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COMMISSION STAFF WORKING DOCUMENT

Member State : Bulgaria

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)

River Basin Management Plans

{COM(2012) 670 final}

1. GENERAL INFORMATION

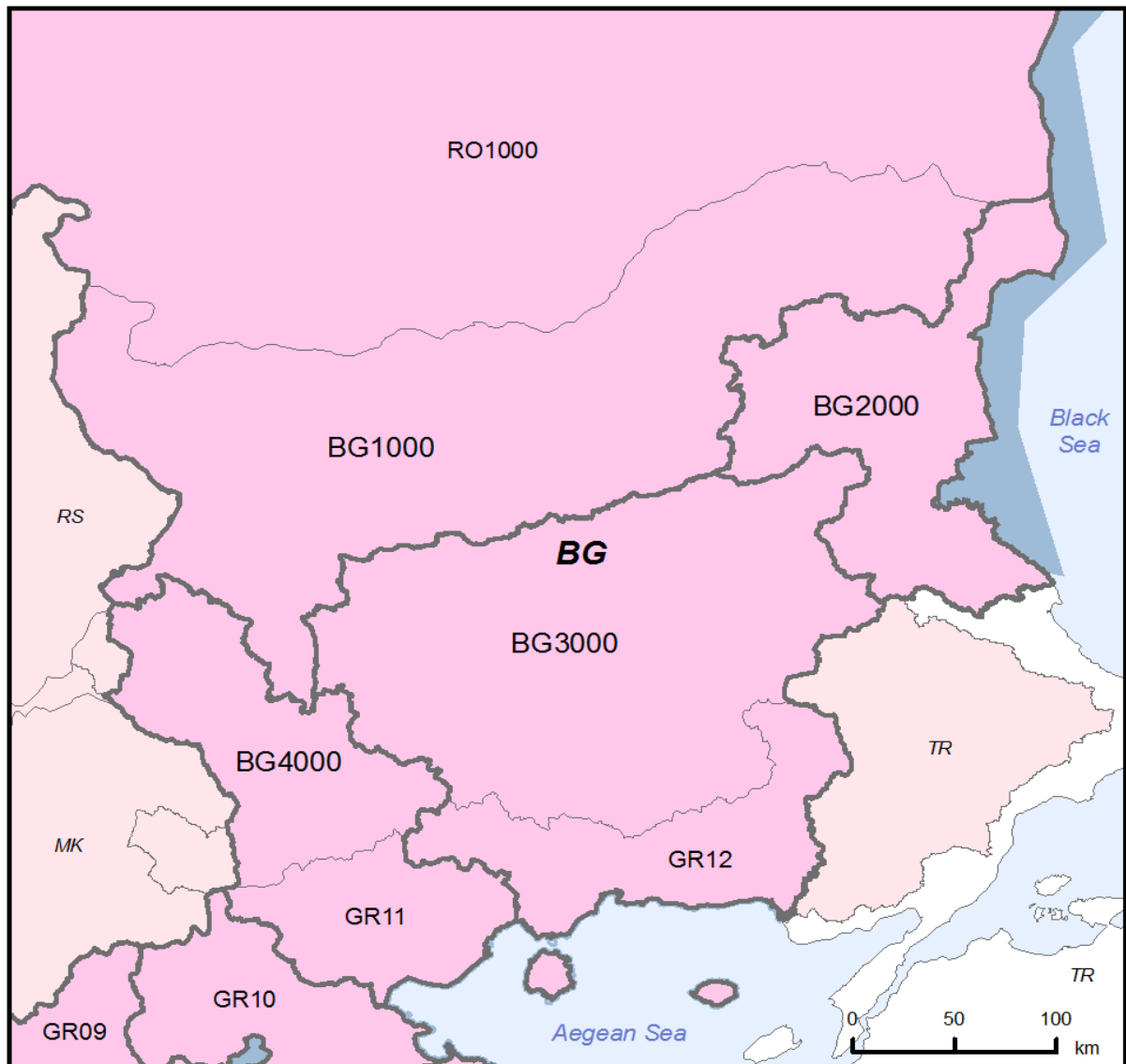


Figure 1.1: Map of River Basin Districts

	International River Basin Districts (within EU)
	International River Basin Districts (outside EU)
	National River Basin Districts (within EU)
	Countries (outside EU)
	Coastal Waters

Source: WISE

Bulgaria has a population of 7.6 million¹ and a total surface area greater than 111910 km². The north of Bulgaria is dominated by the vast lowlands of the Danube and the south by the highlands and elevated plains. In the east, it is bounded by the Black Sea.

