is monitored in the one reported reservoir and four other river water bodies.

Figure 3.7 compares the classification of biological quality elements in terms of ecological status/potential for the second RBMP. It should be noted that this comparison should be treated with caution as there are differences between the numbers of surface water bodies classified for individual elements between the first and second plans. The same biological quality elements were used for the first and second plans. Other aquatic flora was reported but Luxembourg subsequently confirmed that this was a reporting error, and that they reported “other aquatic flora” in place of the two sub-BQEs diatoms and macrophytes.

Even fewer water bodies have been classified using the supporting quality element hydrological regime in the second RBMP than in the first²⁷ (Figure 3.9).

All river water bodies were classified according to River Basin Specific Pollutants, 97 (88 %) using monitoring results, the remainder by expert judgment. 100 water bodies were reported to be directly monitored (Figure 3.9).

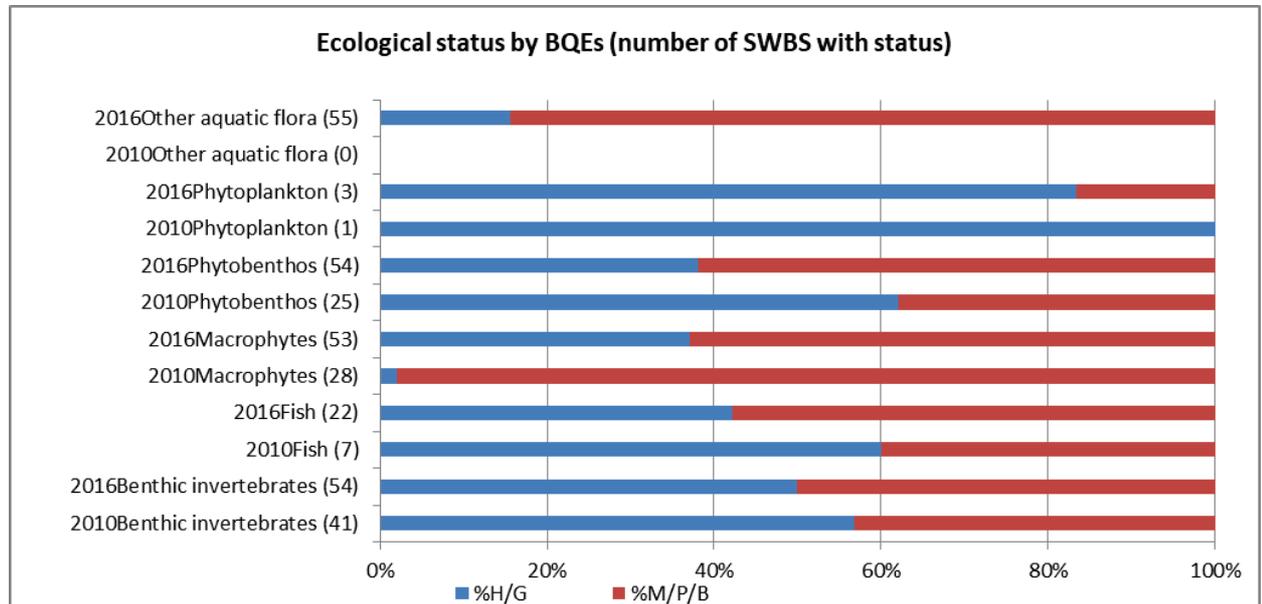
Figure 3.6 *Ecological status/potential of the biological quality elements used in the classification of surface waters in Luxembourg. Note that water bodies with unknown status/potential, and those that are monitored but not classified or not applicable, are not presented.*



Source: WISE electronic reporting. Luxembourg subsequently noted that there was no monitoring for “other aquatic flora” and this was reported by mistake.

²⁷ Luxembourg subsequently clarified that hydrological regime is monitored but was not evaluated in the 2nd RBMP as the methodology was not ready. It will be evaluated for the next RBMP.

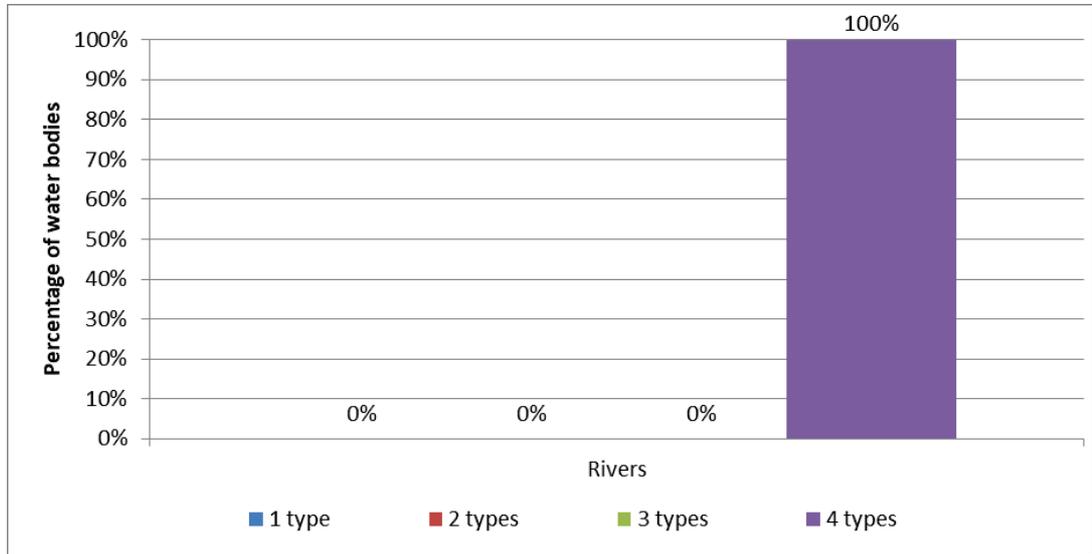
Figure 3.7 Comparison of ecological status/potential in Luxembourg according to classified biological quality elements in rivers between the first and second RBMP



Source: WISE electronic reporting. Luxembourg subsequently noted that there was no monitoring for “other aquatic flora” and this was reported by mistake.

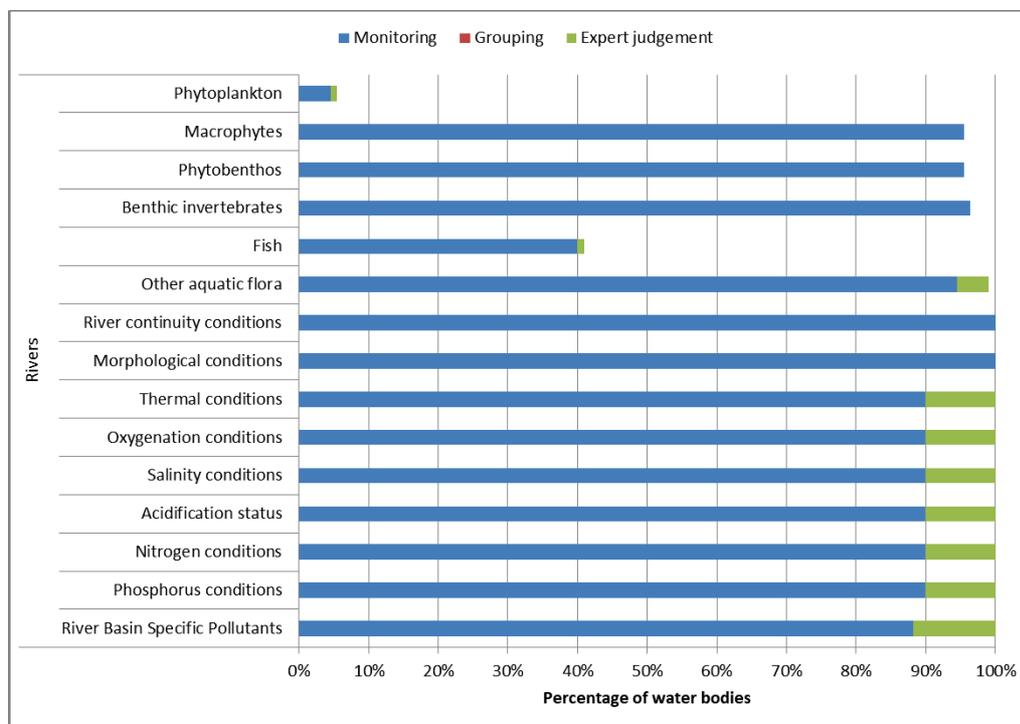
Figure 3.8 and Figure 3.9 illustrate the basis of the classification of ecological status/potential of rivers in Luxembourg for the second RBMP. Overall in Luxembourg, the ecological status of rivers has been assessed using all four groups of quality elements (Figure 3.8).

Figure 3.8 *The classification of the ecological status or potential of rivers in Luxembourg 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: WISE electronic reporting

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



Source: WISE electronic reporting. Luxembourg subsequently noted that there was no monitoring for “other aquatic flora” and this was reported by mistake, “Transparency conditions” and “Hydrological regime” were monitored but not used,

Assessment methods and classification of biological quality elements

Reference conditions were reported not to have been established for any river type in Luxembourg for hydromorphological quality elements²⁸. Reference conditions have been established for all general physicochemical quality elements for all river types. In terms of biological quality elements, there are reference conditions for all elements in all six river types, and for some elements for one type that has not been given a national code. There is also double reporting of one type (VI): a common intercalibration type has been reported but also "not applicable".

According to the reporting in WISE, there is still one gap in the biological quality elements monitored: fish in rivers in the Meuse RBD. However Luxembourg subsequently clarified that

²⁸ Luxembourg subsequently explained that the morphological parameters were assessed by applying a German methodology that compares the gap to the reference conditions of each German LAWA type. As every Luxembourgish river type is related to its corresponding LAWA type, Luxembourg did apply the LAWA reference conditions for each of its river types.

this was a reporting error and that fish are monitored and assessed in two of the three water bodies of the Meuse RBD. None of the water bodies included in surveillance monitoring in both RBDs was reported to be monitored for all required hydromorphological quality elements. Luxembourg subsequently clarified that this was also a reporting error and that all water bodies included in surveillance monitoring had been monitored for the required hydromorphological quality elements.

One reported assessment method is relevant for phytoplankton in lakes. This is related to the one river water body that is a reservoir and is therefore monitored and assessed as a lake. Methods for the assessment of all relevant biological quality elements have been reported for rivers and are reported to be sensitive to all possible impacts.

Intercalibration of biological assessment methods

Only 3 % of river water bodies did not have an equivalent common intercalibration type. The river types were intercalibrated against four common intercalibration types.

Assessment methods for hydromorphological quality elements

Only two of the three required hydromorphological quality elements were assessed in terms of ecological status and potential, hydrological regime was not. The assessment of river continuity was reported to be related to the class boundaries for the sensitive biological quality elements whereas for morphological conditions it was not.

The supporting quality elements of morphology and continuity were classified for all water bodies on the basis of a German assessment method (LAWA-guideline). The hydrology has not been classified, as the assessment method did not cover this aspect.

The evaluation of the hydromorphological status was based on a detailed structural quality survey of all water bodies, which was not available for the first RBMP; a comparison with the first RBMP is therefore not possible.

Assessment methods for general physicochemical quality elements

Luxembourg reported that all the relevant supportive general physicochemical quality elements in rivers have been assessed in terms of ecological status/potential and the classification boundaries are related to the class boundaries for the sensitive biological quality elements. Standards have been set for all relevant general physicochemical quality elements in rivers and are reported to be consistent with the good-moderate status boundary of the relevant sensitive biological quality elements.

The RBMP indicates that Environmental Quality Standards for the general physicochemical parameters were used to adjust the specific reference conditions for the second RBMP, and the worst case classification for these quality elements was used in combination with the biological quality elements to determine ecological status/potential.

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

The RBMP indicates that River Basin Specific Pollutants were selected from the list of substances listed in Appendix I of the Grand-Ducal Regulation of 28 February 2003, depending on their relevance. The environmental quality standards have been set based on an analysis of the Directives in force. In case of divergence between the regulatory provisions, it is the most stringent quality objectives that have been retained.²⁹

Environmental Quality Standards have been set for 54 River Basin Specific Pollutants in water for rivers: none was derived in accordance with the Technical Guidance Document No 27³⁰. For 35 substances the analytical method used meets the minimum performance criteria laid down in Article 4.1 of the QA/QC Directive (2009/90/EC³¹) for the strictest standard applied. For the remaining 19 substances the analytical method complies with the requirements laid down in Article 4.2 of the same Directive for the strictest standard applied.

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

Luxembourg reported that the ‘one-out, all-out’ principle has been applied in deriving the overall classification of the ecological status/potential of a water body in both RBDs.

3.2 Main changes in implementation and compliance since the first RBMP

There are differences in the numbers of monitoring sites reported to WISE and that obtained from the published first RBMP. Using the most recent data for the first RBMP, it seems that there has been a large increase in the number of operational sites in the Rhine RBD, from 99 in the first RBMP to 215 in the second.³² The number of operational sites (3) for the other RBD (Meuse) was the same for both RBMP. In terms of surveillance sites, the only difference from

²⁹ Luxembourg subsequently explained that the list of River Basin Specific Pollutants and the associated limit values were revised during 2015. The Grand-Ducal Regulation which will make this new list binding was published in January 2016. This revision is based above all on new knowledge on the presence of various polluting substances in Luxembourg's rivers. An intense exchange with France has also taken place on the list of River Basin Specific Pollutants. The revised list of specific pollutants and associated new quality standards will form the basis of the assessment of surface water bodies for the next RBMPs.

³⁰ <https://circabc.europa.eu/sd/a/0cc3581b-5f65-4b6f-91c6-433a1e947838/TGD-EQS%20CIS-WFD%2027%20EC%202011.pdf>

³¹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:201:0036:0038:EN:PDF>

³² Luxembourg subsequently stated that for the first RBMP more stations were monitored, however they were not reported as some of them were not WFD compliant.

the first to the second RBMP was a decrease in the Rhine RBD, from four for the first RBMP to three for the second.

Overall the assessment is based on more complete data sets, i.e. more complete sets of quality elements and results for a larger number of water bodies. For example, assessments for phytobenthos and macrophytes were available for 98 % of surface water bodies for the second RBMP, whereas for the first RBMP 47 % of surface water bodies were assessed on the basis of macrophytes alone and 49 % on the basis of diatoms; fish were reported to be assessed in 41 % of surface water bodies for the second RBMP, compared with 14 % for the first RBMP.

3.3 Progress with Commission recommendations

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

- Recommendation: *The assessment methods for ecological and chemical status need to be further developed, in particular for the hydromorphological quality elements. Some biological quality elements still need to be adapted to the Decision on Intercalibration.*

Assessment: The biological quality element “fish” and the supporting quality element 'hydrological regime' were not classified for the majority of water bodies. A biological assessment method for fish is in place; therefore it is unclear why Luxembourg did not classify more water bodies using this biological quality element³³. An assessment method for the hydrological regime was not available³⁴. No information is available on the status of intercalibrated biological quality elements for Luxembourg³⁵.

Based on this information it is considered that this recommendation has been partially fulfilled³⁶.

- Recommendation: *The identification of River Basin Specific Pollutants needs to be more transparent, with clear information on how pollutants were selected, how and where they were monitored, where there are exceedances and how such exceedances*

³³ Luxembourg subsequently stated that a new method is being developed and will be intercalibrated for 2020. The monitoring of fish was extended for the 2nd RBMPs and more monitoring results will be available for the next RBMPs.

³⁴ Luxembourg subsequently stated that a methodology for hydrological regime has been established and will be used for the next RBMPs

³⁵ Luxembourg subsequently stated that all biological quality elements have been intercalibrated.

³⁶ Luxembourg subsequently stated that all biological quality elements have now been intercalibrated and are included in the 2018 Intercalibration Decision. The monitoring of fish was extended for the 2nd RBMP and more monitoring results will be available for the next RBMP.

have been taken into account in the assessment of ecological status. It is important that there is an ambitious approach to combatting chemical pollution and that adequate measures are put in place.

Assessment: The RBMP provide information on how River Basin Specific Pollutants have been selected. Environmental Quality Standards have been derived for 54 River Basin Specific Pollutants in water (only) for the second RBMP, but none of the standards was derived in accordance with the Technical Guidance Document No 27. For 35 substances the analytical method used meets the minimum performance criteria laid down in Article 4.1 of the QA/QC Directive (2009/90/EC) for the strictest standard applied and for the remaining 19 substances it complies with the requirements laid down in Article 4.2.

Detailed information has been reported on the River Basin Specific Pollutants monitored in water with their respective sampling frequencies. However, whereas all pollutants were monitored at least at the minimum recommended frequency for surveillance monitoring at all sites where they are monitored, for operational monitoring none of the sites for all pollutants were reported to be sampled at least at the minimum frequency. However Luxembourg subsequently informed the Commission that there were errors in the reporting and that some of the sites were monitored at the minimum recommended frequency. In addition, there is conflicting information on the number of sites monitoring River Basin Specific Pollutants with far fewer being reported at the specific substance level than at the generic quality element level: Luxembourg subsequently clarified that this is a reporting error.

Zinc and copper were reported to be causing the failure to achieve good ecological status/potential in 11 and six river water bodies, respectively. The one-out, all-out principle has been applied in the classification based on River Basin Specific Pollutants.

Based on this information it is considered that this recommendation has been partially fulfilled.

- Recommendation: *Close the remaining gaps in monitoring networks and assessment methodologies as regards ecological status or surface water, chemical status of surface and groundwaters and quantitative status of groundwaters.*

Assessment: In terms of biological quality elements, the same elements monitored for the first RBMP were reported to be monitored for the second RBMP. Fish in rivers was

still reported as not being monitored in the Meuse RBD, but Luxembourg subsequently clarified that this was a reporting error and two water bodies had been monitored for fish in the Meuse.

For the second RBMP, river continuity and morphological conditions were reported not to be monitored but Luxembourg subsequently clarified that morphological conditions and river continuity were monitored and evaluated for every water body, while hydrological regime was not evaluated in the second RBMP.

In conclusion, there has been progress in this aspect and the recommendation has been partially fulfilled.

- Recommendation (partial): *Enhance measures to tackle pollution by nutrients (nitrogen and phosphorus) considering their impact on ecological status. Full consideration of the basin-wide impact is needed in this respect (local and downstream up to transitional and coastal waters). To this extent Luxembourg should check that their nutrient standards are consistent with biological requirements for the achievement of good status and provide a more coherent strategy encompassing WFD with the Nitrates Directive and Common Agricultural Policy in agriculture.*

Assessment: The nutrient threshold defined for nitrate (25 mg/l) may be considered as too relaxed to support the achievement of good ecological status/potential. However, it would require additional analysis to confirm this supposition. Luxembourg subsequently stated that a study from 2015 relating nitrate, phosphorous and biological parameters found the threshold to be accurate for good ecological status, but that a more substantial study taking into consideration other parameters will be launched in 2018.

In conclusion, there are still questions concerning the adequateness of the threshold used by Luxembourg and at this stage it cannot be concluded whether or not the recommendation has been fulfilled.

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

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

4.1.1 Monitoring of chemical status in surface waters

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

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

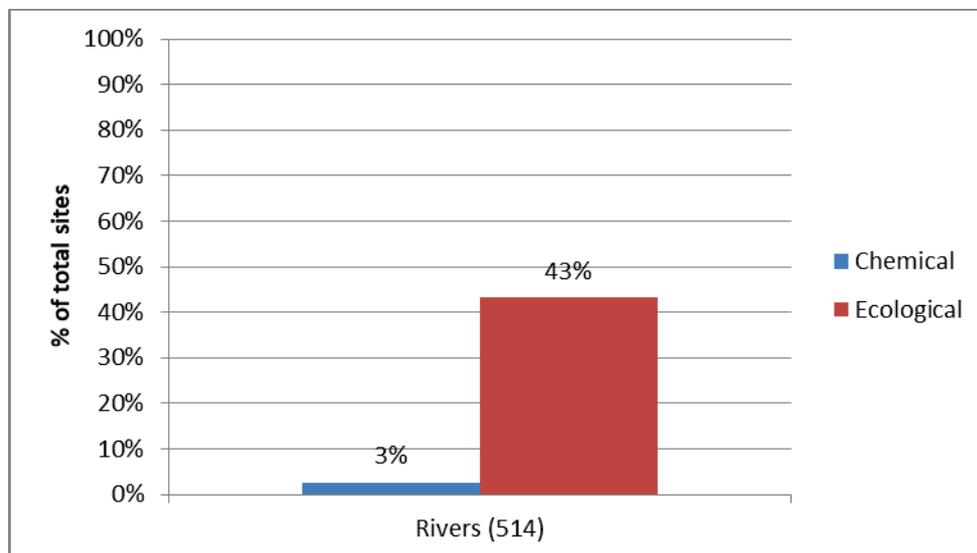
Surveillance monitoring programmes should allow Member States to supplement and validate the impact assessment procedure, to efficiently and effectively review the design of their monitoring programmes, and to assess the long-term changes in natural conditions and those resulting from widespread anthropogenic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

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

Figure 4.1 summarises the proportion of sites used for the monitoring of chemical status in rivers for the second RBMP. In this figure, no distinction is made between sites used for surveillance and/or operational purposes. More detailed information can be found on the website of the European Environment Agency³⁷. Figure 4.1 shows that only a very small proportion of the total number of monitoring sites (3 %) are used for monitoring chemical status whereas 43 % of all monitoring sites are used for monitoring ecological status. Luxembourg subsequently clarified that they only reported to WISE the sites where all priority substances have been monitored. Monitoring has been carried out also at other sites, either only for some of the priority substances, or at a frequency not in line with the provisions of the WFD. These other sites haven't been reported to WISE, although the monitoring results were used to assess chemical status.

³⁷ <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 Luxembourg. The number in parenthesis next to the category is the total number of monitoring sites irrespective of their purpose*

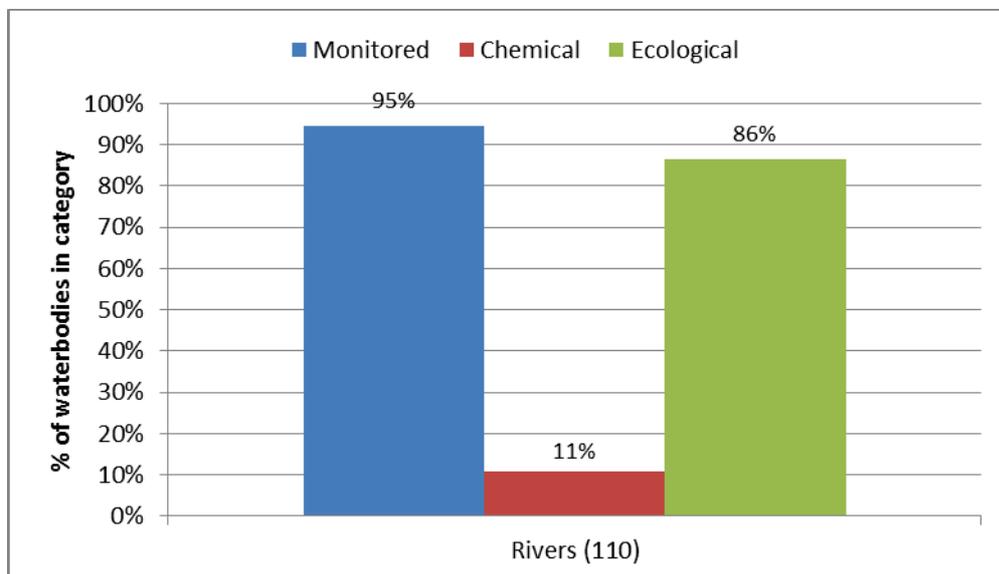


Source: WISE electronic reporting

A total of 13 out of 110 river water bodies are reported to be monitored for chemical status across the two RDBs in Luxembourg (12 in the Rhine RBD and one in the Meuse RBD).

Figure 4.2 summarises the proportion of water bodies monitored for chemical status rivers for the second RBMP. For the purposes of this figure, no distinction is made between sites used for surveillance and/or operational purposes. The graph shows also the proportion of water bodies monitored for any purpose and those for ecological status.

Figure 4.2 *Proportion of water bodies used for monitoring of chemical status and, for comparison, ecological status, in Luxembourg. The number in parenthesis next to the category is the total number of water bodies irrespective of their purpose*



Source: WISE electronic reporting

12 % of water bodies failing to achieve good chemical status were reported to be monitored in Luxembourg as a whole. More explicit, the percentage of water bodies failing to achieve good chemical status being monitored are 11 % in the Rhine RBD and 33 % in the Meuse RBD respectively.

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

All 41 Priority Substances that are used in the classification of chemical status are all reported to be monitored. According to the data reported, 89 % and 67 % of water bodies (all rivers) in Luxembourg (the Rhine and Meuse RBDs respectively), were not monitored for the whole list of Priority Substances but the remainder were monitored for all of the Priority Substances. Luxembourg subsequently clarified that metals and PAH were monitored in the 89 % of waterbodies identified above, but the information was not reported because the monitoring frequencies were not in line with the frequencies in the WFD.

The initial assessment shows that no information was reported to WISE on the monitoring of sediments or biota. The RBMP confirms that monitoring has only been carried out in water samples (except at one monitoring station where suspended solids are also analysed).

The RBMP indicates that Luxembourg has derived alternative standards for mercury, hexachlorobenzene and hexachlorobutadiene in water for use in the assessment of chemical status and monitors for these substances in water. A new analytical method has been applied to mercury from 2014 (for water samples) with a much lower limit of detection and therefore only a small number of mercury results are considered to be reliable to use in the assessment of chemical status.

Luxembourg subsequently clarified that analysis of biota and sediments started in 2016 and the results will be presented in the next RBMP.

In terms of transnational monitoring, Priority Substances are monitored at least at one site in each international RBD in collaboration with the relevant international body.

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 are reported for 41 Priority Substances at the site level in both Luxembourg RBDs. All substances were monitored 13 times per year in both RBDs for a period of at least one year which fulfils the minimum requirements for surveillance monitoring.

For operational monitoring, the frequencies of monitoring in the Rhine RBD do not meet the minimum recommended frequency as described in the WFD. For the Meuse RBD, the frequency of operational monitoring is in accordance with the minimum recommended frequency of the WFD.

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 substances³⁸ that tend to accumulate in sediment and/or biota, for the purpose of long-term trend assessment. Monitoring should take place at least once every three years, unless technical knowledge and expert judgment justify another interval.

Spatial coverage

No information was provided via WISE for either RBD on the arrangements for the long-term trend analysis of concentrations of those Priority Substances listed in Part A of Annex I of the EQS Directive that tend to accumulate in sediment and/or biota (Article 3(3) EQS Directive).

Some information can however be found in the RBMP: the RBMP indicates that the monitoring of suspended sediment at one location (Wasserbillig / Sûre) at the downstream extent of the river network in Luxembourg is used for trend assessment. Monitoring at this station is part of a coordinated international programme as part of the International Commissions for the Protection of Moselle and Saar and the data contributes a long-term data series. Luxembourg subsequently clarified that monitoring of sediments commenced in 2016 at all four surveillance monitoring sites (used for the assessment of the chemical status) and additionally 13 operational monitoring sites and will be reported in the next RBMP.

Frequency

Monitoring of suspended sediment is reported to be undertaken 12 times per year. Luxembourg subsequently clarified that for the sediment monitoring that commenced in 2016, the frequency for monitoring at surveillance monitoring sites (for status assessment) is every year and that for operational monitoring is every three years.

³⁸ Anthracene, brominated diphenylether, cadmium, C10-13 chloroalkanes, DEHP, fluoranthene, hexachlorobenzene, hexabutadiene, hexachlorocyclohexane, lead, mercury, pentachlorobenzene, PAH, Tributyltin.

Monitoring of Priority Substances that are discharged in each RBD

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

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

In Luxembourg, 41 Priority substances and groups of priority substances are reported to be included in the inventories of emissions in both RBDs and all are reported to be monitored.

Performance of analytical methods used

For 29 Priority Substances, Luxembourg reported that the analytical methods used meet the minimum performance criteria laid down in Article 4(1) of the Technical specifications for chemical analysis and monitoring of water status³⁹, the strictest standard are applied. For the remaining 12 Priority Substances reported, the analytical methods complied with the requirements laid down in Article 4(2) of the Technical specifications for chemical analysis and monitoring of water status for the strictest standard applied.

The RBMP indicates that some issues remain with the analytical methods for mercury, hexachlorobenzene and hexachlorobutadiene in terms of achieving a suitable limit of quantification in relation to the alternative environmental quality standards in water used for status assessment.

The method of dealing with measurements of Priority Substances lower than the limit of quantification is as specified in Article 5 of the Technical specifications for chemical analysis and monitoring of water status.

³⁹ 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>

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. In Luxembourg, the chemical assessments were carried out in specified years in the period from 2011 to 2014 in the Meuse RBD. However, in the Rhine RBD, 41 % and 6 % of chemical assessments were carried out in 2014 and 2013, respectively with the remainder being carried between 2011 and 2014. The one-out-all-out principle has been applied.

The chemical status of surface water bodies in Luxembourg for the second RBMP is illustrated in Map 4.1. This is based on the most recent assessment of status. All water bodies are classified as “failing to achieve good status”.

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



The chemical status of rivers in Luxembourg for the first and second RBMP is given in Table 4.1.

Overall in Luxembourg between the two cycles, there was a large decrease in the proportion of surface water bodies with good chemical status from 70 to 0 % and a significant increase in the proportion failing to achieve good status from 30 to 100 %. With regards to the basis of the classification of chemical status, monitoring underpinned the classifications of 11 and 33 % of river water bodies in the Rhine and Meuse RBDs, respectively, with the remainder classified by expert judgement.

Table 4.1 *Chemical status of surface water bodies in Luxembourg 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 the EQS Directive. All water bodies are assessed as failing to achieve good chemical status in the second RBMP, whether the 2008 or the 2013 environmental quality standards are used. 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	%
2 nd RBMP	Rivers (110)	0	0	110	100 %	0	0
1 st RBMP	Rivers (102)	71	70 %	31	30 %	0	0

Figure 4.3 shows the confidence in the classification of chemical status for the second RBMP. Overall 12 % of surface water bodies in Luxembourg were classified for chemical status with high confidence and 88 % of surface water bodies were classified with low confidence. Luxembourg subsequently clarified that high confidence was assigned where monitoring for all Priority Substances was undertaken and low confidence where this was not the case. Confidence in the classification of chemical status for the first RBMP was not reported.

Figure 4.4 compares the chemical status of surface water bodies in Luxembourg for the first cycle with that for the second RBMP (based on the most recent assessment of status) and that expected by 2015. As stated above, a 70 % increase in the proportion of water bodies failing to achieve good status was observed, and all water bodies were expected to be classified as such in 2015.

Luxembourg based the assessment of chemical status for the second RBMP on the standards laid down in EQS Directive (version in force on 13 January 2009⁴⁰). An assessment using the EQS defined in Directive 2013/39/EU was also done in order to be able to identify changes in the status assessment which are related to the more stringent EQS fixed by the new Directive. 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.⁴¹

Directive 2013/39/EU amended the EQS Directive. In particular, it sets more stringent environmental quality standards for seven substances⁴². Member States were required to indicate if the new standards caused the status of the surface water body to appear to deteriorate. In Luxembourg as a whole, this was the case for 100 % of river water bodies in terms of fluoranthene and benzo(a)pyrene.

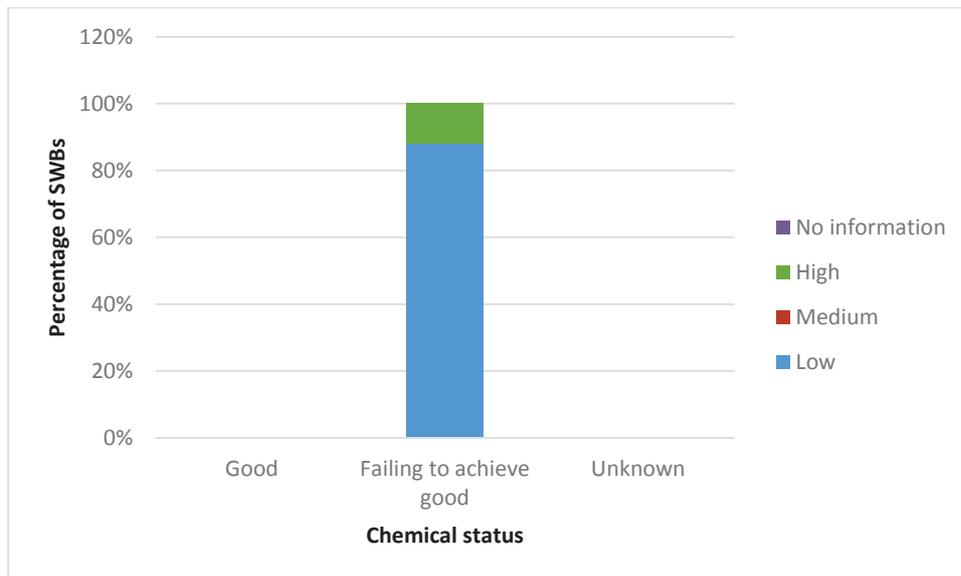
Good chemical status should be reached by 2021 in relation to the revised environmental quality standards, unless Member States apply exemptions under WFD Article 4(4) and/or less stringent objectives under WFD Article 4(5). As such, Member States were asked to report the expected date for the achievement of good chemical status. Good chemical status of surface water bodies is expected to be achieved by the end of the 3rd cycle for all river water bodies in Luxembourg.

⁴⁰ Please note that following the Directive 2013/39/EU, which amended the Environmental Quality Standards Directive, introduced a less stringent annual average environmental quality standard for naphthalene in transitional and coastal waters. This less stringent environmental quality standard should be taken into account for the determination of surface water chemical status by the 2015 deadline laid down in Article 4 of the WFD.

⁴¹ <https://www.eea.europa.eu/publications/state-of-water>

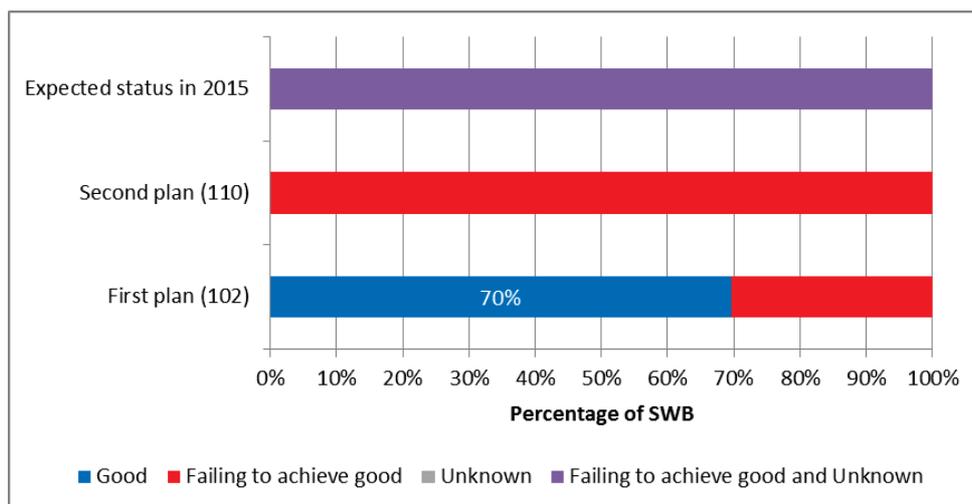
⁴² Anthracene, Brominated diphenylether, Fluoranthene, Lead and its compounds, Naphthalene, Nickel and its compounds, Polyaromatic hydrocarbons (PAH)

Figure 4.3 *Confidence in the classification of chemical status of surface water bodies in Luxembourg based on the most recently assessed status*



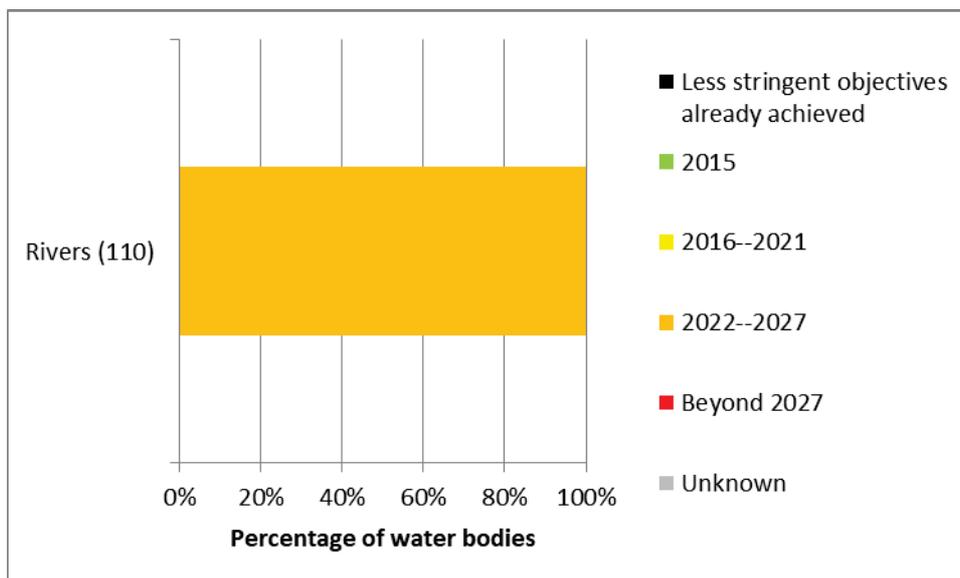
Source: WISE electronic reporting

Figure 4.4 *Chemical status of surface water bodies in Luxembourg 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 2011 to 2014. The year of the assessment of status for the first RBMP is not known*



Source: WISE electronic reporting

Figure 4.5 *Expected date of achievement of good chemical of surface water bodies in Luxembourg. The number in the parenthesis is the number of water bodies*



Source: WISE electronic reporting

Priority substances causing the failure of good chemical status

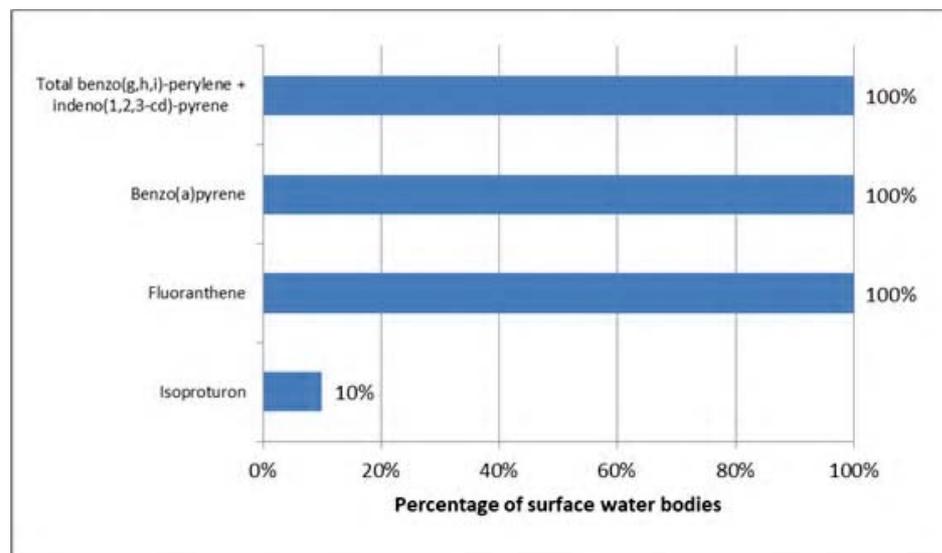
Information reported to WISE indicates that the substances causing water bodies to fail good chemical status were: isoproturon, fluoranthene, benzo(a)pyrene, mercury and total benzo(g,h,i)-perylene + indeno(1,2,3-cd)-pyrene. However, Luxembourg subsequently clarified that mercury did not contribute to the failure of good status in any water body for the second RBMP (mercury was only monitored in water and the water EQS was not exceeded) but that they expect the relevant biota environmental quality standard will be exceeded in the future and included this in the WISE reporting to highlight this. With regard to fluoranthene and benzo(a)pyrene, these two substances are only causing water bodies to fail good status if the revised EQS from Directive 2013/39/EU are applied.

The RBMP confirms that widespread failure to achieve good status in all river water bodies in Luxembourg is driven mainly by the presence of Polycyclic Aromatic Hydrocarbons (PAHs). The environmental quality standard benzo(g,h,i)-perylene + indeno(1,2,3-cd)-pyrene as listed in Directive 2008/105/EC was exceeded in the headwaters of small rivers in rural areas. Given the widespread diffuse inputs of PAHs, the classification of failing to achieve good status was extrapolated by expert judgement to all river water bodies in Luxembourg. The RBMP also confirms that isoproturon exceeded the environmental quality standard in Directive 2008/105/EC at two monitoring sites and, given the diffuse nature of the sources of this

substance, all 11 river water bodies downstream of these sites were classified as failing to achieve good status.

Figure 4.6 summarises the Priority Substances causing failure to achieve good status.