Bulgaria has four river basin districts.

RBD	Name	Size (km ²)	Countries sharing borders
BG1000	Danube	47235	CS, RO
BG2000	Black Sea	19004 (terrestrial) / 6358 (marine)	RO, TR
BG3000	East Aegean	35230	EL, TR
BG4000	West Aegean	11965	CS, EL, MK

Table 1.1: Overview of Bulgaria's River Basin Districts

Source: River Basin Management Plans reported to WISE²: <http://cdr.eionet.europa.eu/bg/eu/wfdart13>

A number of catchments are shared with other Member States (Romania and Greece) and with third countries (Turkey, Serbia, FYR Macedonia) and there is a varying degree of co-operation with them.

Name international river basin	National RBD	Countries sharing borders	Co-ordination category					
			1		3		4	
			km ²	%	km ²	%	km ²	%
Danube	BG1000	RS, RO	47235	5.8				
Rezovska / Mutludere	BG2000	TR			184	24.9		
Veleka	BG2000	TR			792	80		
Mesta-Nestos	BG4000	EL			2785	49.6		
Struma-Strymonas	BG4000	EL, RS, MK					8545	47.2
Maritsa-Evros_Meric	BG3000	EL, TR			35230	66.0		

Table 1.2: Transboundary river basins by category (see CSWD section 8.1) and % share in Bulgaria³

Category 1: Co-operation agreement, co-operation body, RBMP in place.

Category 2: Co-operation agreement, co-operation body in place.

Category 3: Co-operation agreement in place.

Category 4: No co-operation formalised.

Source: EC Comparative study of pressures and measures in the major river basin management plans in the EU.

¹ European Commission - http://europa.eu/about-eu/countries/member-countries/bulgaria/index_en.htm

² This MS Annex reflects the information reported by the MS to WISE which may have been updated since the adoption of the RBMPs. For this reason there may be some discrepancies between the information reported in the RBMPs and WISE.

³ Categorisation determined under the EC Comparative study of pressures and measures in the major river basin management plans in the EU (Task 1b: International co-ordination mechanisms).

2. STATUS OF RIVER BASIN MANAGEMENT PLAN REPORTING AND COMPLIANCE

2.1 Adoption of the RBMPs

In Bulgaria, the river basin management plans were adopted by an order of the Minister of Environment and Water dated 22 March, 2010. The RBMPs were reported to the Commission on 30 March, 2010. Re-submission of several data corrections into the WISE system was made in 2011.

2.2 Key strengths and weaknesses

A common strength for Bulgaria's RBMPs is that the RBMPs are well structured and they present a good basis for further development in the next planning cycles. Significant efforts were made to secure the participation of the public in the process of development of the RBMP. The Plans as well as the PoMs make a clear statement on the objectives both at RBD and single water body level. The economic analysis of the water use is very detailed and well structured, in compliance with the WATECO guidelines. It has used the available information and at the same time indicates what is still to be done.

However, a range of weaknesses exist:

- There was limited co-ordination in the river basin management between the basin and state level, and between river basin districts. Therefore, common approaches and methodologies have only been partially used in the four RBDs.
- There is a significant gap in the intercalibration and the development of methodologies. There is no fully developed and formally adopted classification system for the assessment of the ecological status.
- Expert judgement is used extensively in the assessment of different aspects in the four RBMPs. In most of the cases this is explained by the lack of methodology or insufficient data collected. Moreover, often there are no criteria to support/justify the expert judgement and if they exist they are different for each of the RBDs, meaning that results are not comparable. At the same time measures to fill in these gaps are rarely provided in the programme of measures. Consequently, it is questionable whether the environmental objectives have been properly established and whether they form a sound basis for taking appropriate measures and if the measures proposed will allow the achievement of the WFD objectives.
- For some of the surface water bodies there is not enough monitoring data relating to biological and chemical elements. This is also a reason for a low confidence in the assessment of their status.
- The assessment of chemical status is not complete as there are no methodologies in place for the analyses of some of the priority substances.
- There international co-operation/co-ordination mechanisms established are not comprehensive.

- The identification of exemptions appears to be incomplete.
- A common approach to ensure adequate incentives for efficient water use, and an adequate contribution from different water users was not in place by 2010.
- The links between the Programmes of Measures, the impacts of human activities and the objectives are not clearly presented in the RBMPs.

It is clear though that Bulgaria is aware of the shortcomings and is extensively working on carrying out studies as regards both the harmonisation of the methodologies used and the collection of the data required as well as to raise the certainty of the assessments.

3. GOVERNANCE

3.1 RBMP timelines

All RBMPs were reported on 30 March 2010, according to the deadlines established in Article 14 of the WFD. No re-submissions were made. Some additional information was reported to WISE in November 2011.

The following table shows the dates of **consultations** on the work programme, the significant water management issues (SWMIs), and draft RBMP (from WISE section 1.3.2).

RBD	Timetable	Work programme	Statement on consultation	Significant water management issues	Draft RBMP	Final RBMP
Due dates	22/06/2006	22/06/2006	22/06/2006	22/12/2007	22/12/2008	22/12/2009
BG1000		22/12/2006		28/12/2007	22/12/2008	30/03/2010
BG2000		22/12/2006		22/06/2007	22/12/2008	30/03/2010
BG3000		01/11/2006		22/03/2008	22/12/2008	30/03/2010
BG4000		18/12/2006		20/12/2007	22/12/2008	30/03/2010

Table 3.1.1: Timeline of the different steps of the implementation process

Source: WISE

3.2 Administrative arrangements - river basin districts and competent authorities

The competencies of the competent authorities are divided at national level (responsibilities of Ministry of Environment and Water - MoEW, Water Directorate; Executive Environmental Agency under MoEW) and RBD level (responsibilities shared geographically among 4 RBD Directorates/competent water authorities under MoEW) in compliance with the requirements of Bulgarian Water Law.

The co-ordination between the competent authorities is the responsibility of the competent water authority.

The River Basin Directorates play a key role in the water management. They are in charge of the development and implementation of the RBMPs, as well as all permitting procedures and public involvement in water management.

Water monitoring is organised and implemented by the Executive Agency on Environment and Water.

The stakeholders' involvement in the water management process, at basin level, is organised through the River Basin Councils. The members of the Council are 20% state administration employees, 30% municipal administration, 30% water users and 20% representatives of non-profit organizations and academia. The establishment of the Councils follows the provisions of the Water Law and the Rules of Procedure which are enacted by an order of the Minister of Environment and Water.

3.3 RBMPs - structure, completeness, legal status

The four RBMPs in Bulgaria follow the general structure recommended by the WFD. The only structural difference is that two of the RBDs have developed a single, integrated RBMP; the other two RBDs have developed also plans on sub-basin level.

'Sub plans' were also established for different economic sectors. There are 'sub plans' produced for different sectors in the 4 RBDs.

There was only a limited national approach during the preparation of the RBMPs. A common approach and methodology has only been used in the following areas: a) part of the economic analysis of water use (demographic forecasts, water use forecasts, an analysis of the recovery of the costs etc.); b) definition of groundwater threshold values; c) determining the ecological status of surface water based on the classification system developed (but the results have been applied to varying degrees in the four RBDs); d) establishment of the chemical status of surface water bodies.

The Plans are complete as far as their structure is concerned; however, there are sometimes gaps and omissions within the structural units.

The RBMPs in Bulgaria are developed and adopted following the requirements of the national Water Law. The RBMPs are approved by the Minister of Environment and Water. According to the 2010 amendments in the Bulgarian Water Law, the second RBMPs are to be approved by the Council of Ministers of Bulgaria with a Governmental decision providing priority financing to the implementation of the measures. The commitment for funding of the PoMs is renewed on a yearly basis by the adoption of the Law on the National Budget.

As regards their legal status, the RBMPs are planning documents. The decision for adoption is a sub-legislative act, and therefore cannot contradict laws. It covers a specific river basin and as such should respect nation-wide planning documents such as the National Environmental Strategy and the National Strategy for management and development of the water sector (both adopted by the National Assembly).

RBMPs should be 'connected' to other plans within the scope of the relevant territorial division, including regional development plans, spatial development, forest management, park management and other such plans. Any plan which does not conform to the Water Act and to the RBMPs could be modified in the future by the Council of Ministers on the basis of

a proposal from the Minister of Environment and Water. While the term ‘connect’ involves a form of mutual obligation (RBMP should conform to other plans and these should conform to RBMP), the second provision clearly gives precedence to RBMPs as it provides for the possibility to amend other plans which are not in conformity with the RBMPs.