Figure 4.6 *Priority Substances causing failure to achieve good chemical status in surface water bodies in Luxembourg (according to Directive 2008/105/EC for total benzo(g,h,i)-perylene + indeno(1,2,3-cd)-pyrene and isoproturon and to Directive 2013/39/EU for benzo(a)pyrene and fluoranthene).*



Source: WISE electronic reporting

For the surface water bodies in the Luxembourg, exceedances were for the annual average Environmental Quality Standard for fluoranthene and, benzo(a)pyrene, (but only when applying the revised environmental quality standard from Directive 2013/39/EU) and total benzo(g,h,i)-perylene + indeno(1,2,3-cd)-pyrene; all had 100 % exceedance. Exceedances of maximum allowable concentration Environmental Quality Standard were largest for isoproturon (10 %).

Ubiquitous persistent, bioaccumulative and toxic Priority Substances

According to article 8(a) of the EQS Directive⁴³, eight priority substances and groups of priority substances are behaving like ubiquitous, persistent, bioaccumulative and toxic substances⁴⁴. These substances are generally expected to cause widespread exceedances, and

⁴³ Amended by Directive 2013/39/EU

⁴⁴ Brominated diphenylether, Mercury and its compounds, Polyaromatic hydrocarbons (PAH), Tributyltin, PFOS, dioxins, hexabromocyclodecane and heptachlor

their emissions can be challenging to tackle (e.g. due to long-range atmospheric transport and deposition). In order to show the progress made in tackling other priority substances, Member States have the possibility to present the information related to chemical status separately for these substances. In the RBMP, Luxembourg reports the influence of ubiquitous, persistent, bioaccumulative and toxic substances on chemical status in two ways; when chemical status is determined on the basis of the environmental quality standards in Directive 2008/105/EC and when it is determined on the basis of those in Directive 2013/39/EU. More details are presented in the 2018 State of Water report of the European Environment Agency⁴⁵.

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

All 41 Priority Substances that are used in the classification of chemical status are reported to be monitored in both RBDs.

Monitoring was used for classification of 11 % and 33 % of water bodies in the Rhine and Meuse RBDs respectively, with the remainder classified by expert judgement. A statement is also made by Luxembourg that the status of surface water bodies not monitored for chemical status has been derived or extrapolated from monitoring available for comparable water bodies. This has included assessments of results from profiles for several pollutants along selected river stretches or other investigative monitoring programmes.

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.

Luxembourg reported that all of the Environmental Quality Standards laid down in Part A of Annex I of the Directive 2008/105/EC for assessment of the chemical status of bodies of surface water had been applied. Alternative and/or additional standards for particular Priority Substances had not been applied. Moreover, it is clear from the RBMP that both the standards in Directive 2008/105/EC and those in Directive 2013/39/EU have been used in different representations of chemical status.

⁴⁵ <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

Use of mixing zones

Article 4 of Directive 2008/105/EC¹³ provides Member States with the option of designating mixing zones adjacent to points of discharge. Concentrations of substances may exceed the relevant environmental quality standard within such mixing zones if they do not affect the compliance of the rest of the body of surface water 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; measures taken with a view to reducing the extent of the mixing zones in the future.

Mixing zones have not been designated in Luxembourg.

Background Concentrations and Bioavailability

EC Directives 2008/105/EU and 2013/39/EU stipulate that Member States may (i.e. treat as optional), when assessing the monitoring results against the EQS, take into account:

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

Luxembourg reported that neither natural background concentration nor parameters that affect bioavailability had been taken into consideration in the second RBMP. Luxembourg subsequently clarified that work is underway with regard to these issues and will be reported in the next RBMP.

4.2 Main changes in implementation and compliance since the first cycle

In the second cycle, all 110 surface water bodies were classified as “failing to achieve good chemical status”, compared to the first cycle where 70 % were classified as “good chemical status” and 30 % as “failing to achieve good status”. The reason for the change has been attributed to the expansion of the monitoring programme leading to more widespread failure of the Environmental Quality Standard for polycyclic aromatic hydrocarbons⁴⁶ (from diffuse sources, mainly atmospheric deposition) and the extrapolation of this result to all surface water bodies. Without polycyclic aromatic hydrocarbons, the second cycle chemical status assessment would have resulted in 90 % “good status” and 10 % “failing to achieve good status” in 2015 based on the environmental quality standards in Directive 2008/105/EC.

⁴⁶ Specifically for total benzo(g,h,i)-perylene + indeno(1,2,3-cd)-pyrene.

Furthermore, on the basis of the amended EQS Directive, all surface water bodies were classified as “failing to achieve good status” because the stricter Environmental Quality Standard for benzo(a)pyrene (used as a marker for the group of five listed polycyclic aromatic hydrocarbons) was widely exceeded, as well as the stricter Environmental Quality Standard for fluoranthene. It is also stated that all surface water bodies would still be classified as “failing to achieve good chemical status” without using the benzo(a)pyrene standard, because of the presence of fluoranthene.

Luxembourg provided some further clarification to corroborate the statements above. Investigative monitoring undertaken during the first cycle confirmed the widespread presence of polycyclic aromatic hydrocarbons in small tributaries and associated these with “Diffuse – atmospheric deposition” pressures rather than point source discharges.

In addition to changes to the monitoring programmes for chemical status mentioned above, minor changes were made in the selection of monitoring sites to better represent catchments, and three additional Priority Substances were added to a suspended solids monitoring programme for the Rhine RBD. The RBMP provide details of Priority Substances, including details of monitoring sites and sampling frequencies. Operational monitoring has been revised, locating at least one operational monitoring site on each water body with targeted monitoring to gain more reliable profiles along river stretches and to ensure more certainty in the risk analyses. Investigative monitoring was increased for the second cycle, focusing on polycyclic aromatic hydrocarbons and certain metals in order to better understand their sources.

Information on Priority Substances causing failure of good chemical status for the first cycle was not systematically reported making comparison with the second cycle difficult. However, examination of the first RBMP showed that diuron (4 %), isoproturon (3 %) and DEHP (3 %) in addition total benzo(g,h,i)-perylene and indeno(1,2,3-cd)-pyrene (5 %) were causing the greatest failures of Environmental Quality Standards in the two RBDs in Luxembourg at that time.

There were no Priority Substances reported to have improved status from failing to achieve good to good.

4.3 Progress with Commission recommendations

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

- Recommendation: *Where there are currently high uncertainties in the characterisation of the RBDs, identification of pressures, and assessment of status, these need to be addressed in the current cycle, to ensure that adequate measures can be put in place before the next cycle.*

Assessment: While Luxembourg monitors all Priority Substances in water, the spatial coverage of monitoring is limited. With regards to the basis of the classification of chemical status, monitoring underpinned the classifications of 11 % and 33 % of river water bodies in the Rhine and Meuse RBDs, respectively, with the remainder classified by expert judgement. Overall 12 % of surface water bodies in Luxembourg were classified for chemical status with high confidence and 88 % of surface water bodies were classified with low confidence. Luxembourg subsequently clarified that high confidence was assigned to classifications of water bodies where monitoring of all Priority Substances was undertaken and low confidence where this was not the case. The RBMP indicates that further monitoring and investigations have also been carried out to gain a better understanding of pressures and impacts. This recommendation has therefore been partially addressed.

- Recommendation: *The assessment methods for ecological and chemical status need to be further developed, in particular for the hydromorphological quality elements. Some biological quality elements still need to be adapted to the Decision on Intercalibration.*

Assessment: Luxembourg monitors all 41 Priority Substances in water but does not report monitoring in biota and sediment in the second RBMP. For status assessment, alternative standards for mercury, hexachlorobenzene and hexachlorobutadiene in water have been derived and are used in the assessment of chemical status. The RBMPs indicates some issues with the analytical methods used to determine concentrations of these substances in water in relation to the alternative standards. For trend assessment, monitoring of suspended sediment is undertaken at one strategic location as part of an international programme and to contribute to a long-term dataset. Luxembourg subsequently clarified that sediment monitoring has commenced in 2016 and the results will be reported in the next RBMP. With respect to chemical status, all surface water bodies have been classified and a combination of extrapolation from monitored sites and expert judgement has been used. Luxembourg thoroughly considered the environmental quality standards in both versions of the Environmental Quality Standard Directive in their assessment of chemical status. The RBMP indicates that further monitoring and investigations have been carried out in an attempt to reduce uncertainty and to link pressures and impacts. Progress has therefore been made with addressing this recommendation.

- Recommendation: *More information on the monitoring of Priority Substances, specifying for more sites which substances have been monitored and which have caused failure, will be expected in the next RBMP.*

Assessment: All 41 Priority Substances that are used in the classification of chemical status are monitored in both RBDs. The monitoring programme has been expanded but according to WISE, still only a small proportion of monitoring sites are used for assessing chemical status (3 % of the total number of monitoring sites and a total of 13 out of 110 river water bodies are reported to be monitored for chemical status across the two RBDs in Luxembourg– see figures 4.1 and 4.2).

Luxembourg subsequently clarified that they only reported to WISE the sites where all priority substances have been monitored. Monitoring has been carried out also at other sites, either only for some of the priority substances, or at a frequency not in line with the provisions of the WFD. These other sites haven't been reported to WISE, although the monitoring results were used to assess chemical status. However, it is not possible to assess the extent of this additional monitoring based on the information available.

Therefore, based on the information available, this recommendation has been partially addressed.

- Recommendation: *Close the remaining gaps in monitoring networks and assessment methodologies as regards ecological status or surface water, chemical status of surface and groundwaters and quantitative status of groundwaters.*

Assessment: This recommendation is relevant to a number of Topics. Luxembourg has classified all surface water bodies with respect to chemical status and has used extrapolation and expert judgement as part of the process. Monitoring frequencies are reported for 41 Priority Substances at site level in both Luxembourg RBDs and are shown to be in accordance with the WFD for both operational and surveillance monitoring only for one RBD. For the other RBD, the operational monitoring is still not in line with the WFD. For more details on the spatial extent of monitoring, see recommendation above. This recommendation has therefore been partially addressed.

- Recommendation: *The requirement for trend monitoring in sediment or biota as specified for several substances in Directive 2008/105/European Commission Article 3(3) will also need to be reflected in the next RBMP.*

Assessment: Luxembourg confirms that, to date, monitoring has only been carried out in water samples (except at one monitoring station where suspended solids are also analysed). Luxembourg also state that monitoring of sediment or biota has started in 2016 and will be reported in the next RBMP. Limited progress has therefore been made towards addressing this recommendation.

- Recommendation: *Monitor mercury, hexachlorobenzene and hexachlorobutadiene in biota for comparison with the biota standards in the EQS Directive, unless water Environmental Quality Standards providing an equivalent level of protection are derived.*

Assessment: For mercury, hexachlorobenzene and hexachlorobutadiene water environmental quality standards have been derived and monitoring was done in water samples. Although no alternative standards have been reported to WISE, alternative water standards have been set in the RBMP for each of these substances. These alternative standards are lower than the water standards provided in the Directive, and the RBMP states they were derived to be as protective as the biota standards (this could not be checked during this assessment). Luxembourg does not report monitoring in biota in the second RBMP. Luxembourg subsequently clarified that monitoring of biota started already in 2016 and will be reported in the next RBMP. Subject to the alternative water standards being as protective as the biota standards, this recommendation is 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 cycle

5.1.1 Monitoring of quantitative status in groundwater

The total number of groundwater bodies in Luxembourg is six (Table 2.2); all in the Rhine river basin district. One groundwater body is not subject to monitoring for quantitative status (Table 5.1). This means that 17 % of groundwater bodies are not monitored. RBMP and supporting document investigations found no indication that grouping has been applied. It is mentioned that this groundwater body has not been monitored because of technical reasons, which prevented representative monitoring, but the quantitative monitoring network is expected to be expanded in all groundwater bodies.

The number of groundwater bodies increased by 20 % from five in the first RBMP to six in the second RBMP, but the total groundwater body area remained nearly the same. According to the RBMP and supporting documents, one groundwater body was divided into two groundwater bodies and the remaining four groundwater bodies remained unchanged since the first RBMP.

The number of monitored groundwater bodies increased from four in the first RBMP to five in the second RBMP. The number of monitoring sites for quantitative status is listed in Table 5.3. There has been a decrease from 30 in the first RBMP to 17⁴⁷ in the second RBMP. Two⁴⁸ of six groundwater bodies are identified as drinking water protected areas.

⁴⁷ Luxembourg subsequently clarified that due to reporting errors the correct number of monitoring sites is 19 for the first RBMP and 18 for the second cycle. The quantitative monitoring station LU_COC-118-11 was not reported anymore because measurements were considered less reliant than the continuous online measurements at monitoring station LU_FCE-118-19 (well), which is located in the same catchment area.

⁴⁸ Luxembourg clarified that due to a reporting error five and not two of 6 groundwater bodies are drinking water protected areas.

Table 5.1 *Number of water bodies in Luxembourg directly monitored and the purpose of monitoring*

RBD	Total groundwater bodies directly monitored	Monitoring Purpose						
		CHE - Chemical status	NID - Nutrient sensitive area under the Nitrates Directive - WFD Annex IV.1.iv	OPE - Operational monitoring	QUA – Quantitative status	SOE - EIONET State of Environment monitoring	SUR - Surveillance monitoring	TRE - Chemical trend assessment
LU000	6	6	6	0	5	0	6	3

Source: WISE electronic reporting

Table 5.2 *Proportion of groundwater bodies in Luxembourg monitored for quantitative status*

RBD	Number of groundwater bodies with quantitative monitoring	Total number groundwater bodies	Percentage of total groundwater bodies monitored for quantitative status
LU000	5	6	83.33 %

Source: WISE electronic reporting

Table 5.3 *Number of groundwater monitoring sites in Luxembourg and their purpose*

RBD	Total groundwater monitoring sites	Monitoring Purpose							
		CHE – Chemical status	DRI - Groundwater abstraction site for human consumption	NID - Nutrient sensitive area under the Nitrates Directive - WFD Annex IV.1.iv	OPE – Operational monitoring	QUA – Quantitative status	SOE - EIONE T State of Environment monitoring	SUR – Surveillance monitoring	TRE – Chemical trend assessment
LU000	31	31	0	31	0	17 (18)	0	31	24

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

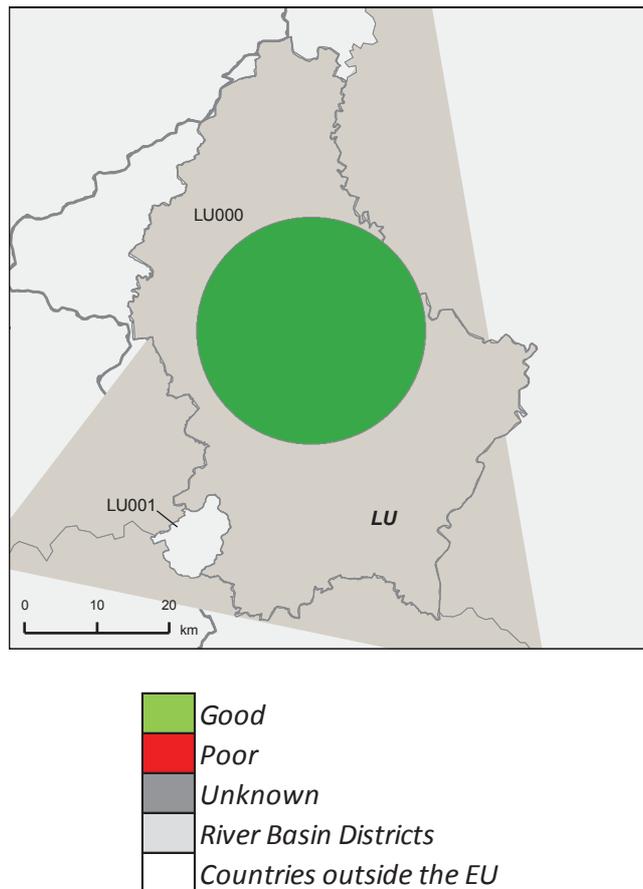
5.1.2 Assessment and classification of quantitative status for groundwater

Map 5.1 displays the most recently assessed quantitative status of groundwater bodies. It shows that all six groundwater bodies (100 %) were of good quantitative status (Figure 5.1) and they were already in good status in the first RBMP. Figure 5.2 shows the confidence in status classification, which is of medium and high level. All groundwater bodies had, and still have, a clear status, in the first and in the second RBMPs. According to the RBMP and supporting documents, in the groundwater body where no quantitative monitoring data were available, the quantitative status was based on risk assessment from abstraction data only.

In Luxembourg, water balance was assessed by using reliable information on groundwater levels across the groundwater body.

The criterion of ‘available groundwater resource’ has not been applied in accordance with WFD Article 2(27)⁴⁹. From all environmental objectives, only water balance has been considered in the status assessment. There is no groundwater body at risk of failing good quantitative status.

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

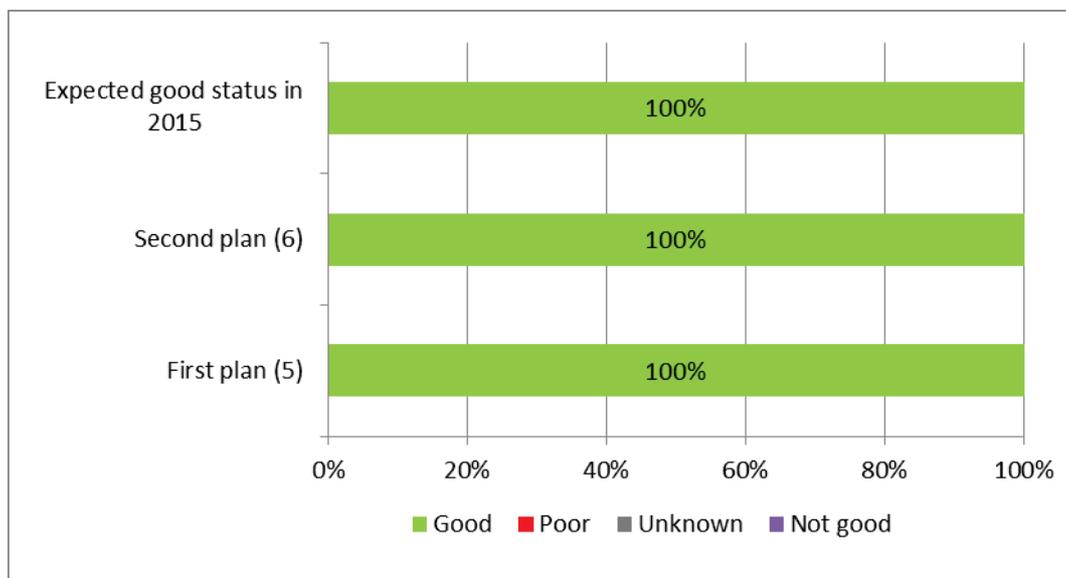


Note: Standard colours based on WFD Annex V, Article 2(2)(4).

Source: WISE, Eurostat (country borders)

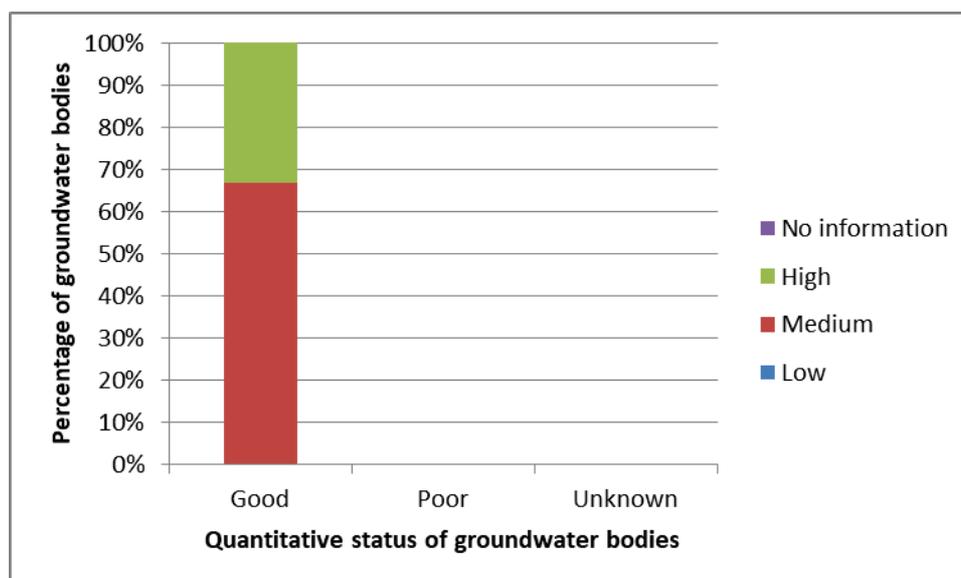
⁴⁹ Luxembourg subsequently clarified that for the groundwater bodies “Unterer Lias” (numerical) and “Trias Nord” conceptual models have been established to calculate the annual average rate of overall recharge of groundwater. Currently, in these two groundwater bodies, where the most significant relation to associated surface bodies occurs, studies are ongoing to estimate the long-term annual rate of flow required to achieve the ecological quality objectives.