As regards the legal effect, there is a general obligation to take into account (for water body use) and conform (for permits) with the RBMP. The administration, when taking relevant decisions related to water issues, should conform to the RBMPs. There is no specific provision on the binding effect on third parties. However, when permits (for water abstraction and water body use) are issued, these need to take into account the RBMPs. Consequently, there is an indirect binding effect for permit users (incl. industry, agricultural users, etc.). No explicit provision is in place requiring the review of existing permits in line with environmental objectives, nor there is a timing specified.⁴

Strategic Environmental Assessment (SEA) is integrated in the RBMPs. SEA has influenced the selection of certain measures. The SEA was, however, applied on the draft RBMP which has changed quite significantly thereafter.

3.4 Consultation of the public, engagement of interested parties

Significant efforts were made to secure the participation of the public in the process of development of the RBMP. There was a national approach to the co-ordination of public information on draft RBMP. The approach was also proactive at RBD and local level.

In all RBDs, the draft RBMPs were available via web sites, public meetings were held and interested parties also had the opportunity to submit written comments for 6 months.

The stakeholders and the general public have been approached through the media, internet communications, direct contact with selected groups and organisations, meetings in RBD Directorates’ offices or a number of municipalities within the RBDs.

There were regular meetings held with stakeholders. Sectors involved in all RBDs included: water supply, sanitation, energy, fisheries, NGOs, local/regional authorities. Sectors involved in some RBDs included: agriculture and industry (Danube, Black Sea and East Aegean RBDs), navigation/ports and tourism (Black Sea RBD). Stakeholders that were partially involved included consumers who were involved in the process of public participation through a telephone survey and a poll of random users.

The contacts with the stakeholders groups and the general public resulted in a number of proposals, given as annexes to the RBMPs. The results of the consultation process are clearly indicated as contributing to the development of both the RBMP and PoM.

The changes due to consultation can be seen in the selection and adjustment of measures. Additional information and further research needs are also included.

There was no international co-ordination of public participation.

⁴ Categorisation determined under the EC Comparative study of pressures and measures in the major river basin management plans in the EU (Task 1)

The River Basin Councils have also had a role to play in the process of contributing and approving each step of the RBMP development, especially after the formulation and reporting of the plans, providing a mechanism to maintain the contacts between the different stakeholders.

3.5 International co-operation and co-ordination

All four RBDs in Bulgaria are part of international RBDs, although the Black Sea RBD was initially not designated as international despite the river basins being shared with Turkey. The Bulgarian authorities have confirmed they will change this designation.

Bulgaria is a member of the International Commission for the Protection of Danube River (ICPDR). However there is very limited information on this international co-operation in the RBMP of the Danube RBD. Some bilateral activities are also on-going for the management of the shared groundwater bodies with Romania.

The Black Sea RBMP does not make any reference to the Strategic Action Plan for the Rehabilitation and Protection of the Black Sea and the Convention on the Protection of the Black Sea Against Pollution and its Protocols.

There is no co-ordination mechanism and formal international agreement in place aiming at development of an international RBMP in the East Aegean and West Aegean RBDs. Links to the planning and other activities in Turkey and Greece in the East Aegean, and with Greece in the West Aegean RBDs, are limited to some data and information exchange based mainly on the Helsinki Convention provisions.

There were no steps taken to co-ordinate with Greece when preparing the RBMPs. The first contact was made after the RBMP reporting in 2010, but no particular action towards joint river basin management planning has been envisaged to date.

Bulgaria has undertaken bilateral meetings in respect of co-ordination with Macedonia and Turkey.

3.6 Integration with other sectors

The Ministry of the Environment and Water is supported by the National Consultative Water Board, where the Ministry of Regional Development and Public Works, Ministry of Economy, Energy and Tourism, Ministry of Agriculture and Food, Ministry of Transport and Communications, Ministry of Health, Ministry of Interior and the Bulgarian Academy of Sciences are represented. The functions and responsibilities of all these Ministries, together with the responsibilities of the Municipal Councils and Mayors are described in the Water Law.

The RBMPs comprise a register of all other relevant plans and programmes (municipal plans and programmes, regional strategies, national and sectoral documents and plans and programmes for protected areas). There is no detailed information on the links between the RBMP and the other plans, programmes and strategies listed, nevertheless a clear statement is made that their objectives have been taken into consideration in the development of the RBMPs. Special reference is made to spatial and land use planning, and the plans for management of forest and protected areas.

4. CHARACTERISATION OF RIVER BASIN DISTRICTS

4.1 Water categories in the RBD

Three of Bulgaria's RBMPs (Danube, East Aegean, West Aegean) are landlocked, therefore include only two water categories (rivers and lakes) while the fourth RBMP (Black Sea) includes all four water categories (rivers, lakes, transitional and coastal waters).

Work is on-going on the validation of biological and chemical information for identifying the typologies of transitional waters. Generally, the transitional waters are coastal lakes or estuaries with very high variability of salinity throughout the year.

The coastal waters are delineated in the one-mile coastal zone.

4.2 Typology of surface waters

RBD	Rivers	Lakes	Transitional	Coastal
BG1000	22	6	0	0
BG2000	9	3	5	6
BG3000	10	5	0	0
BG4000	17	4	0	0

Table 4.2.1: Surface water body types at RBD level

Source: WISE

Different approaches have been taken regarding the characterisation of the surface water bodies in the different RBDs. There is no national approach adopted.

The typology for surface waters has been developed for rivers, lakes and coastal waters and for transitional waters.

By the time of development of the RBMP, there was no approved national methodology for the analysis and assessment of the biological quality elements (BQEs) in place in Bulgaria. As a result, the compulsory three-year monitoring with a view to defining reference conditions was not implemented. Therefore, in the first RBMP the reference conditions have been specified as potential reference conditions. Currently monitoring of BQEs is carried out in accordance with the methodology based on these potential reference conditions.

The RBMP for the Danube RBD uses a typology based on the non-revised System “B” that is the basis of the latest typology developed at national level. This typology has been reported in 2007 and it is planned to be validated over the period 2010-2015 on the basis of monitoring data.

A revised version of System “B” has been used in the Black Sea and the East Aegean RBDs, partly validated by biological data. The process is still on-going and will be completed during the period of the first RBMP. The biological elements used are fish, macrozoobenthos,

macrophytes and phytobenthos for rivers; phytoplankton, macrophytes, macrozoobenthos and fish fauna for lakes.

For the transitional waters in the Black Sea RBD, reference conditions and a classification system have been developed for some quality elements but not for others (e.g. macrozoobenthos in river estuaries). They are not yet validated. In respect of coastal waters the process of specifying and validating the classification system is on-going but has not yet been completed. Biological elements used are phytoplankton, macrozoobenthos, macrophytes and angiosperms.

The typology adopted in the West Aegean RBD is based on the non-revised System “B” and it was practically invalidated by biological data. Since the end of 2001 the revised system has been introduced and the process of validation has been initiated.

The reference conditions for the revised typology system “B” are defined based on direct validation with biological and hydro-morphological data. An inventory of all types has been developed in part of the basin directorates, not including the transitional waters. Whenever problematic waters are dealt with, the benchmark conditions method is applied.

4.3 Delineation of surface water and groundwater bodies

RBD	Surface Water								Groundwater	
	Rivers		Lakes		Transitional		Coastal			
	Number	Average Length (km)	Number	Average Area (sq km)	Number	Average Area (sq km)	Number	Average Area (sq km)	Number	Average Area (sq km)
BG1000	153	44	13	2	0		0		50	1471
BG2000	122	49	3	1	15	7	13	110	40	712
BG3000	291	36	17	2	0		0		48	816
BG4000	122	19	10	1	0		0		39	380
Total	688	37	43	2	15	7	13	110	177	882

Table 4.3.1: Surface water bodies, groundwater bodies and their dimensions
Source: WISE

Overall, Bulgaria has designated 759 surface water bodies. Of these, 688 are river water bodies.

There is a different approach in considering small water bodies in the 4 RBDs.

No small water bodies have been identified in the Danube RBD. Water bodies of size below the threshold of 10 km² of catchment area (for rivers) and 0.5 km² size for lakes have been included as part of contiguous water bodies of the same category and type.

The RBMP for the Black Sea RBD does not contain the concept for small water bodies.

With a view to protecting surface waters used for the abstraction of drinking water, in the East Aegean RBD the water bodies of category ‘rivers’ with catchment area of less than 10 km² have been identified as ‘drinking water bodies’ if they are used for the abstraction for drinking water. In order to protect water bodies of the category ‘lake’, small mountain lakes of importance for the respective river basin district were identified and grouped into a larger water body.

In the West Aegean RBD, small mountain lakes of importance for the river basin district have been identified and grouped into a larger water body. For surface water bodies of the category 'river' in the West Aegean RBD no small water bodies with catchment area of less than 10 km² have been identified.