Figure 5.1 *Quantitative status of groundwater bodies in Luxembourg 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 2010 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 Luxembourg based on the most recent assessment of status*



Source: WISE electronic reporting

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

In five of six groundwater bodies, groundwater associated surface waters have been reported, they are not related to risk and they have not been considered in status assessment in the RBD.

In five of six groundwater bodies groundwater dependent terrestrial ecosystems have been reported, they are not related to risk and they have not been considered in status assessment in the river basin district. The needs of these ecosystems have not been considered in status assessment.

5.2 Main changes in implementation and compliance since the first cycle

Four of six groundwater bodies remained unchanged since the first RBMP.

The monitoring situation has not improved as the number of monitoring sites decreased and there is still one out of the six groundwater bodies without quantitative monitoring.

The RBMP and supporting document assessed found that the increasing number of groundwater bodies from five to six was due to dividing one groundwater body into two groundwater bodies. Reviews and extensions of the existing monitoring network are planned. One groundwater body has not been monitored because of technical reasons, but the quantitative monitoring network is expected to be expanded in all groundwater bodies by 2019.

5.3 Progress with Commission recommendations

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

- Recommendation: *Where there are currently high uncertainties in the characterisation of the RBDs, identification of pressures, and assessment of status, these need to be addressed in the current cycle, to ensure that adequate measures can be put in place before the next cycle.*
- Assessment: Regarding high uncertainties in status assessment, the confidence in the status results is reported to be of medium and high level. This recommendation is fulfilled.

- Recommendation: *Close the remaining gaps in monitoring networks and assessment methodologies as regards ecological status or surface water, chemical status of surface and groundwaters and quantitative status of groundwaters.*
- Assessment: Regarding the closure of monitoring gaps; one out of six groundwater bodies is without quantitative monitoring and the total number of monitoring sites decreased. Therefore, this recommendation is largely fulfilled as the monitoring site in the groundwater body without monitoring is announced to be officially included in the monitoring network in 2019.

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 cycle

6.1.1 Monitoring of chemical status in groundwater

The total number of groundwater bodies in Luxembourg is six (Table 2.2); all in the Rhine RBD. All (100 %) groundwater bodies are subject to surveillance monitoring (Table 5.1). Four groundwater bodies (67 %) are at risk but there is no operational monitoring. The coverage of groundwater bodies by monitoring is complete for surveillance, but not for operational monitoring.⁵⁰

The number of groundwater bodies increased by 20 % from five in the first River Basin Management Plan to six in the second River Basin Management Plan but the total groundwater body area remained nearly the same. According to RBMP and supporting document assessment, one groundwater body was divided into two groundwater bodies and the remaining four groundwater bodies remained unchanged since the first River Basin Management Plan.

The number of monitoring sites is listed in Table 5.3 and shows no change between the first River Basin Management Plan and the second River Basin Management Plan i.e. 31. In the first River Basin Management Plan 54 operational monitoring sites⁵¹ were reported and in the second River Basin Management Plan, there is no more operational monitoring.

All substances causing risk of deterioration in chemical status are subject to surveillance monitoring. From the WFD core parameters nitrate, ammonium, electrical conductivity, oxygen and pH only ammonium and nitrate are monitored⁵².

⁵⁰ Luxembourg subsequently clarified, that due to an error of reporting in WISE, in fact operational monitoring is done at all 31 monitoring sites.

⁵¹ For the first RBMPs, there are still 31 monitoring stations. The other stations are belonging to the supplementary monitoring programmes for nitrates and pesticides (http://ec.europa.eu/environment/water/water-framework/pdf/3rd_report/CWD-2012-379_EN-Vol3_LU.pdf)

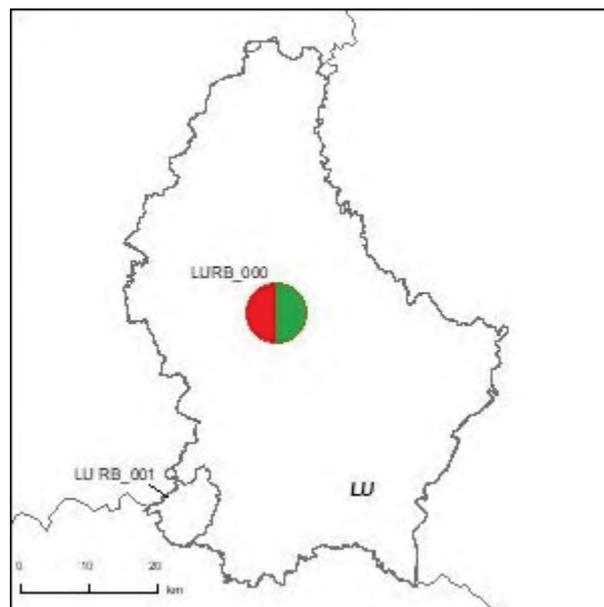
⁵² Luxembourg subsequently clarified, that also electrical conductivity and pH are monitored (reporting error). There are concerns about the representativeness of the measures for dissolved oxygen, especially in spring therefore the parameter is not systematically monitored.

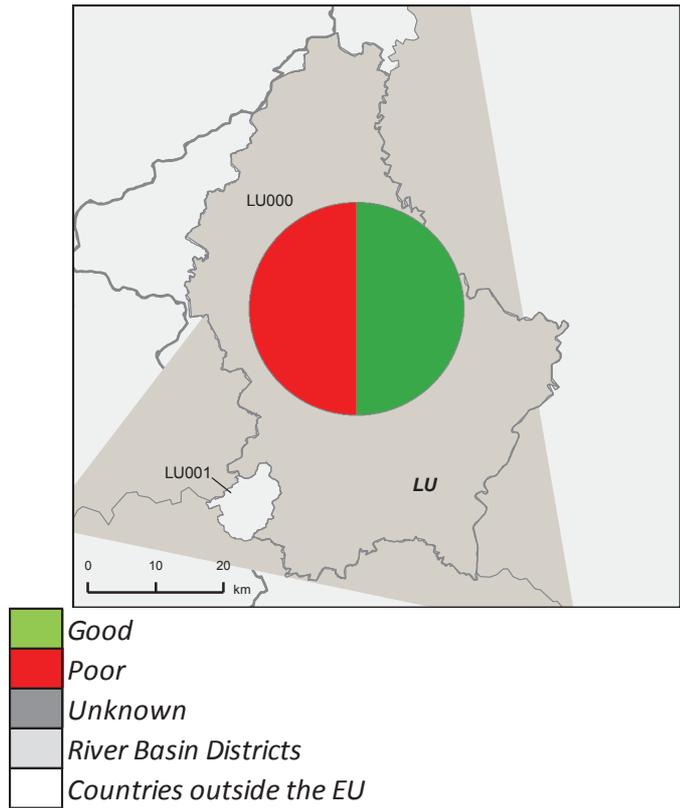
6.1.2 Assessment and classification of chemical status in groundwater

Map 6.1 and Figure 6.1 display the chemical status of groundwater bodies for the most recently assessed status. It shows that three of six groundwater bodies (50 %) were of good chemical status, and the remaining three groundwater bodies (50 %) are failing good status. In terms of area, this means that about 79 % are failing good chemical status. Figure 6.2 shows the confidence in status classifications, all of which are of medium or high level. All groundwater bodies had, and still, have a clear status in the first and second River Basin Management Plans.

The total number of groundwater bodies failing good chemical status increased since the first RBMP from two (40 %) to three (50 %) groundwater bodies (Figure 6.1) (from 63 % to 79 % of the total groundwater body area). The expected date of achievement of good chemical status in Luxembourg is shown in Figure 6.3.

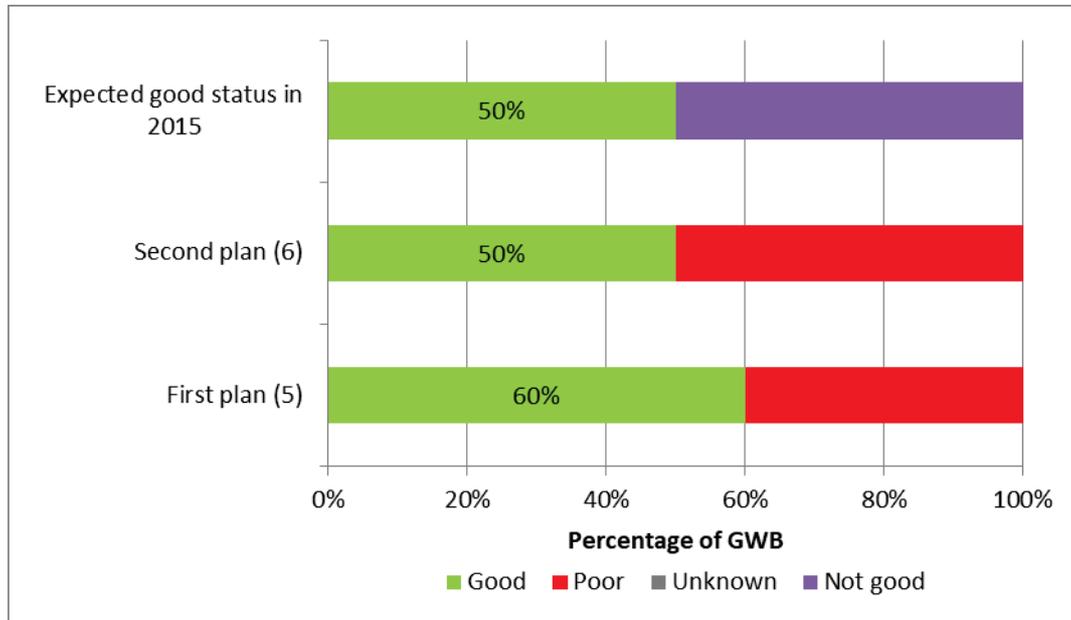
Map 6.1 *Map of chemical status of groundwater bodies in Luxembourg based on the most recently assessed status of the groundwater water bodies*





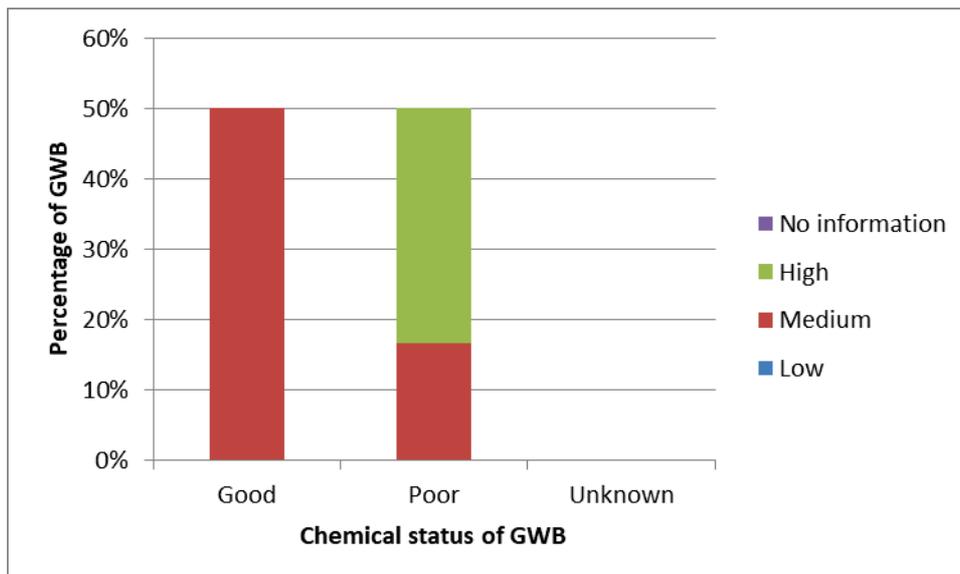
Note: Standard colours based on WFD Annex V, Article 2(4)(5).
 Source: WISE, Eurostat (country borders)

Figure 6.1 *Chemical status of groundwater bodies in Luxembourg 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 2007 to 2014. The year of the assessment of status for first RBMP is not known*



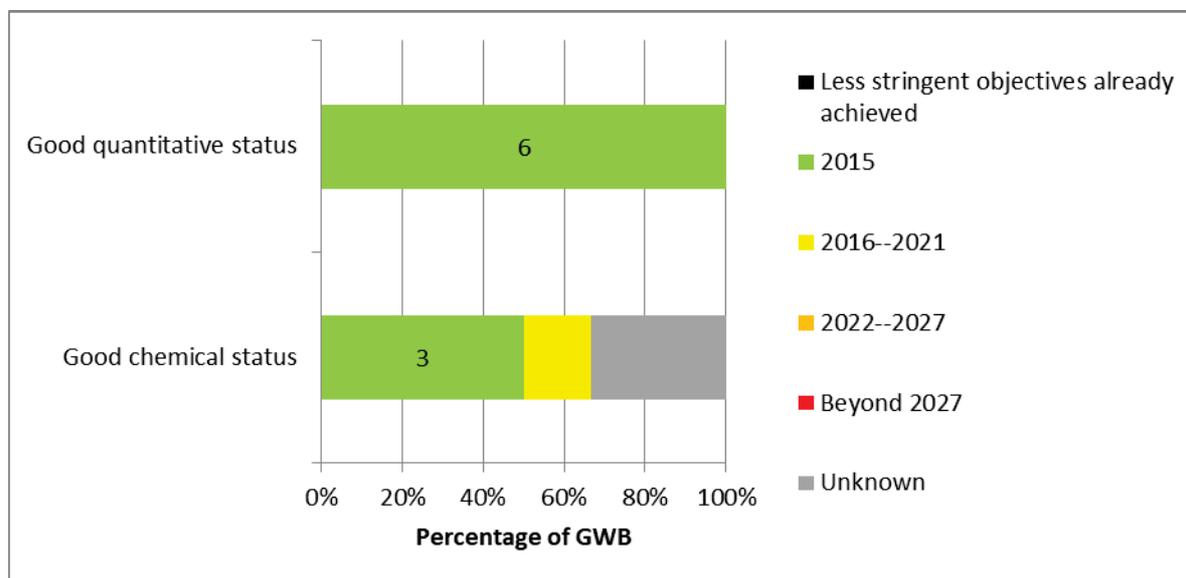
Source: WISE electronic reporting

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



Source: WISE electronic reporting

Figure 6.3 *Expected date of achievement of good quantitative and good chemical status of groundwater bodies in Luxembourg. Six groundwater bodies delineated for the second RBMP*



Source: WISE electronic reporting

The reasons for the failure of good chemical status of groundwater bodies are shown in Figure 6.4, two groundwater bodies failed the chemical status assessment. This assessment considers the significant environmental risk from pollutants across a groundwater body and a significant impairment of the ability to support human uses. Three groundwater bodies are failing the drinking water test which means that the requirements of drinking water protected areas have not been met. One groundwater body is failing the groundwater associated surface water test which means that there is diminution of the status of groundwater associated surface water. Figure 6.5 shows the pollutants causing failure of status and those causing a sustained upward trend.

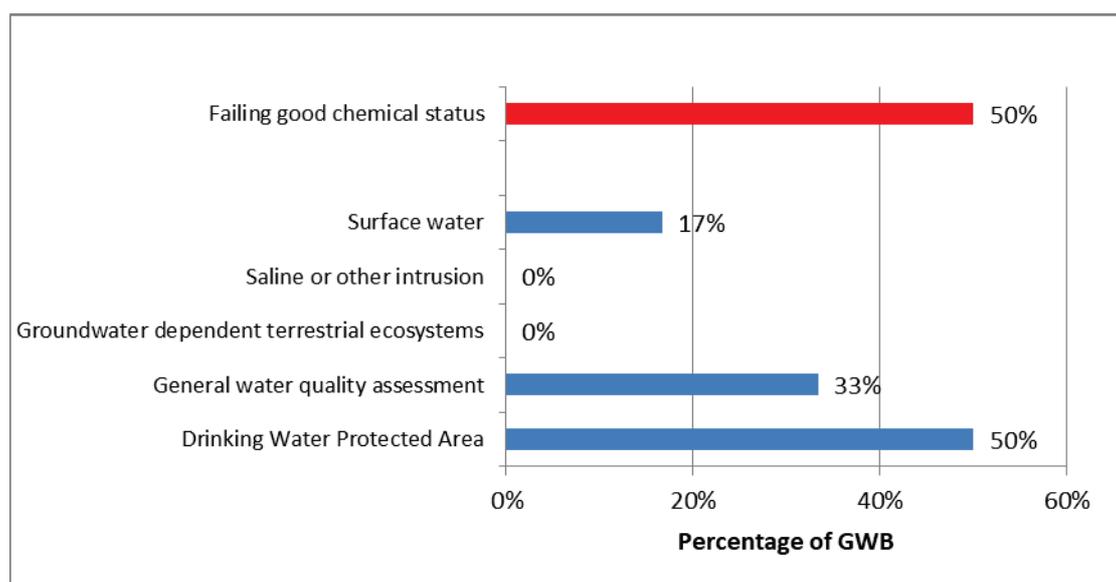
The calculation of the extent of exceedance of a groundwater quality standard or a groundwater threshold value is based on the number of monitoring sites in the groundwater body in the RBD.

Groundwater threshold values have been established for all pollutants or indicators of pollution causing a risk of failure of good chemical status. The RBMP and supporting document

assessment found an indication that the Groundwater Directive⁵³ Annex II substances have been considered. Natural background levels have been considered in the establishment of groundwater threshold values.

A trend and trend reversal methodology is available and assessments have been performed in the RBD.

Figure 6.4 *Reasons for failing good chemical status in Luxembourg 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.

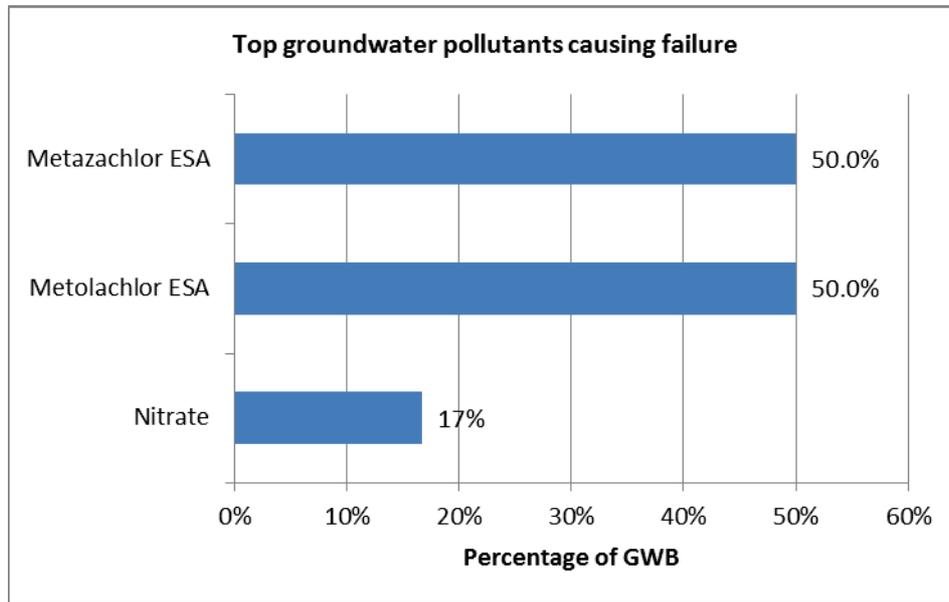
‘Saline or other intrusion’ = Regional saline or other intrusions resulting from anthropogenically induced sustained changes in flow direction.

‘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.