4.4 Identification of significant pressures and impacts

There are substantial differences in the approach to determine significant pressures and impacts in the four basin districts, but mostly expert judgement is used.

In the Danube RBD a system of criteria is based on the magnitude of the pollution load (mainly urban and industrial wastewater), type and effectiveness of the water treatment and the availability of permits. The most important sources of pollution are untreated urban waste water, industrial waste waters discharged into lagoons and agricultural activities. For water abstraction a threshold of 150 000 m³ is used (drinking water abstractions not included).

In the Black Sea RBD point sources are assessed as significant when they fail to meet the emission standards. It is reported that there is no methodology for the assessment of the diffuse sources and it has been based on expert judgement. Water abstraction is assessed by the ratio of the abstracted volumes compared to the water flow or water volume of the reservoir; no numeric criteria were reported. There was no data reported on hydromorphological criteria. Specific other pressures considered were bottom trawling and invasive species.

In the East Aegean RBD, point and diffuse sources are assessed as significant when they have influence on the water status and change it. There is a general definition for significance of the point and diffuse sources, the types are similar to those in the previous two RBDs. There are numeric criteria for the assessment of the significance of water abstraction, the used threshold is 150 000 m³. The regulation activities and hydromorphological alterations are described in detail, but no numeric criteria are presented. Specifically the transfer of water among river basins is defined as criterion for significant pressure. Other pressures mentioned are old mines and erosion.

In the West Aegean RBD, a general approach for assessment of the pressures is given; the definition of the significant ones has been made by expert judgement. The water abstraction is assessed as a percentage of the water flow/volume, but no numeric criteria are reported. Hydromorphology is described in detail, but there is no information on how exactly it is used in the definition of significant pressures. A specific other pressure in this RBD is soil erosion.

Navigation and related activities, such as port development, dredging, etc., were not considered in the plan as a water use or pressure. Dredging was assessed as a potential significant pressure for the coastal waters in the Black Sea RBD.

Diffuse sources are a significant pressure for 42% of surface water bodies, and point sources for 35%. Water abstraction is a significant pressure for one fifth of surface water bodies. Almost a fourth of all surface water bodies are not subject to significant pressures. Significant differences are seen across the RBDs: Diffuse source pollution shows the highest percentage in the Black Sea RBD while water abstractions affect a high percentage of surface water bodies in the West Aegean RBD. In the Danube RBD all the pressure categories are significant for a relatively high proportion of water bodies.

RBD	No pressures		Point source		Diffuse source		Water abstraction		Water flow regulations and morphological alterations		River management		Transitional and coastal water management		Other morphological alterations		Other pressures	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
BG1000	18	10.84	75	45.18	87	52.41	58	34.94	72	43.37	40	24.1	0	0	20	12.05	19	11.45
BG2000	37	24.18	48	31.37	109	71.24	2	1.31	0	0	0	0	0	0	0	0	3	1.96
BG3000	114	37.01	108	35.06	82	26.62	9	2.92	14	4.55	23	7.47	0	0	0	0	38	12.34
BG4000	12	9.09	31	23.48	40	30.03	86	65.15	1	0.76	9	6.82	0	0	0	0	1	0.76
<i>Total</i>	<i>181</i>	<i>23.85</i>	<i>262</i>	<i>34.52</i>	<i>318</i>	<i>41.9</i>	<i>155</i>	<i>20.42</i>	<i>87</i>	<i>11.46</i>	<i>72</i>	<i>9.49</i>	<i>0</i>	<i>0</i>	<i>20</i>	<i>2.64</i>	<i>61</i>	<i>8.04</i>

Table 4.4.1: Number and percentage of surface water bodies affected by significant pressures