⁵³ 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>

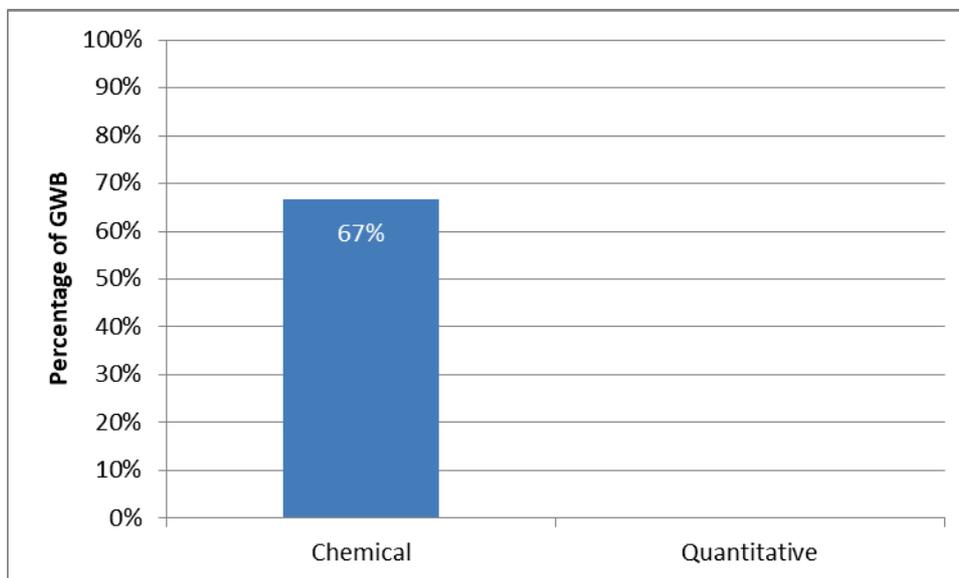
Figure 6.5 *Top groundwater pollutants causing failure of good chemical status in Luxembourg*



Source: WISE electronic reporting.

Note: only three pollutants reported causing failure.

Figure 6.6 *Percentage of groundwater bodies in Luxembourg at risk of failing good chemical status and good quantitative status for the second RBMP*



Source: WISE electronic reporting

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

In five of six 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 RBDs. Furthermore, groundwater dependent terrestrial ecosystems have been reported. The water bodies are not related to risk, and they have not been considered in status assessment.

Groundwater associated aquatic ecosystems and groundwater dependent terrestrial ecosystems have not been considered in the establishment of groundwater threshold values but there is no related risk.

6.2 Main changes in implementation and compliance since the first cycle

The RBMP and supporting document assessment found a summary of changes and updates for this topic in the RBMP. The main changes are:

- To improve transparency and clarity in the second RBMP, the assessment method for chemical quality in groundwater was carried out according to Common Implementation Strategy Guidance document no. 18⁵⁴.
- New trend analyses in groundwater bodies were carried out for the second RBMP based on a method used and tested in Austria.
- Additional monitoring stations are envisaged for the second cycle, and the monitoring stations for the Nitrates Directive⁵⁵ will be integrated more closely with WFD monitoring sites

The RBMP and supporting document assessment found that the increasing number of groundwater bodies from five to six was due to dividing one groundwater body into two groundwater bodies. The total groundwater body area remained nearly the same and four of six groundwater bodies remained unchanged since the first RBMP.

The WISE data showed that the monitoring situation deteriorated. All groundwater bodies are still subject to surveillance monitoring, but in the second River Basin Management Plan there is no more operational monitoring even though four groundwater bodies are at risk of failing

⁵⁴ https://circabc.europa.eu/sd/a/ff303ad4-8783-43d3-989a-55b65ca03afc/Guidance_document_N%C2%B018.pdf

⁵⁵ 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>

good chemical status. However, Luxembourg subsequently clarified that actually the situation improved and all groundwater bodies are under operational monitoring. The lack of operational monitoring is due to a reporting error in WISE.

The status situation deteriorated as the groundwater body area failing good chemical status increased from 63 % to 79 % of the total groundwater body area.

6.3 Progress with Commission recommendations

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

- Recommendation: *Close the remaining gaps in monitoring networks and assessment methodologies as regards ecological status or surface water, chemical status of surface and groundwaters and quantitative status of groundwaters.*

Assessment: The RBMP and supporting document investigation found that it was mentioned that in order to improve transparency and clarity in the second River Basin Management Plan, the assessment method for chemical quality in groundwater was carried out according to Common Implementation Strategy Guidance document no. 18. All groundwater bodies are still subject to surveillance monitoring but there is no more operational monitoring even if four of six groundwater bodies are at risk of failing good chemical status.

Luxembourg subsequently clarified that the operational monitoring is performed at all monitoring sites. This was due to an error of reporting in WISE. Therefore despite the WISE reported data, the additional information provided by Luxembourg indicates that the recommendation is 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 cycle for designation

7.1.1 Designation of Heavily Modified and Artificial Water Bodies

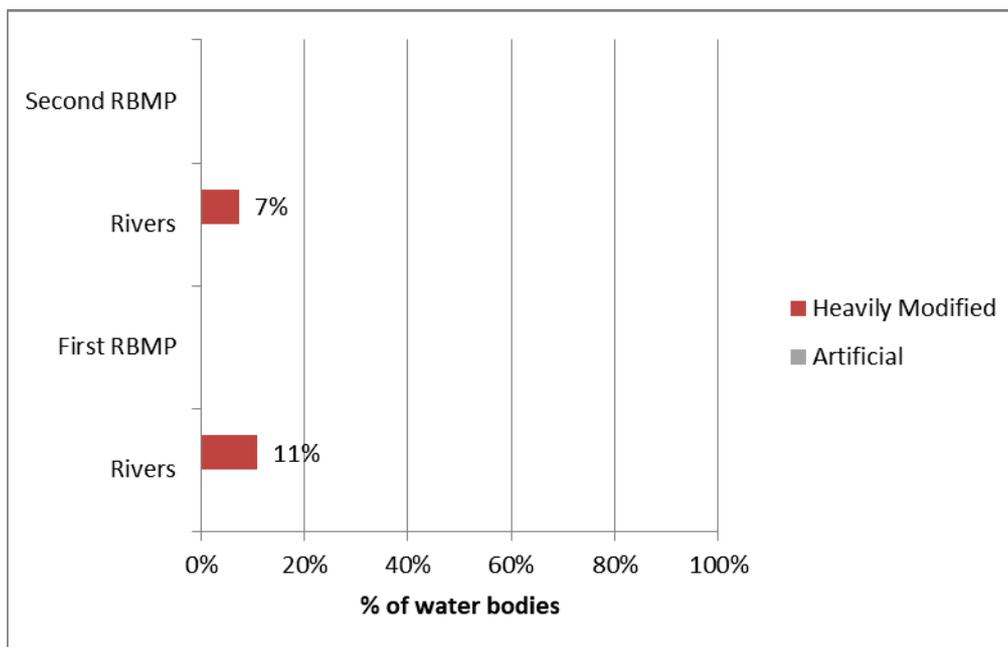
Similar to the first RBMP, there are only river water bodies designated as heavily modified water bodies (6.5 % and 33.3 % of river water bodies respectively in the Rhine RBD and the Meuse RBD) (Figure 7.1). No artificial water bodies have been designated. In the Rhine RBD, one water body is a reservoir which was originally a river and is designated as a river heavily modified water body. The WFD requires a review of designation every six years. As noted further below in this chapter, only few changes have been noted in the designation of heavily modified water bodies since the first RBMP.

Heavily modified water bodies are designated due to urban development, hydropower, flood protection and transport. The main physical alterations of heavily modified water bodies are channelisation/straightening/bed stabilisation/bank reinforcement and weirs/dams/reservoirs.

The second RBMP provide specific information on water body level concerning the outcome of the assessment of significant adverse effects of restoration measures on the use or the wider environment. Each heavily modified water body has been assessed individually based on a national approach and a general description of the reasons for designation are given, e.g. maintenance of navigation, provision of public water supply (reservoir) and hydroelectricity, preservation of old city/town centres. The criteria provided for the assessment of significant adverse effects are described in general terms without quantitative definitions.

It has also been checked whether the beneficial objectives can be achieved by “other means” and specific information is given on water body level on the outcome of this assessment. There is a general statement that the designation of eight heavily modified water bodies was necessary on the basis that there were no technically feasible alternative measures, not entailing excessive costs, or an alternative use which would represent a better environmental option.

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



Source: WISE electronic reporting

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

According to WISE, good ecological potential is reported as defined at water body level in both RBDs following the Common Implementation Strategy Guidance approach (based on biological quality elements as illustrated in Common Implementation Strategy Guidance No 4). Information in the RBMP indicates that this new proposed method combines the Common Implementation Strategy Guidance approach and elements of the Prague approach (based on the identification of mitigation measures). For the second RBMP, work to define good ecological potential started in 2013 and a specific method for defining good ecological potential has been developed for river water bodies. Because of the low number of heavily modified water bodies, an individual approach to defining good ecological potential for each water body will be followed.

Good ecological potential is also reported to have been defined in terms of biology. According to WISE, the biological quality element for which biological values have been derived to define moderate ecological potential and good ecological potential are macrophytes, phytobenthos, benthic invertebrates, fish, and phytoplankton. It is also reported that a comparison between good ecological potential and good ecological status has been made in both RBDs.

According to information in the RBMP, benthic invertebrates and fish have been included most commonly in the evaluation because these are considered as sensitive to hydromorphological alterations. The same method for the evaluation of biological quality elements, and the same references and limits, has been applied for heavily modified water bodies as for natural surface water bodies. This has resulted in the classification of the ecological potential of all heavily modified water bodies as “moderate or worse”. A slightly different approach was used for two heavily modified water bodies (both reservoirs in the Rhine RBD) which are characterised by significant water level fluctuations caused by the water use (impoundment reservoirs used for hydro-electricity production). For the impounded sections of these heavily modified water bodies, the classification of ecological potential was mainly based on phytoplankton.

It is intended to further improve and refine the definition of good ecological potential in the course of the second planning cycle.

Biological quality element assessment methods sensitive to hydrological and morphological changes in rivers are reported for fish, benthic invertebrates and macrophytes.

The estimation of values of biological quality elements were based on available monitoring data for 2007-2012, and a combination of the use of the “worst monitoring result” (if several differing monitoring results are available for one water body and biological quality element) and expert judgment (for example, justification in cases where the “worst” result is not used, or consideration of hydromorphological and physico-chemical quality elements).

Mitigation measures for defining good ecological potential have not been reported, because this information cannot be provided by Luxembourg to WISE. Measures which need to be taken in order to reach good ecological potential have been identified for each heavily modified water body and are included in the detailed Programme of Measures (in annex 20 of the second RBMP), which contains technical measures to be implemented for each water body, including heavily modified water bodies, in order to reach good status. However, no information could be found on the ecological changes that the mitigation measures are designed to achieve in either qualitative or quantitative terms. Luxembourg informed the Commission that the definition of ecological potential and the mitigation measures permitting to achieve good ecological potential is under development and will be available for the third RBMP.

7.2 Main changes in implementation and compliance since the first cycle

No changes are noted in the extent of heavily modified water body designation in the Meuse RBD (where only one river water body is designated as a heavily modified water body). In the Rhine RBD, river heavily modified water bodies have decreased from 10 to 7 water bodies (from 10 % to 6.5 % of total river water bodies).

The methodology for the designation of heavily modified water bodies has not been modified since the first RBMP, as the method and criteria used for the review of the designation of heavily modified water bodies are the same as for the first RBMP (based on Common Implementation Strategy Guidance no.4). The review of the designation of heavily modified water bodies has been based on the availability of better hydromorphological structural quality mapping of all surface (river) waters, measures in progress and results of new investigations concerning feasibilities of re-naturalisation actions. This has led to the de-designation of three previously designated heavily modified water bodies (in the Rhine RBD), changing these to natural surface water bodies for which good ecological status is expected to be achieved.

Good ecological potential had not been defined for the first RBMP, while for the second RBMP a method has been developed to do so following the Common Implementation Strategy guidance based approach. Luxembourg informed the Commission that this new method will be used in order to define good ecological potential in the third RBMP.

7.3 Progress with Commission recommendations

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

- Recommendation (report 2012): *There are significant gaps in the designation of heavily modified water bodies. The methodology of this first RBMP does not provide for any driver for restoration and improvement of the existing pressures from hydromorphological modifications. Furthermore, the methodology to define good ecological potential was not yet defined in this plan, and there is therefore a significant gap in the objectives to be defined for the heavily modified water bodies. The designation of heavily modified water bodies should be brought in line with all the requirements of Article 4(3).*

Assessment: The methodology for the designation of heavily modified water bodies has not been modified since the first RBMP, as the method and criteria used are the same as for the first RBMP. However, the designation of heavily modified water bodies has been reviewed based on the availability of better hydromorphological structural quality mapping of all

surface (river) waters, measures in progress, and results of new investigations concerning feasibilities of re-naturalisation actions. In addition, descriptions of the assessment of significant adverse effects of restoration measures and of other means to deliver the benefits of the modifications are provided for each heavily modified water body, although they remain general and do not use any quantified criteria as a basis.

Overall, based on the information found, this recommendation has been partially fulfilled.

- Recommendation (report 2015): *Justify better in the second RBMP the designation of HMWB and water bodies subject to exemptions in particular as regards the consideration of significant adverse effects and affordability. Good ecological potential should be correctly defined for HMWB.*
- Assessment: Concerning issues on the designation of HMWB, details are given under the previous recommendation. Concerning good ecological potential, for the second RBMP, a method has been developed to define good ecological potential, following the Common Implementation Strategy guidance based approach. Efforts have also been made to do this in biological terms, and mitigation measures are included in the detailed Programme of Measures. However, no information could be found on the ecological changes that the mitigation measures are designed to achieve in either qualitative or quantitative terms.

Luxembourg informed the Commission that the definition of ecological potential and the mitigation measures permitting to achieve good ecological potential is under development and will be available for the third RBMP.

Therefore, this recommendation has been partially fulfilled.

Topic 8 Environmental objectives and exemptions

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

8.1.1 Environmental objectives

The environmental objectives are defined in Article 4 of the WFD. The aim is long-term sustainable water management based on a high level of protection of the aquatic environment. Article 4(1) defines the WFD general objective to be achieved in all surface and groundwater bodies, that is, 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 2015⁵⁶), 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).

In Luxembourg, environmental objectives for ecological and chemical status of surface water have been reported in both RBDs as well as for chemical and quantitative status of groundwater in the Rhine RBD.

Assessments of the current status of surface and groundwater bodies in Luxembourg are provided elsewhere in this report: for ecological status/potential of surface waters (Chapter 3 Topic 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).

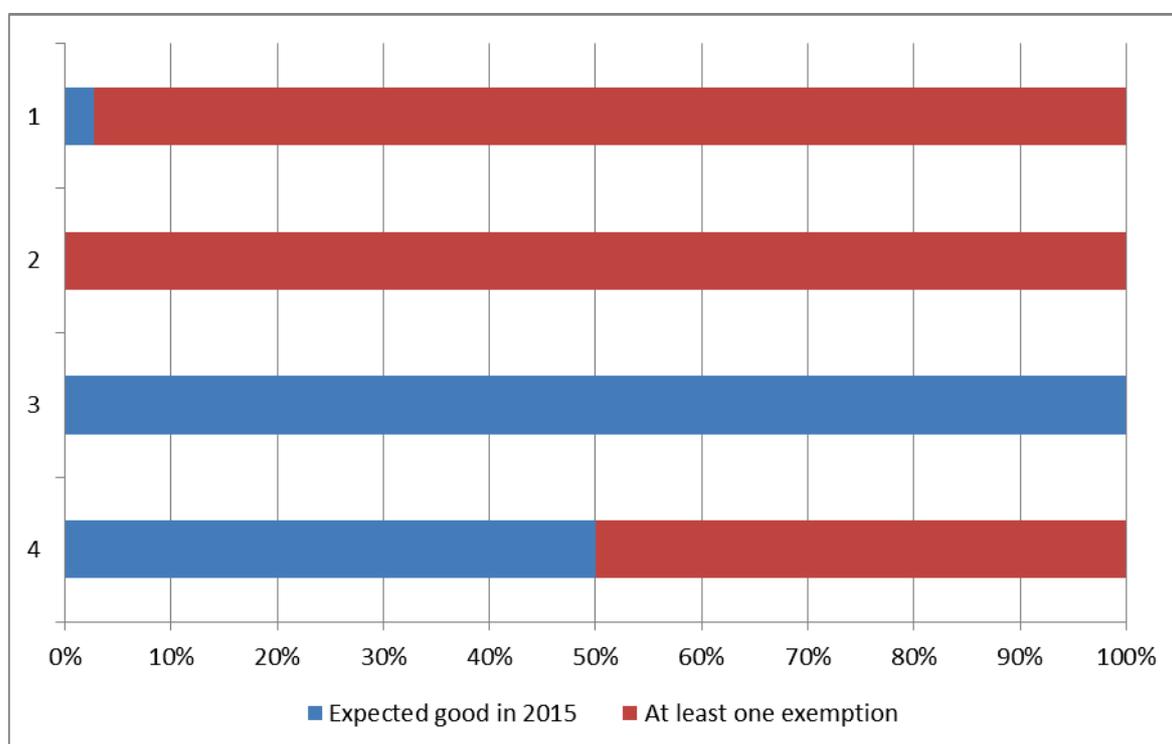
For the second RBMP, Member States are required to report the date when they expect each surface and groundwater body to meet its environmental objective. This information is summarised for Luxembourg elsewhere in this report: for ecological status/potential of surface waters in Chapter 3; chemical status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

⁵⁶ 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 Luxembourg for the four main sets of environmental objectives.

Figure 8.1 *Water bodies in Luxembourg 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*



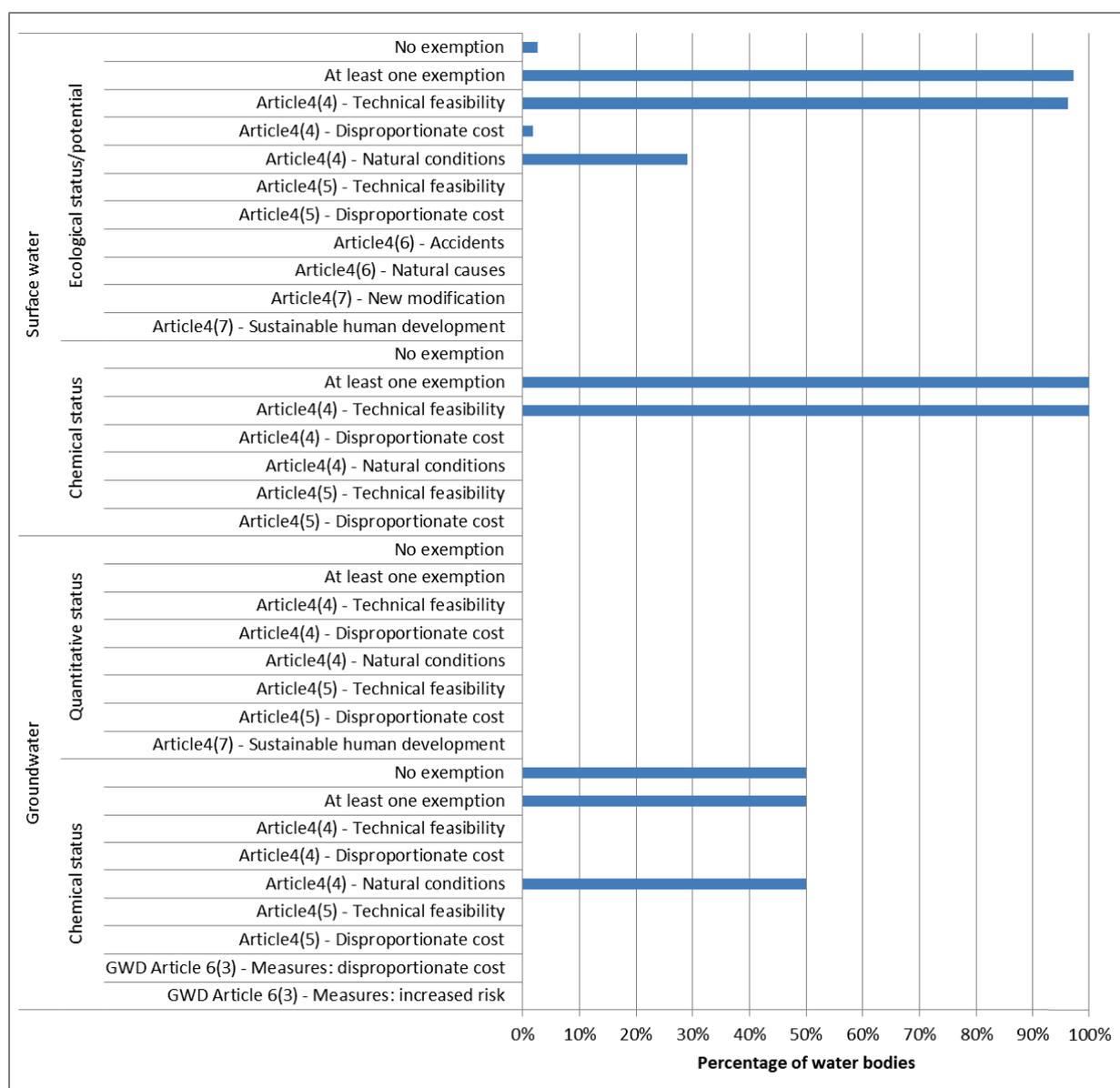
Source: WISE electronic reporting

Article 4 of the WFD allows under certain conditions for different exemptions to the objectives: an 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 is 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 Luxembourg.

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

Surface water bodies on the national level increased from 102 to 110. Overall exemptions increased from 72 % to 97 %, i.e. to 107 surface water bodies (from 74 water bodies in the first cycle). The number of groundwater bodies on the national level increased from five to 6, exemptions increased from 40 % to 50 % (three water bodies for chemical status). The reasons for this increased use of exemptions are explained in chapters 7 and 15 of the RBMP.

Application of Article 4(4)

The application of Article 4(4) exemptions has increased, which is inter alia explained by the re-classification of all surface waters as poor chemical status (see Chapter 4 of this report for further information). This was mainly based on the widespread occurrence of polycyclic aromatic hydrocarbons as defined in the revised EQS Directive⁵⁷, as well as on a lower Environmental Quality Standard for benzo(a)pyrene (used as marker for five polycyclic aromatic hydrocarbons). In addition, fluoranthene is expected to exceed the lower Environmental Quality Standards of the Directive widely in the near future, and there are uncertainties concerning mercury, which is also expected to exceed the biota Environmental Quality Standards (based on data obtained by Germany, not yet monitored in Luxembourg, but planned for the second cycle; mercury was identified to be ubiquitous at EU level in 2013).

In the case of groundwater, the increase in exemptions from 40 % to 50 % of groundwater bodies merely reflects the re-designation of these, i.e. splitting one groundwater body with poor chemical status into two, one with good and one with poor chemical status, thereby increasing the total number of groundwater bodies from five to 6, with the number of poor quality groundwater bodies remaining the same (three or 50 %, previously three or 40 %).

All exemptions are due to Article 4(4) for both surface waters (Table 8.1) and groundwater (Table 8.2). The justification in surface waters is related to technical feasibility, natural conditions and disproportional costs. For groundwater, natural conditions are reported.

For surface waters, natural conditions are justified by natural hydrogeological conditions and the re-establishment of flora and fauna. Technical feasibility refers to no information on the cause of the problem, no technical solution is available, and it takes longer to fix the problem. Disproportionate costs refer to affordability, assessment of the consequences of non-action, benefits assessment, cost-benefit analysis, cost-effectiveness analysis, distribution of costs, social and sectoral impacts, and other reasons (not further defined).

⁵⁷ 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.

Table 8.1 *Pressures on surface water bodies responsible for Priority Substances in Luxembourg failing to achieve good chemical status in 2015 (when applying EQS from Directive 2008/108/EC)⁵⁸ and for which exemptions have been applied*

Significant pressure on surface water bodies	Failing Priority Substances	Article 4(4) - Technical feasibility exemptions
	Number	Number
2.2 - Diffuse - Agricultural	1	11
8 - Anthropogenic pressure - Unknown	4	440

Source: WISE electronic reporting

Table 8.2 *Pressures responsible for pollutants in Luxembourg failing to achieve good chemical status in groundwater in 2015 and for which exemptions have been applied*

Significant pressure on groundwater	Number of failing pollutants	Number of exemptions
		Article 4(4) - Natural conditions
2.2 – Diffuse - Agricultural	3	7

Source: WISE electronic reporting

Application of Article 4(5)

No exemptions according to Article 4(5) have been applied.

Application of Article 4(6)

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

Application of Article 4(7)

No exemptions according to Article 4(7) have been applied.

⁵⁸ Luxembourg subsequently clarified that the EQS for mercury, fluoranthene and benzo(a)pyren in water was not exceeded, as defined by Directive 2008/105/EC. However the RBMP (chapter 7.4.2.1) indicated that the biota EQS for mercury will most likely be exceeded in the future, once the new EQS is applicable.

Application of Article 6(3) of the Groundwater Directive

No exemptions according to Article 6(3) of the Groundwater Directive⁵⁹ have been applied.

8.2 Progress with Commission recommendations

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

- Recommendation: *It is unclear whether there are any new physical modifications planned in RBMPs. If this is the case, the use of exemptions under Article 4(7) should be based on a thorough assessment of all the steps as requested by the WFD, in particular an assessment of whether the project is of overriding public interest and whether the benefits to society outweigh the environmental degradation, and regarding the absence of alternatives that would be a better environmental option. Furthermore, these projects may only be carried out when all possible measures are taken to mitigate the adverse impact on the status of the water. All conditions for the application of Article 4(7) in individual projects must be included and justified in the RBMPs as early in the project planning as possible.*
- Recommendation: *A large number of exemptions have been applied in the first cycle of RBMPs. While the WFD does provide for exemptions, there are specific criteria that must be fulfilled for their use to be justified. The application of exemptions needs to be more transparent and the reasons for the exemptions should be clearly justified in the plans, in particular the justification for technical infeasibility and the expected timeline for the achievement of the objectives.*
- Recommendation: *Only little improvement of the water status is expected by 2015 and the objectives for subsequent planning deadlines are not always clear. Objectives should be clearly indicated and transparent in order to be able to reach good status of waters in a reasonable timeframe.*
- Recommendation: *The high number of exemptions applied in the first RBMPs is expected to be significantly decreased in the second cycle. Luxembourg should take all necessary measures to bring down the number of exemptions for the next cycle, including the needed improvements in the characterisation process, monitoring networks and status assessment methods, as well as reducing significantly the degree of uncertainty.*

⁵⁹ 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.

Assessment (for all recommendations): Article 4(7) is not used in the second cycle. However, it is not clear whether there are any new physical modifications planned in the RBMP without employing Article 4(7).

All exemptions are due to Article 4(4). The justification in surface waters is related to technical feasibility, natural conditions and disproportional costs. For groundwater, natural conditions are reported.

Technical feasibility refers to the fact that more time is required to achieve good chemical status and good ecological status/potential because no technical solution was available. Whilst no comprehensive definition of technical feasibility/infeasibility was reported, a specification is provided in table 7.1 of the River Basin Management Plan, presenting four "levels" of technical feasibility/infeasibility (T1 - there is no technical solution, T2 - more time needed to solve the problem, T3 - no information on the cause of the problem, and T4 – other). Much of the ubiquitous polycyclic aromatic hydrocarbons contamination is thought to be due to atmospheric deposition, and mercury is also considered a long- term problem (partly due to atmospheric deposition) and consequently, no short-term solution is available at present. Exemptions due to technical feasibility/infeasibility have not been applied to groundwater.

Natural conditions are justified by natural hydrogeological conditions and the re-establishment of flora and fauna. No definition was provided, except an explanation that water replenishment in groundwater was long-term (5-15 years and in some cases longer) and therefore the achievement of good chemical status by 2027 was uncertain in two of the three groundwater bodies (one expected good by 2021). For surface water bodies, it is noted that biological recovery can take several years; no details were reported in relation to exemptions based on hydrological conditions, although a short explanation is provided in the RBMP (table 7-1).

No clear definition of disproportionate costs was provided but it was stated that the justification was based on cost-benefit analyses, without giving details of these analyses.

Time-wise objective setting for reaching objectives has improved, although less water bodies are expected to reach good status/potential in 2021 than initially planned in 2009, or even at a later stage (i.e. in 2027).

Overall, the number of exemptions increased, partly due to justified reasons, and the justifications for exemptions improved slightly. Hence, partial progress has been achieved regarding the recommendations.

Topic 9 Programme of measures

The aim of this chapter is to provide an overview of the Programme of Measures reported by Members; 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 Type of Measure may be one national measure but it would typically comprise more than one national measure. The 25 predefined Key Types of Measure are listed in the WFD Reporting Guidance 2016.

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

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

9.1.1 General issues

An indication 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. Not all reported significant pressures seem to be covered by KTMs which may impact upon the achievement of WFD objectives in Luxembourg. For

example for groundwater (Rhine RBD only; there are no groundwater bodies in the Meuse RBD) only diffuse agricultural pressures are covered, but there are no KTMs for point source pollution from contaminated sites or abandoned industrial sites, or for abstraction for public water supply (the latter does not seem to be an issue, as all groundwater bodies are in good quantitative status - see Chapter Topic 10 of this report)⁶⁰.

For surface water (Rhine RBD), only 9 of 19 significant pressure types are covered: no KTMs are reported operational for point sources from storm overflows; Industrial Emissions Directive⁶¹ plants; non- Industrial Emissions Directive plants; nor for diffuse sources from agriculture, contaminated sites or abandoned industrial sites, and atmospheric deposition; abstraction or flow diversion for public water supply and cooling water; physical alterations, such as dams, barriers locks for navigation; hydrological alterations for transport; introduced species and diseases; or other anthropogenic pressures, although six individual substances are covered. In addition, significant pressures not covered by KTMs are navigation, sediment deposition, and recreation. For surface water in the Meuse RBD, two of six reported pressure types are covered: no KTMs are reported for point sources from Industrial Emissions Directive: plants; diffuse sources from contaminated sites or abandoned industrial sites, and atmospheric deposition; sediment deposition and other anthropogenic pressures, although four individual substances are covered. The apparent lack of operational measures for reported significant pressures is due to incomplete WISE reporting, for example there is information in the RBMP on tackling diffuse agricultural pressures in the Rhine RBD (see Chapter Topic 11 of this report).

158 national basic measures and 63 national supplementary measures have been mapped against a wide range of KTMs for both RBDs. 30 % of the national basic measures were mapped to KTM 2 - "Reduce nutrient pollution from agriculture". 28 % of the national supplementary measures were mapped to the nationally defined KTM "(Administrative) measures which should help achieving the good status or facilitate the implementation of other measures from the Programme of Measures". Links to further information on Article 11(3)(c)(k) basic measures for both RBDs were provided, as was an inventory of national measures, with individual basic measures listed with codes and mapped against measure types, including supplementary measures. This includes, for example, national measures for KTM 17 - "Measures to reduce sediment from soil erosion and surface run-off", but not for KTM 18 –

⁶⁰ Luxembourg clarified subsequently that measures are in place to address point source pollution from contaminated sites or abandoned industrial sites, and for abstraction for public water supply.

⁶¹ Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32010L0075>

“Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases”, although the latter is included in the issues for the Rhine RBD.

Whilst KTMs were mapped against national measures, little information was provided on KTMs tackling significant pressures, although some significant pressures causing failure of objectives were listed for groundwater and surface water in the Rhine RBD, and surface water (groundwater not relevant) in the Meuse RBD, including some Priority Substances and River Basin Specific Pollutants. The percentage of water bodies failing objectives by 2027 is not yet known (marked “no information”).⁶²

No information was reported for River Basin Specific Pollutants or Priority Substances causing failure of objectives, nor any KTMs used to tackle these⁶³. This seems to be mainly incomplete WISE reporting, as there is information in the RBMP.

Cost-effectiveness analysis is an appraisal technique that provides a ranking of alternative measures on the basis of their costs and effectiveness, where the most cost-effective has the highest ranking. A combination of qualitative and quantitative cost-effectiveness analysis was carried out in both RBDs. Cost-effectiveness analysis was undertaken in the first cycle for all Article 11(3)(a) and Article 11(3)(b)(i) type measures, but not supplementary measures, the latter being mainly of an administrative nature. In the second RBMP, the information reported to WISE indicated that a combination of qualitative and quantitative cost-effectiveness analysis was carried out in both RBDs. Therefore, this was examined further in RBMP and background documents of the assessment where it was found that, apart from satisfying existing legal requirements - Article 11(3)(a) measures - prioritisation of measures was described in detail and is broadly based on cost effectiveness in the following order of priority:

First: Measures which serve to achieve more than one objective, for example, objectives of the WFD as well as the Floods Directive and/or protected areas (NATURA 2000);

Second: Multiple effectiveness in terms of Quality Elements (scoring system zero to ++++ for physico-chemical, biological, and hydromorphological quality elements, as well as chemical quality) and reduction or elimination of multiple pressures; and

3rd: Acceptability of a measure, which means early implementation and therefore also early effectiveness.

⁶² Luxemburg noted that some information related to some indications will be described in the next RBMP, when further monitoring results are available

⁶³ Luxembourg clarified subsequently that KTM 21 and KTM 22 have been reported in table “KTM” and these 2 KTM will help tackling pollution related to RBSP as well as priority substances.

The measures were grouped as in the first cycle in terms of the most important pressures on water bodies in Luxembourg, that is, (i) Urban Water Management (mainly wastewater collection and treatment), (ii) Hydromorphological, (iii) Agricultural, and (iv) Groundwater Protection. Further prioritisation was described in terms of these groups of measures, for example, the priority in “Urban Water Management” was the introduction of biological wastewater treatment where not already in place, and the top priority in “Groundwater Protection” was the protection of the quality of groundwater used for public drinking water supply.

The above information applies nationally (Rhine RBD and Meuse RBD, but the latter has no groundwater bodies).

A critical factor in the success of the implementation of the Programme of Measures is the availability of funding to support the investments required. Whilst in the first cycle costs of basic measures were clearly identified as investment costs and maintenance costs up to 2027 (except for agriculture), these have not been reported for the second cycle (Annex 0 explains that cost data has not been gathered at river basin district level). Information regarding costs of measures at the national level is included in the RBMP.

A clear financial commitment has been secured for the implementation of Programme of Measures in both RBDs. On a sectoral basis, commitments have been secured for agriculture, urban, hydropower and flood protection in both RBDs. However, industry, transport, energy and aquaculture are indicated as not relevant, although some significant pressures relate to industry and transport.

In relation to co-ordination with the Marine Strategy Framework Directive⁶⁴, Luxembourg reported that as a land-locked country co-ordination is not relevant.

The RBMP and Floods Directive Flood Risk Management Plan have not been integrated into single plans and no joint consultation of RBMP and Flood Risk Management Plan was carried out. However, the objectives and requirements of the Floods Directive have been considered in the second RBMP and Programme of Measures. Luxembourg also indicated that win-win measures in terms of achieving the objectives of the WFD and Floods Directive, drought management and use of Natural Water Retention Measures have been included in the Programme of Measures; the design of new and existing structural measures, such as flood defences, and storage dams, has been adapted to take account of WFD Environmental

⁶⁴ 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>

Objectives, and clear financial commitments have been secured for the implementation of Programme of Measures in the flood protection sector.

WFD Article 9(4) has not been applied to 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

Other significant pressures were not reported separately, although some were included in the overall pressures, such as introduced species and diseases, and other anthropogenic pressures but no KTMs were reported for these.

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 KTM. KTMs are expected to deliver the bulk of the improvements through reduction in pressures required to achieve WFD Environmental Objectives. A KTM may be one national measure, but it would typically comprise more than one national measure. Member States are required to report on the national measures associated with the KTMs, and whether the national measures are basic - Article 11(3)(a) or Article 11(3)(b)(1) - or supplementary - Article 11(4).

Table 9.1 summarises the number of national measures that have been mapped to the relevant KTMs in Luxembourg. Also shown is the number of RBDs for which the KTM has been reported⁶⁵. Table 9.2 then summarises the type of basic measures associated with the national measures mapped against the Key Type of Measure.

⁶⁵ Luxembourg clarified subsequently that an error was made in the reporting and that the same information was provided for both RBDs even though some measures are not relevant for the Meuse RBD

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

Key Type of Measure	National basic measures	National supplementary measures	Number of RBDs where reported
KTM1 - Construction or upgrades of wastewater treatment plants	13	5	2
KTM10 - Water pricing policy measures for the implementation of the recovery of cost of water services from industry	1		2
KTM11 - Water pricing policy measures for the implementation of the recovery of cost of water services from agriculture	1		2
KTM12 - Advisory services for agriculture		2	2
KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc)	1		2
KTM14 - Research, improvement of knowledge base reducing uncertainty		2	2
KTM17 - Measures to reduce sediment from soil erosion and surface run-off	27	4	2
KTM2 - Reduce nutrient pollution from agriculture	48	8	2
KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure	7	1	2
KTM22 - Measures to prevent or control the input of pollution from forestry	1		2
KTM23 - Natural water retention measures		3	2
KTM3 - Reduce pesticides pollution from agriculture.	25	9	2
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)	3	2	2
KTM6 - Improving hydromorphological conditions of water bodies other than longitudinal continuity	12	4	2
KTM7 - Improvements in flow regime and/or establishment of ecological flows	3	3	2
KTM8 - Water efficiency, technical measures for irrigation, industry, energy and households	4		2
KTM9 - Water pricing policy measures for the implementation of the recovery of cost of water	1		2

Key Type of Measure	National basic measures	National supplementary measures	Number of RBDs where reported
services from households			
KTM99 - Other key type measure reported under Programme of Measures - (Administrative) measures which should help achieving the good status or facilitate the implementation of other measures from the Programme of Measures		12	2
KTM99 - Other key type measure reported under Programme of Measures - Construction of stormwater storage basins, stormwater overflow tanks and combined sewer storage tanks	8	2	2
KTM99 - Other key type measure reported under the Programme of Measures - Measures related to groundwater	3	4	2
Total number of Mapped Measures	158	63	2

Source: WISE electronic reporting

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

Key Type of Measure	Basic Measure Type											
	Accidental pollution	Controls water abstraction	Cost recovery water services	Efficient water use	Hydromorphology	Nitrates	Point source discharges	Pollutants diffuse	Pollutants direct groundwater	Protection water abstraction	Recharge augmentation groundwaters	Urban Waste Water
KTM1 - Construction or upgrades of wastewater treatment plants							10					3
KTM10 - Water pricing policy measures for the implementation of the recovery of cost of water services from industry			1									
KTM11 - Water pricing policy measures for the implementation of the recovery of cost of water services from agriculture			1									
KTM13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc)									1			
KTM17 - Measures to reduce sediment from soil erosion and surface run-off				27		8			27			
KTM2 - Reduce nutrient pollution from agriculture				48		18			48			
KTM21 - Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure	3						5	1				
KTM22 - Measures to prevent or control the input of pollution from forestry				1					1			
KTM3 - Reduce pesticides pollution from agriculture.				24		8			24			
KTM5 - Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams)					3							
KTM6 - Improving hydromorphological conditions of water bodies other than longitudinal continuity					12							
KTM7 - Improvements in flow regime and/or establishment of ecological flows					3							
KTM8 - Water efficiency, technical measures for irrigation, industry, energy and households		4		1								
KTM9 - Water pricing policy measures for the implementation of the recovery of cost of water services from households			1									
KTM99 - Other key type measure reported under PoM							8		3		1	

Source: WISE electronic reporting

Key

‘Accidental pollution’ = Article 11(3)(f); 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.
'Nitrates' = Nitrates Directive (91/676/EEC).
'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.
'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 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.

Luxembourg has not defined indicator values for any of the significant pressures identified, and no gap analyses have been reported for the different reporting cycles. Luxembourg indicated in their Annex 0 that this is due to the relevant data being unavailable.

9.2 Main changes in implementation and compliance since the first cycle

The level of implementation of the first cycle of Programme of Measures in the two RBDs in Luxembourg was reported as “some measures completed”. Obstacles in terms of lack of measures were reported for both RBDs as “Governance”, “Lack of finance”, and “Other” (land availability, complex land purchasing procedures, stakeholder engagement/deadlock). Progress does seem to have been made in identifying significant pressures and linking at least some of these to KTMs and national measures.

The catalogue of measures was reviewed and revised on the basis of: (i) the revised status analysis made during 2013-2014, (ii) the pressures described in this analysis, and, (iii) additional requirements, such as the Floods Directive, and included a public consultation. Based on the status of implementation, measures which were not expected to be completed by 2015 were included in the revised programme of measures, and a considerable number of new measures (not included in the 2009 programme of measures) were added.

New legislation or regulations to implement the Programme of Measures in the first cycle was reported necessary and already adopted.

9.3 Progress with Commission recommendations

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

- Recommendation: *The RBMPs should be clearly structured and accessible to the public and relevant stakeholders. It would also be advisable to clearly distinguish the information and the measures that are relevant for the Rhine RBD, for the Meuse or for both. This transparency within a clear governance structure will encourage public participation in both the development and delivery of necessary measures to deliver sustainable water management.*

Assessment: Improvements have been made in distinguishing more clearly between measures relevant to the Rhine, Meuse, or both RBDs. This recommendation has been fulfilled.

- Recommendation: *Where there are currently high uncertainties in the characterisation of the RBDs, identification of pressures, and assessment of status, these need to be addressed in the current cycle, to ensure that adequate measures can be put in place before the next cycle.*

Assessment: Progress has been made in identifying significant and other pressures, at least at RBD level, and linking at least some, but not all of these to measures. This recommendation has been partially fulfilled (further information may be obtained from Chapter 2).