Source: WISE

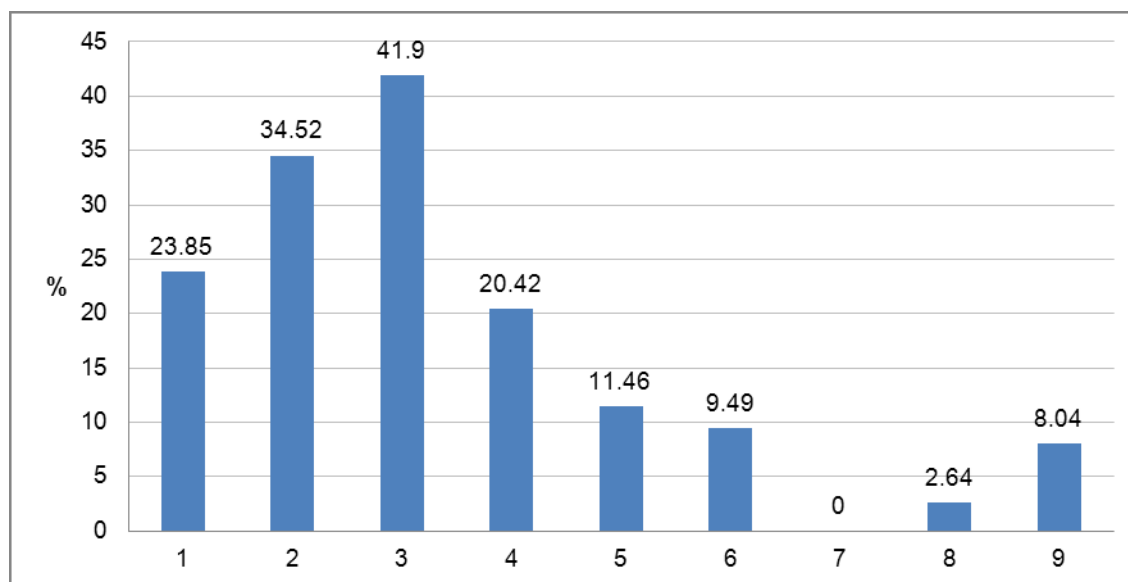


Figure 4.4.1: Graph of percentage of surface water bodies affected by significant pressures

1 = No pressures

2 = Point source

3 = Diffuse source

4 = Water abstraction

5 = Water flow regulations and morphological alterations

6 = River management

7 = Transitional and coastal water management

8 = Other morphological alterations

9 = Other pressures

Source: WISE

The RBMPs identify a list of economic sectors that contribute significantly to chemical pollution; this includes industrial emissions (direct and indirect discharges), households (including waste water treatment plants), atmospheric deposition and the transport network.

4.5 Protected areas

In Bulgaria, nearly 1000 protected areas have been designated, according to information provided to WISE.

331 of these areas are for drinking water abstraction under Article 7 of the WFD.

RBD	Number of PAs										
	Article 7 Abstraction for drinking water	Bathing	Birds	European Other	Fish	Habitats	Local	National	Nitrates	Shellfish	UWWT
BG1000	115	1	47	-	-	110	-	-	1	-	14
BG2000	40	89	25	-	106	48	-	57	2	8	4
BG3000	107	3	21	-	-	48	-	45	1	-	3
BG4000	69	-	18	-	-	25	-	1	-	-	1
<i>Total</i>	<i>331</i>	<i>93</i>	<i>111</i>	<i>-</i>	<i>106</i>	<i>231</i>	<i>-</i>	<i>103</i>	<i>4</i>	<i>8</i>	<i>22</i>

Table 4.5.1: Number of protected areas of all types in each RBD and for the whole country, for surface and groundwater⁵

Source: WISE

⁵ This information corresponds to the reporting of protected areas under the WFD. More/other information may have been reported under the obligations of other Directives.