- Recommendation: *Meaningful information regarding the scope, the timing and the funding of the measures should be included in the PoM so that the approach to achieve the objectives is clear. All the relevant information on basic and supplementary measures should be included in the summary of the Programme of Measures to increase transparency on the planned actions for the achievement of the environmental objectives set out in the WFD.*

Assessment: Although there is a comprehensive listing of basic and supplementary measures, not all seem to be operational, although specific pressures were reported (although this may be in part due to a WISE reporting problem). This recommendation has been partially fulfilled.

- Recommendations: *Ensure that the RBMPs clearly identify the gap to good status, and that the Programme of Measures are designed and implemented to close that gap with transparent and meaningful information regarding the scope, the timing and the funding of the measures; Improve knowledge about the link between pressures and impacts in designing and making operational the measures for the second RBMPs in order to: refine the significance of the pressures by quantifying those which are likely to prevent the*

achievement of environmental objectives; apportion pressures by their source and identify the responsible sectors/areas; and assess the reduction in pressures required to achieve environmental objectives.•

Assessment: It is not possible to judge how and when WFD objectives will be met due to the complete absence of gap indicators and gap analyses for the different reporting cycles. Although financial commitments have been secured for most relevant sectors, there is not for all the measures an indication of timing and funding of measures. (some information regarding funding of measures is provided in chapter 9 of the RBMP). With regard to the measures contained in the detailed programme of measures, information regarding the implementation date of each measures is described in annex 20 of the RBMP. These recommendations have not been fulfilled.

Topic 10 Measures related to abstractions and water scarcity

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

10.1.1 Water exploitation and trends

Water abstraction pressures are not reported as relevant for Luxembourg. The Water Exploitation Index + is not calculated, and water quantity data have not been reported to support the European State of the Environment Report in relation to Water Quantity. Water scarcity is not considered an issue at the international level. The RBMP does not include a water resource allocation and management plan.

10.1.2 Main uses for water consumption

No data have been reported for the uses of water consumption, as water quantity pressures are not reported as significant.

10.1.3 Measures related to abstractions and water scarcity

Regarding basic measures - Article 11(3)(e) - in Luxembourg there is a concession authorisation and/or permitting regime to control water abstractions and impoundment, but no register of impoundments. Small abstractions are not exempted from these controls.

Measures promoting efficient and sustainable water use - basic measure Article 11(3)(c) - were implemented in the previous cycle, and new measures and/or significant changes are planned for the second cycle.

The reported information indicates that measures for the prior authorisation of artificial recharge or augmentation of groundwater bodies - Article 11(3)(f) had been implemented in the previous cycle, and no new measures or significant changes are planned for the next period.

Complementary measures under KTMs are not reported for addressing abstraction pressures.

Water reuse is not foreseen as a measure.

10.2 Main changes in implementation and compliance since the first cycle

There are no significant changes to report.

10.3 Progress with Commission recommendations

There are no Commission recommendations based on the first RBMP and Programme of Measures.

Topic 11 Measures related to pollution from agriculture

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

Luxembourg has stated in the RBMP that diffuse pollution pressures from the agriculture sector are assessed in the Rhine and Meuse RBDs. However the reported information to WISE states that there are no pollution pressures from agriculture in the Meuse RBD⁶⁶.

Measures matching the identified pressures. KTM 2 - Reduce nutrient pollution from agriculture, KTM 3 - Reduce pesticides pollution from agriculture, KTM 12 - Advisory services for agriculture, KTM 13 - Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc.), KTM 17 - Measures to reduce sediment from soil erosion and surface run-off, and KTM 23 - Natural water retention measures are applied in both RBDs⁶⁷.

In relation to KTM 13 - "Drinking water protection measures (for example, establishment of safeguard zones, buffer zones etc.)", since the first RBMP five drinking water protection zones have been designated near groundwater bodies, with specific Grand-ducal Regulations for each protection zones⁶⁸. These regulations also set out the measures/restrictions that apply in 3-4 different zones around the drinking water abstraction point. Another seven protection zones are in the process of being designated through regulations, and a further 80 are still provisional designations under technical investigations (it seems that all were provisional designations in the first cycle). For surface water bodies, there is only one relevant protection zone (impoundment reservoir Obersauer Stausee) under the law of 27th May 1961 and the Grand-ducal Regulation of 16 December 2011, which also sets out the measures/restrictions at and around the site. All abstractions for drinking water supply are in the Rhine RBD and therefore there are no drinking water protection zones in the Meuse RBD.

The implementation of basic measures related to Article 11(3)(h) for the control of diffuse pollution from agriculture at the source is ensured in all RBDs. According to WISE the rules

⁶⁶ Luxembourg subsequently clarified that pressures from agriculture have been assessed at the level of the water bodies (see annex 5 of the RBMP). However, the used national category "agricultural and forestry-related activity" didn't match the "pressure types" used in WISE, so they have been reported as "2.10 Diffuse – Other" type.

⁶⁷ Luxembourg subsequently clarified that an error was made in the reporting and that the same information was provided for both RBDs even though some measures are not relevant for the Meuse RBD.

⁶⁸ Luxembourg subsequently clarified that further safeguard zones have been or will be established but the process takes several years. By December 2018 78 % of the groundwater resources used for drinking water purposes will be protected by safeguard zones.

applied are differentiated for different parts of the RBD. However, information on what the differences are and how they relate to different scales of pressures/impacts was not available in the RBMP. Supplementary measures are applied in both RBDs. General binding rules for microbiological/bacteriological pollution, nitrates, organic pollution, pesticides and phosphorus to control diffuse pollution from agriculture are set and applied in all RBDs. Sediments are not controlled.

There are a large number of agricultural measures which apply on a nationwide basis; both mandatory and voluntary. The focus of these measures is to tackle diffuse pollution from agriculture (mainly nutrients and pesticides). Point source pollution is dealt with by existing legislation, e.g. discharge permits, including minimum requirements according to Article 11(3)(g), and measures include extending those which are mandatory in drinking water protection zones to apply nationwide, for example the prohibition of pesticide applications near water courses. Other relevant measures aim at nutrient control in general or are mainly part of voluntary initiatives, such as the Rural Development Programme. The RBMP states that measures under the Nitrates Directive and other legal requirements are insufficient to reach the objective of the good ecological status and other measures are required.

The RBMP does not clearly separate the measures in terms of mandatory and voluntary measures or their effectiveness.⁶⁹ The catalogue of agricultural measures (listed in Annex 19 RBMP) indicates that many individual measures types are subject to regulations without specifying these. Some measures are listed as both mandatory (in the case of drinking water protection zones) and voluntary in other areas. Some measures are clearly indicated as part of voluntary initiatives, such as biological/organic farming (linked to compensation schemes and governed by regulations once participation is agreed), but for some measures there is no information whether they are mandatory or voluntary. Many Measures are mainly related to Article 11(3)(d); there are no technical measures related to agriculture under Article 11(3)(h) or Article 11(3)(g). The RBMP states that these are administrative measures, i.e. regulations. Mandatory measures include prohibition of fertiliser application on strips of land along water courses, conditions relating to fertiliser application equipment, creating additional storage capacity for organic fertiliser, restrictions on livestock numbers, reductions in cereal production, restrictions on nitrogen fixing crops and prohibition of ploughing on permanent grassland.

Supplementary measures are listed separately (Article 11(4) measures) and include voluntary measures relevant to agriculture, such as advice to farmers, and a “No Pesticides Action Plan”.

⁶⁹ Luxembourg stated that they have already planned to describe this in more in detail in the next RBMP.

Some agricultural measures apply nation-wide, and some are targeted specifically to protected areas, especially drinking water protection zones or along water courses.

Luxembourg did not report any indicators to measure the effectiveness of measures. It did not report measures to assess the scale of measure implementation needed and the progress in implementation.⁷⁰ It reported that this information is not available. This indicates that the European Commission Recommendation was largely not taken up.

As regard to the timing of the measures, the RBMP (Annex 18) lists agricultural measures completed or partially completed, and the Catalogue of agricultural measures in Annex 19 indicates which measures are relevant in the second cycle, but there are no completion dates indicated.

Luxembourg reported that financing has been secured. It reports information on investment needs but does not report on the use of European Union funds such as Rural Development funds. National contributions to funding are provided, but there is no indication of the source. The mechanisms are mainly compensation payments linked to voluntary initiatives, e.g. amount per ha per annum of participating land. Mandatory measures are carried by farmers (internalised costs).

11.2 Main changes in implementation and compliance since the first cycle

There have been no changes in implementation and compliance since the first cycle.⁷¹

11.3 Progress with Commission recommendations

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

- Recommendation: *Agriculture is indicated as exerting a significant pressure on the water resource in Luxembourg RBDs. However, the measures related to agriculture are mainly on a voluntary basis, which makes the strategy unlikely to deliver. A right balance between voluntary actions and a strong baseline of mandatory measures and rules needs to be set*

⁷⁰ Luxembourg has subsequently informed the Commission that the progress will be reported in the dedicated reporting by the end of this year.

⁷¹ Luxembourg subsequently clarified that especially the legal framework implementing Council Directive 91/676/CEE has been amended several times. Also the delimitation of water protection areas has been strengthened by the legal framework. Meanwhile also the legislation on Greening, Cross Compliance and Rural Development Programme have been implemented.

up. This should be developed with the farmers' community to ensure technical feasibility and acceptance.

Assessment: Luxembourg has consulted the farming community when developing the program of measures. Measures have also been discussed with the Ministry of Agriculture. The current Rural Development Program includes several voluntary measures, the Nitrate Action Program and the national plant protection law mandatory measures. Stricter mandatory measures are included in the program of measures in relation to zones used for drinking water abstraction. Additional mandatory measures are also implemented or foreseen in nature protection areas. This recommendation has been implemented.

- Recommendation: *There needs to be a very clear baseline in the agriculture sector so that all farmers know the rules this can be adequately advised and enforced and so that the authorities in charge of the CAP funds can adequately set up Rural Development programmes and cross compliance water requirements.*

Assessment: see above.

- Recommendation: *Enhance measures to tackle pollution by nutrients (nitrogen and phosphorus) considering their impact on ecological status. Full consideration of the basin-wide impact is needed in this respect (local and downstream up to transitional and coastal waters). To this extent Luxembourg should check that their nutrient standards are consistent with biological requirements for the achievement of good status and provide a more coherent strategy encompassing WFD with: the Nitrates Directive and CAP in agriculture and the UWWT Directive in urban areas. In particular, it is expected that RBMPs, based on the necessary reduction in nutrient load, clearly identify the extent to which the measures already taken under the implementation of ND and UWWTD contribute to the achievement of WFD objectives and which additional measures should be taken to actually achieve these objectives. A clear identification of basic (mandatory) measures is expected to be made transparent both to the sectors and to the general public.*

Assessment: For measures see above. According to the RBMP nutrient standards have been revised during the Article 5 assessment. A gap assessment for nutrients is still lacking, but loads coming from diffuse sources are presented in the RBMP. The contribution of different policies towards the achievement of the good ecological status/potential has not been assessed. Therefore the recommendation has been partly fulfilled.

- Recommendation: *Define measures targeted to agriculture with an appropriate level of detail to ensure their uptake by farmers and their inspection by relevant agencies. The*

RBMPs are expected to make a clear distinction between mandatory measures and voluntary ones that will be funded under the EARDF.

Assessment: It is not fully clear from the RBMP which measures are voluntary and which are mandatory;⁷² they have made no progress on assessing the effectiveness of measures and Luxembourg has developed no indicators to measure what will be achieved by mandatory measures⁷³ and the gaps being filled by supplementary measures. There is a general statement that the measures taken under the Nitrates Directive and other legislation are not enough, but there are no technical measures under Article 11(3)(h), although regulations under Article 11(3)(h) are mentioned (but not specified). Financing sources of measure are provided.

Recommendation: *Review the regulation of the use of pesticides in order to effectively reduce current levels of contamination of both rivers and groundwater, making clear linkages with the implementation of the Directive on the Sustainable Use of Pesticides.*

Assessment: According to the RBMP Luxembourg has adopted on the of 19 December 2014 a law on plant protection products, transposing Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve a use of the pesticides compatible with sustainable development; and implementing certain provisions of Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing on the market of plant protection products and repealing Directives 79/117 / EEC and 91/414/EEC of the Council. The recommendation has been implemented.

⁷² At the stage of writing the RBMP, this could not easily be done because Luxembourg had chosen to use Article 28 as well as Article 30 of EU-Regulation 1305/2013/EC and it depends on the defined zone if article 28 or 30 has to be applied. In addition, the definition of the zones, especially the water protection areas, is an ongoing process.

⁷³ This statement does not reflect the reality. There are indicators in place, for example the assessment run under 91/676/CEE or 1305/2013/EC, and a new model is under development.

Topic 12 Measures related to pollution from sectors other than agriculture

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

In the context of this topic, pollution is considered in terms of nutrients, organic matter, sediment, saline discharges and chemicals (Priority Substances, River Basin Specific Pollutants, groundwater pollutants and other physico-chemical parameters) arising from all sectors and sources apart from agriculture. Key types of 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 not been reported in the context of those pressures⁷⁴.

The WFD specifies that Programmes of Measures shall include, as a minimum, “basic measures” and, where necessary to achieve objectives, “supplementary measures” when basic measures are not enough to address specific significant pressures (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) is missing for both RBDs in Luxembourg, and quantitative information on basic measures to tackle pollution from non-agricultural sources (number of measures per KTM) has not been reported to WISE for any measure types for either RBD in Luxembourg.⁷⁵

Luxembourg has clarified, however, that there are measures in place to eliminate/reduce pollution from Priority Substances and other substances in both RBDs in Luxembourg.

Basic measures under Article 11(3)(k) are reported to be in place for Priority Substances but the links between KTMs and the substances causing failure were not reported in WISE.

⁷⁴ Pressures and measures had been reported. However, Luxembourg did not report the link between them (showing a reporting gap related to KTMs).

⁷⁵ Luxembourg subsequently highlighted that KTMs have been reported and these include non-agricultural measures, and they are also included in annex 19 of the RBMP. Yet, their link to pressures was not reported.

The RBMP states that measures (other than basic measures to control point sources (permitting) where relevant) are not yet in place, pending further investigation of the sources (polycyclic aromatic hydrocarbons are probably mainly from old/disused industrial or waste sites, diuron (detected but not causing failure) is probably a result of inappropriate disposal, whereas isoproturon is expected to be reduced to some extent as a result of a usage ban in water protection zones, already in place. In addition, the RBMP indicates administrative and technical measures to prevent or limit the discharge/input of pollutants from point sources under Article 11(3)(g), and diffuse sources under Article 11(3)(h) (administrative measures only).

No timescale is given for the completion of investigations and the subsequent introduction of appropriate measures, but the table of supplementary measures under Article 11(4) indicates how they should be prioritised. Measures include A30-15 - “Preparation of an Action Plan to investigate and where necessary to clean-up old/disused industrial or waste sites”, which has high priority and is on-going, and measure A33-15 – “investigative monitoring” which refers to obtaining further information on pressures, such as polycyclic aromatic hydrocarbons, labelled as “high priority”, and several measures to deal with pesticides, including A5-15 – “Review/revision of the National Action Plan on pesticides” and the A6-15 - “Campaign without pesticides”, both of which are high priority and on-going.

As far as measures for River Basin Specific Pollutants causing failure are concerned, copper and zinc have been identified as significant pressures on surface water in the Rhine RBD (zinc only in the Meuse RBD). The RBMP considers these to be mainly from industrial discharges, which are subject to administrative measures (permits) but indicates that, following further monitoring, there may have to be stricter emission limits in industrial permits in future.

No non-agricultural pollutants have been reported to WISE as causing failure of objectives in groundwater.

Luxembourg provided more detailed 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 RBDs for surface and groundwater. There is no register of waste water discharges in either RBD in Luxembourg. There are no thresholds below which waste water discharges do not require permits and are not

subject to registration⁷⁶. Some direct discharges to groundwater are authorised in accordance with Article 11(3)(j) in both RBDs in Luxembourg.

12.2 Main changes in implementation and compliance since the first cycle

In the first RBMP, information on substance-specific measures was provided in largely general terms. For example, “reductions in emissions of WFD Annex VIII, IX and X substances, including reduced application and emission of pesticides, and reductions in emissions of Indeno(1,2,3-cd)pyrene and metazachlor in one water body”. Supplementary measures for all other substances were related mainly to diffuse agricultural sources, and included, for example, reduced application of pesticides and control of fertiliser application (to reduce nutrient input - nitrate, phosphorus) on a nationwide, although voluntary, basis.

For the second RBMP, basic measures under Article 11(3)(k) are reported to be in place for Priority Substances and KTMs are not linked to specific substances causing failure in the WISE reporting as explained in Annex 0. No information is reported on the progress expected in implementing KTMs between 2015 and 2027, and no gap indicator is reported, as also explained in Annex 0.

12.3 Progress with Commission recommendations

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

- Recommendation: *The identification of River Basin Specific Pollutants needs to be more transparent, with clear information on how pollutants were selected, how and where they were monitored, where there are exceedances and how such exceedances have been taken into account in the assessment of ecological status. It is important that there is an ambitious approach to combating chemical pollution and adequate measures are put in place.*

Assessment: In terms of measures for pressures from non-agricultural sources, there are measures in place to eliminate/reduce pollution from Priority Substances and other substances in both RBDs in Luxembourg. However, they have not been reported for all individual substances. For the second RBMP, basic measures under Article 11(3)(k) are reported to be in place for Priority Substances. For Priority Substances and River Basin Specific Pollutants, KTMs were not linked to specific substances causing failure in the WISE reporting. There is however more information detailed in an annex to the RBMP

⁷⁶ Luxembourg subsequently clarified that there is an internal register of wastewater treatment plants (communal or industrial) according to the UWWTD. Additionally industrial discharges are registered in the E-PRTR.

which includes measures such as A30-15 - “Preparation of an Action Plan to investigate and where necessary to clean-up old/disused industrial or waste sites”.

Therefore, this recommendation is partially fulfilled in terms of measures for pressures from non-agricultural sources.

- Recommendation: *Enhance measures to tackle pollution by nutrients (nitrogen and phosphorus) considering their impact on ecological status. Full consideration of the RBD-wide impact is needed in this respect (local and downstream up to transitional and coastal waters). To this extent Luxembourg should check that their nutrient standards are consistent with biological requirements for the achievement of good status and provide a more coherent strategy encompassing WFD with the Urban Wastewater Directive, in urban areas. In particular, it is expected that RBMPs, based on the necessary reduction in nutrient load, clearly identify the extent to which the measures already taken under the implementation of Nitrates Directive and Urban Wastewater Directive contribute to the achievement of WFD objectives and which additional measures should be taken to actually achieve these objectives. A clear identification of basic (mandatory) measures is expected to be made transparent both to the sectors and to the general public.*

Assessment: Due to incomplete reporting to WISE, no data on basic and supplementary measures or KTMs is available. The reported data include KTM 1 – “Construction or upgrades of wastewater treatment plants”, and the Programmes of Measures include several projects, with reference to the Urban Wastewater Directive and nutrient removal, and including an indication of their effect on quality elements (on a semi quantitative scale of zero to ++++), with the biggest effects being on the physico-chemical quality elements which include nutrients, but no details are given for specific substances. The annex containing measures also includes supplementary measures A21-15 to extend and repair local waste water collection networks, listing these as high priority and on-going. However, what is missing is a gap analysis for nutrients, which has not been provided (nor for any other pollutants) in the electronic reporting, nor in the RBMP itself. Therefore, this recommendation is considered partially fulfilled.

Topic 13 Measures related to hydromorphology

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

Significant hydromorphological pressures are reported in both RBDs. For the largest share of water bodies affected by significant hydromorphological pressures, the specific sector linked to these pressures is either unknown or obsolete. In only very few water bodies, significant hydromorphological pressures are linked to either hydropower or the transport/navigation sector.

As concerns the WISE reporting, Luxembourg subsequently informed that information could not be reported on indicators concerning pressure gaps and indicators on KTMs for tackling significant pressures, because the respective data was not available. Although no information is available with regard to whether measures are fully operational or not, according to information in the second RBMP, hydromorphological measures are planned for the second cycle.

The specific hydromorphological measures planned include fish ladders and bypass channels, habitat restoration, sediment management, restoration of bank and bed structures, the removal of physical structures, setting ecological flows, and floodplain inundation. Supplementary measures include revision of the water law of Luxembourg to set minimum ecological flows and to allow the state to be in charge of hydromorphological measures (high priority, ongoing), and simplification of the process of implementing hydromorphological measures.

In terms of basic measures to tackle hydromorphological pressures, there is an authorisation and/or permitting regime in place to control physical modifications in both RBDs, which covers changes to the riparian area of water bodies according to WFD Article 11(3)(i). However, there is no register of physical modifications of water bodies in place.

Overall management objectives and quantitative objectives in terms of restoring river continuity have been set. In addition, the design of new and existing structural measures, such as flood defences, storage dams and tidal barriers, is reported to have been adapted to take into account WFD objectives in both RBDs.

Win-win measures in terms of achieving the objectives of the WFD and Floods Directive, drought management and use of Natural Water Retention Measures are included in the

Programme of Measures of both RBDs. However, due to incomplete reporting, KTM 23 - "Natural water retention measures" is not reported to tackle any significant pressures.

Ecological flows have not been derived for the relevant water bodies but there are plans to do it during the second cycle. With respect to ecological flows, a new supplementary measure is planned for the second cycle, namely to revise the Water Law to set minimum ecological flows. The second RBMP also notes that studies are still ongoing to establish appropriate minimum ecological flows and should become available in the second cycle to support the revision of the Water Law. The implementation of measures on minimum flow is scheduled to take place by 2021.

No conclusion can be drawn on the level of ambition in terms of tackling significant hydromorphological pressures. Indicators on the gap to be filled for significant hydromorphological pressures and KTM value indicators are not reported, as the respective data are not available.

13.2 Main changes in implementation and compliance since the first cycle

The second RBMP summarises progress on hydromorphological measures compared to the first RBMP. 30 of the measures proposed in the first RBMP have been implemented (fish ladders and re-naturalisation projects). A further 97 measures proposed in the first RBMP are in the process of being implemented: these mainly comprise fish ladders, re-naturalisation projects, and one measure to regulate the minimum ecological flow. Some delays have been occurred for various reasons, including planning procedures, public acceptability of measures, property rights and right of way, and limited resources and finances. F measures on dams, barriers or locks to increase river flow continuity have been completed, and another 30 are in progress. In addition to the measures proposed in the first cycle, another 48 measures have either been completed or are in progress. However, analyses of the gap that needs to be closed are missing.

All measures which were not completed by the end of 2015 are included in the second Programme of Measures. Furthermore, the level of detail provided in the second RBMP on measures is far higher than in the first RBMP. A catalogue of hydromorphological measures is used which includes a semi-quantitative effectiveness assessment for each measure type on the different quality elements, as well as an indication of the relevance to the Floods Directive. The catalogue also includes the cost of the measures.

13.3 Progress with Commission recommendations

There were no Commission recommendations based on the first RBMP and Programme of Measures.

Topic 14 Economic analysis and water pricing policies

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

As in the first cycle, the only water services that have been defined for Article 9 purposes are public drinking water supply (abstraction, treatment and distribution) and waste water services (collection and treatment).

A national approach for the calculation of cost recovery rates is used via a harmonised calculation method, but so far the method has not been applied by all municipalities. Cost recovery figures have been gathered nationally (from the municipal authorities) and are presented at national level as total costs and also as costs after geographical adjustment and after economic adjustments, separately for public water supply and waste water services. No sectoral disaggregation details were provided for costs and cost recovery.

The RBMP states that the WFD principle of cost recovery and the "Polluter Pays Principle" are incorporated into the Luxembourg Water Law.

Information on the incentive function of water pricing is rather limited. The incentive function is reflected in the water pricing structure, which includes fixed and variable tariffs. Tarification for households is emphasizing on the variable part (80 %, €/m³) to encourage water saving. Industries on the other hand have a higher fixed part to compensate for a higher pollution.

Resource costs are not considered relevant, since all six groundwater bodies are in good quantitative status. Environmental costs are based on the cost of measures.

The economic analysis has been redone completely in order to better satisfy the requirements of the Common Implementation Strategy Guidance Document⁷⁷. In particular, the water pricing policy has been presented in more depth, a baseline scenario has been developed and the issue of environmental and resource cost recovery has also been addressed in depth.

14.2 Progress with Commission recommendations

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

⁷⁷ [https://circabc.europa.eu/sd/a/cffd57cc-8f19-4e39-a79e-20322bf607e1/Guidance%20No%201%20-%20Economics%20-%20WATECO%20\(WG%202.6\).pdf](https://circabc.europa.eu/sd/a/cffd57cc-8f19-4e39-a79e-20322bf607e1/Guidance%20No%201%20-%20Economics%20-%20WATECO%20(WG%202.6).pdf)

- Recommendation: *Luxembourg should provide the calculation of contribution of different water uses disaggregated into at least households, agriculture and industry to cost recovery of water services, in accordance with the requirements of Article 9. In case Luxembourg applies the flexibility provisions of Article 9(4), Luxembourg authorities should provide required justifications.*
- Recommendation: *The cost-recovery should address a broad range of water services, including impoundments, abstraction, storage, treatment and distribution of surface waters, and collection, treatment and discharge of waste water, also when they are 'self-services', for instance self-abstraction for agriculture. The cost recovery should be transparently presented for all relevant user sectors, and environment and resource costs shall be included in the costs recovered. Information should also be provided on the incentive function of water pricing for all water services, with the aim of ensuring an efficient use of water.*
- Recommendation: *Provide information on how the polluter pays principle has been taken into account in the RBMPs.*
- Recommendation: *Provide a more complete definition of water services and a proper recovery of cost disaggregated into the different uses to contribute to the objectives, especially when fully accounting for environmental and resource costs for services creating a pressure on water bodies.*

Assessment: The only water services that have been defined for Article 9 purposes are public drinking water supply (abstraction, treatment and distribution) and waste water services (collection and treatment). The definition of water services is identical to Article 2(38) of the WFD, i.e. water services mean all services which provide, for households, public institutions or any economic activity: (a) Abstraction, impoundment, storage, treatment and distribution of surface water or groundwater, and (b) waste-water and rainwater collection and treatment facilities which subsequently discharge into surface water.

There is no "broader" definition of water services, such as including self-abstraction by farmers. The relevant sectors causing the most significant pressures have been identified as households, industry, and agriculture.

Although significant pressures were also identified in the baseline scenario from freight navigation and hydroelectricity (mainly hydromorphological alterations) and other (airport as a source of point source pollution), these pressures are reported to affect

only a small number of water bodies. This seems to be the reason for not defining these other activities as water services.

Luxembourg did not apply the flexibility provisions of Article 9(4).

A national approach for the calculation of cost recovery rates is used via a harmonised calculation method which has been made available by the National Water Management Agency to municipalities, but so far the method has not been applied by all municipalities. The harmonised calculation method includes all costs for planning, construction, operation (staff and material) and maintenance of the entire water supply and waste water infrastructure, as well as depreciation and geographical and "economic adjustments".

The RBMP states that the WFD principle of cost recovery and the "Polluter Pays Principle" are incorporated into the Luxembourg Water Law. On this basis, it is explained that Luxembourg is working towards full cost recovery of public water supply and waste water services in the sectors: households, industry and agriculture.

Cost recovery figures have been gathered nationally (from the municipal authorities) and are presented at national level as total costs and also as costs after geographical adjustment and after economic adjustments, separately for public water supply and waste water services. Whilst the aim is 100 % cost recovery, the most recent data shows overall cost recovery of about 80 % for both public water supply and waste water services in 2012, which has been increasing steadily from about 50 % in 2008. These figures relate to costs after geographical and economic adjustments; but for the total costs the recoveries are lower: 73 % for public water supply and 61 % waste water services. Whilst public water supply and waste water volumes are shown for the years 2008-2012 for each of the three sectors households, industry and agriculture, no sectoral disaggregation details were provided for costs and cost recovery.

Information on the incentive function of water pricing is rather limited. Water charges are only partially based on volume of water used, that is, there is a fixed charge and a variable usage charge: for households the variable cost is high at 80 % in order to encourage water saving. For industry the fixed charge is comparatively high, at 70 %, and for agriculture the fixed charge is 60 %. Wastewater charges (in terms of volume) are linked to drinking water usage.

Furthermore, the charges for water services include national taxes imposed on water abstraction and waste water production to address environmental and resource costs.

Two water taxes are in place, set at national level: one is a water abstraction charge, based on volume and fixed by the national Water Law (10 cent per m³), and the other a waste water tax, which is set annually by a national Regulation (in 2013: 16 % m³ discharged into surface waters). These charges are paid by the water service sector (municipalities), and ultimately by their customers once 100 % cost recovery has been achieved, but also by industry where the waste water tax is based on pollutant load. The revenues go into a national water management fund, which contributes to water management projects, for example, contributions to initial investment costs for projects in the area of waste water treatment, rain water management, water protection and re-naturalisation. The funding of projects is governed by the Water Law. Resource costs are not considered relevant, since all six groundwater bodies are in good quantitative status.

Environmental costs are based on the cost of measures. These are presented in terms of (i) Hydromorphological and Urban Water Management Measures (separately for investment and operational costs), and (ii) Agricultural Measures.

Internalised environmental costs are presented separately for measures implemented/on-going and for measures proposed but not yet implemented in the second cycle (2015-21). Similarly, externalised costs are presented for the third cycle (2021-27) for measures requiring to be continued and potential additional measures required. It was not considered possible to relate these costs quantitatively to specific sectors (households, industry, or agriculture) because there is often overlap of different pressures.

The cost of the hydromorphological and urban water management measures is largely covered by municipalities who are responsible for the water services, and to a lesser extent by industry (both through water charges and the water tax) and includes funding of specific projects through the National Water Fund (fed by the water tax), although direct state funding may also be obtained for especially important projects.

Agricultural measures, especially those involving compensation schemes, are largely funded through the agricultural development fund, additional state funding, and other European Union funding schemes. Thus, the environmental costs are not carried by the agricultural sector, although there are some (legal) restrictions which involve internalised costs to the agricultural sector. Currently there are no environmental costs borne by freight navigation or the hydroelectricity sector, although in future there will

be a mandatory requirement for the latter, concerning continuity measures (fish ladders or channels) and minimal water flow.

Compared to the first cycle there are some specifications regarding water pricing policies and environmental and resource costs in the second RBMP, in general the status since the first cycle has changed little. Hence, there is partial progress towards the European Commission's recommendations.

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 cycle

Protected Areas of all types have been reported except those designated under the Nitrates, and Urban Wastewater Directive and those designated for economically significant aquatic species (Table 15.1). A whole territory approach was used to designation under the Urban Waste Water Treatment Directive and Nitrates Directive in both the first and second cycle, therefore, no Protected Areas needed to be reported. Shellfish water areas have not been reported as these are not relevant for Luxembourg. The Number of Drinking Water Protected Areas have decreased significantly from more than 160 in the first cycle to only six in the second plan⁷⁸.

It should be noted that, according to the RBMP, the register of protected areas has been reviewed and revised, and is in the process of being implemented.

Table 15.1 *Number of Protected Areas in both River Basin District of Luxembourg, for surface and groundwater*

Protected Area type	Number of Protected Areas associated with	
	Rivers	Groundwater
Abstraction of water intended for human consumption under Article 7	1	5
Recreational waters, including areas designated as bathing waters under Directive 76/160/EEC ⁷⁹	11	
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) ⁸⁰	15	2
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)	28	11
Nutrient-sensitive areas, including areas designated as vulnerable	Whole territory	Whole territory

⁷⁸ Luxembourg informed subsequently the Commission that this is incorrect and must be due to an error on report of the first RBMP.

⁷⁹ 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>

⁸⁰ 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>

Protected Area type	Number of Protected Areas associated with	
	Rivers	Groundwater
zones under Directive 91/676/EEC and areas designated as sensitive areas under Directive 91/271/EEC ⁸¹		
Areas designated for the protection of economically significant aquatic species ⁸²	Not relevant	Not relevant
Other	0	0

Source: Member States reporting to WISE

The status assessment of water bodies associated with the Protected Areas is illustrated in Figure 15.1.

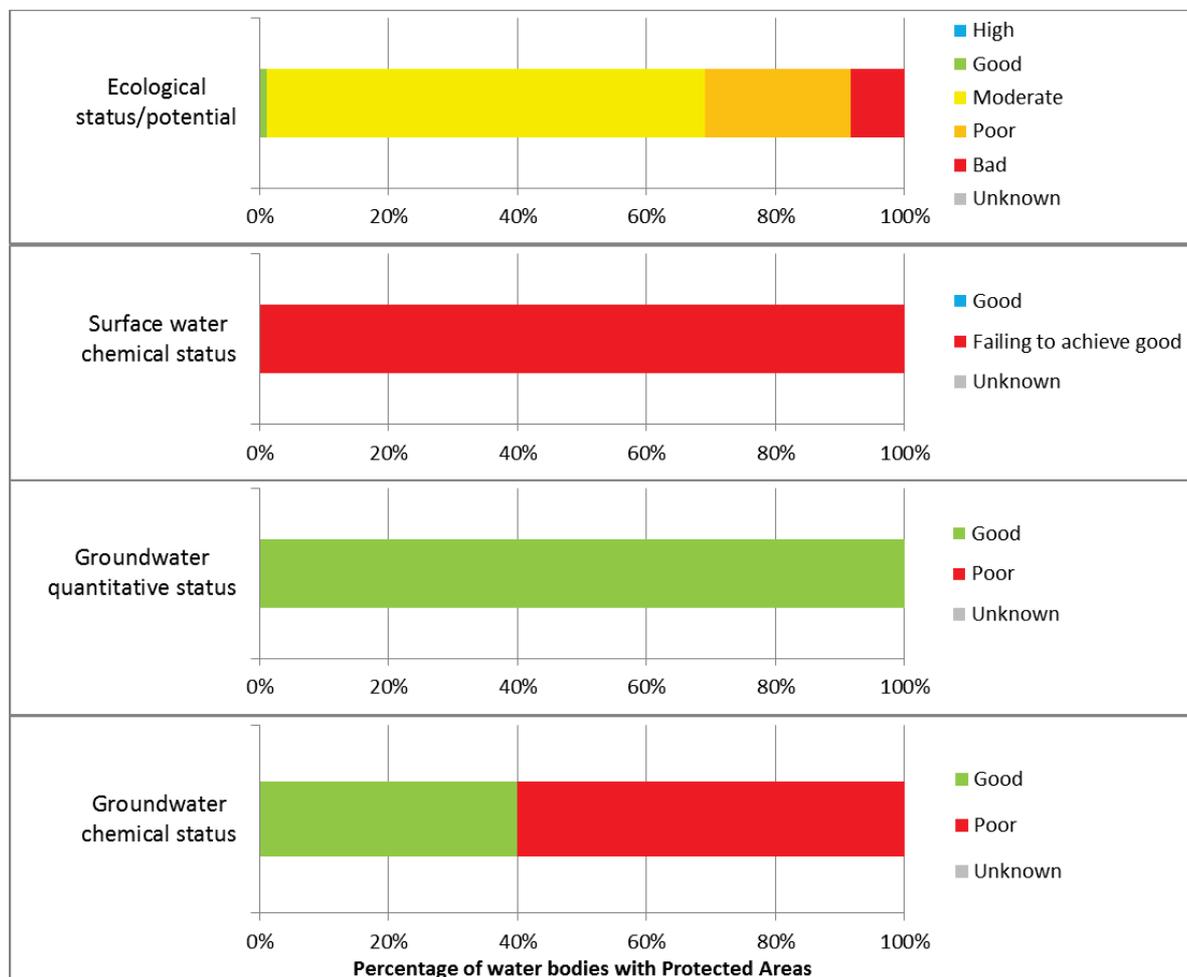
A small number of groundwater Drinking Water Protected Areas have specific objectives set. For the Birds and Habitats Directives, the achievement of good ecological status is thought to be sufficient to meet the requirements of these Directives and fulfil the favourable conservation status in most of the Protected Areas.

In Protected Areas where the achievement of good ecological status is sufficient, no additional measures are required.

⁸¹ 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>

⁸² Luxembourg clarified that shellfish areas have not been reported as these are not relevant for the country. As for fish areas, these have not been reported as the Grand-Ducal regulations ceased to be in force on 22 December 2013 and the WFD foresees equivalent objectives for these areas.

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



Source: WISE electronic reporting

Monitoring sites have only been reported for Protected Areas related to the Bathing Water and Nitrates Directives in the second cycle, while the first RBMP also included monitoring for Protected Areas linked to all relevant Directives⁸³. Exemptions have not been used in the second cycle in Luxembourg.

⁸³ Luxembourg subsequently clarified to the Commission that monitoring is still taking place in Birds, Habitats, and Urban Waste Water Treatment Protected Areas but is not reported, due to a lack of clarity in the reporting guidance document. Moreover, information regarding monitoring taking place in these protected areas can be found in the reporting carried out in the framework of the respective Directives.

All six groundwater bodies in Luxembourg are reported as being monitored as Nutrient Sensitive Areas under the Nitrates Directive, but no other monitoring of groundwater Protected Areas is reported⁸⁴.

Table 15.2 Number of monitoring sites associated with Protected Areas in Luxembourg

Protected Area type	Number of monitoring sites associated with Protected Areas in	
	Groundwater	Rivers
Abstraction of water intended for human consumption under Article 7	NR	NR
Recreational waters, including areas designated as bathing waters under Directive 76/160/EEC	0	11
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) and Directive 92/43/EEC (Habitats)	NR	NR
Nutrient-sensitive areas, including areas designated as vulnerable zones under Directive 91/676/EEC and areas designated as sensitive areas under Directive 91/271/EEC	31	16
Areas designated for the protection of economically significant aquatic species	Not relevant	Not relevant
Other	NR	NR

Source: WISE electronic reporting

NR – Not reported to WISE

15.2 Main changes in implementation and compliance since the first cycle

The main apparent change since the first RBMP was a significant decrease in the number of Drinking Water Protected Areas for groundwater, with 82 reported in the first cycle and only 5 in the second plan. For surface waters, 84 Drinking Water Protected Areas were reported in the first cycle, and only one in the second cycle⁸⁵. The monitoring program reported in the first cycle assessment covered Protected Areas related to all relevant Directives: Drinking Water

⁸⁴ Luxembourg subsequently clarified that information can be found in chapter 6.11 of the RBMP. Moreover, it was clarified that monitoring is still taking place in Birds, Habitats, and Urban Waste Water Treatment Protected Areas but is not reported, due to a lack of clarity in the reporting guidance document. Moreover, information regarding monitoring taking place in these protected areas can be found in the reporting carried out in the framework of the respective Directives

⁸⁵ Luxembourg subsequently informed the Commission that this is incorrect and must be due to an error on report of the first RBMP as only one protected area was in place at that time too.

(both from ground and surface water), Birds, Habitats, economically significant aquatic species, Bathing Waters, Nitrate and Urban Waste Water; whereas the reporting in the second cycle only included monitoring sites related to the Bathing Waters and Nitrates Directives⁸⁶.

15.3 Progress with Commission recommendations

There were no Commission recommendations based on the first RBMP and Programme of Measures.

⁸⁶ Luxembourg subsequently clarified to the Commission that monitoring is still taking place in Birds, Habitats, and Urban Waste Water Treatment Protected Areas but is not reported, due to a lack of clarity in the reporting guidance document. Moreover, information regarding monitoring taking place in these protected areas can be found in the reporting carried out in the framework of the respective Directives.

Topic 16 Adaptation to drought and climate change

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

16.1.1 Climate Change adaptation

Climate change was considered in both RBDs for checking the effectiveness of measures and flood risk management. Projected climate changes have been assessed and taken into account in the second RBMP and Programme of Measures. A climate check of the Programme of Measures has been made in the second cycle, while such a check was missing in the first cycle and the Common Implementation Strategy guidance on climate change⁸⁷ has been used.

No sub-plans addressing climate change in specific have been reported.

16.1.2 Effects and impacts of prolonged droughts, as well as related measures

According to the 2012 Topic Report on Assessment of Water Scarcity and Drought aspects in a selection of European Union RBMPs⁸⁸, droughts are not relevant for the country in local sub-RBDs. No exemptions have been applied for Luxembourg following Article 4(6) due to prolonged droughts.

Even though there is no legal obligation to prepare Drought Management Plans, many Member States have prepared them in order to cope with droughts. No Drought Management Plan has been developed in Luxembourg. This situation is similar to that reported in 2012⁸⁹.

The European Commission made no recommendation regarding drought management.

16.2 Main changes in implementation and compliance since the first cycle

A climate check of the Programme of Measures has been made in the second cycle, while such a check was missing in the first cycle. No National Climate Change Strategy had been developed by the time the RBMP was published.

No Drought Management Plan has been developed in Luxembourg but droughts are not considered relevant for this country.

⁸⁷ 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

⁸⁸ <http://ec.europa.eu/environment/water/quantity/pdf/Assessment%20WSD.pdf>

⁸⁹ <http://ec.europa.eu/environment/water/quantity/pdf/Assessment%20WSD.pdf>

16.3 Progress with Commission recommendations

There were no Commission recommendations based on the first RBMP and Programme of Measures.