5. MONITORING

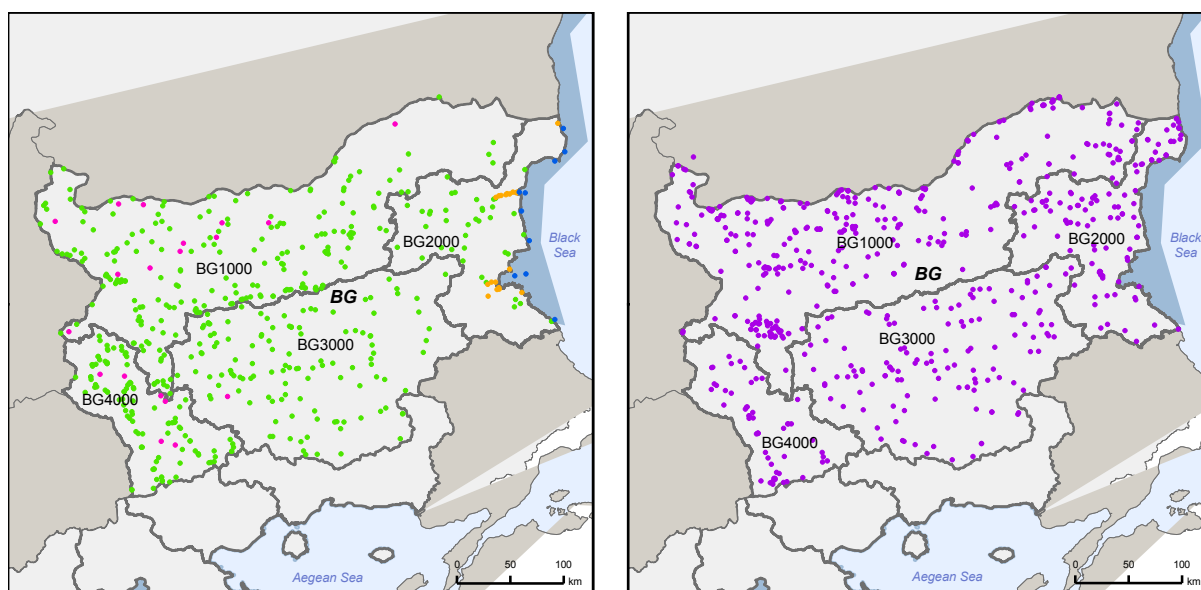


Figure 5.1: Maps of surface water (left) and groundwater (right) monitoring stations

- River monitoring stations
- Lake monitoring stations
- Transitional water monitoring stations
- Coastal water monitoring stations
- Unclassified surface water monitoring stations
- Groundwater monitoring stations



- River Basin Districts
- Countries outside EU

Source: WISE, Eurostat (country borders)

The following table indicates the quality elements monitored, as reported to WISE.

RBD	Rivers										Lakes											
	QE1.1 Phytoplankton	QE1.2 Other aquatic flora	QE1.2.3 Macrophytes	QE1.2.4 Phytobenthos	QE1.3 Benthic invertebrates	QE1.4 Fish	QE1.5 Other species	QE2 Hydromorphological	QE3.1 General Parameters	QE3.3 on priority specific pollutants	QE3.4 Other national pollutants	QE1.1 Phytoplankton	QE1.2 Other aquatic flora	QE1.2.3 Macrophytes	QE1.2.4 Phytobenthos	QE1.3 Benthic invertebrates	QE1.4 Fish	QE1.5 Other species	QE2 Hydromorphological	QE3.1 General Parameters	QE3.3 Non priority specific pollutants	QE3.4 Other national pollutants
BG1000																						
BG2000																						
BG3000																						
BG4000																						

RBD	Transitional										Coastal											
	QE1.1 Phytoplankton	QE1.2 Other aquatic flora	QE1.2.1 Microalgae	QE1.2.2 Angiosperms	QE1.3 Benthic invertebrates	QE1.4 Fish	QE1.5 Other species	QE2 Hydromorphological QEs	QE3.1 General Parameters	QE3.3 Non priority specific pollutants	QE3.4 Other national pollutants	QE1.1 Phytoplankton	QE1.2 Other aquatic flora	QE1.2.1 Microalgae	QE1.2.2 Angiosperms	QE1.3 Benthic invertebrates	QE1.4 Fish	QE1.5 Other species	QE2 Hydromorphological QEs	QE3.1 General Parameters	QE3.3 Non priority specific pollutants	QE3.4 Other national pollutants
BG1000																						
BG2000																						
BG3000																						
BG4000																						

Table 5.1: Quality elements monitored

	QE Monitored
	QE Not monitored
	Not Relevant

Source: WISE

Bulgaria has reported the number of monitoring sites for its RBDs. In total, 527 sites were reported for surface waters, and 605 sites for groundwater.

A higher number of river and groundwater monitoring sites are reported compared to those provided for the European Commission's 2009 report on monitoring in the EU. The number of lake and coastal water monitoring sites reported has decreased.

RBD	Rivers		Lakes		Transitional		Coastal		Groundwater		
	Surv	Op	Surv	Op	Surv	Op	Surv	Op	Surv	Op	Quant
BG1000	97	59	40	0	0	0	0	0	98	22	236
BG2000	10	18	9	14	0	0	7	3	57	36	54
BG3000	12	74	8	4	0	0	0	0	53	63	41
BG4000	27	67	5	4	0	0	0	0	33	0	35
<i>Total by type of site</i>	<i>146</i>	<i>218</i>	<i>62</i>	<i>22</i>	<i>0</i>	<i>0</i>	<i>7</i>	<i>3</i>	<i>241</i>	<i>121</i>	<i>366</i>
<i>Total number of monitoring sites⁶</i>	<i>428</i>		<i>89</i>		<i>-</i>		<i>10</i>		<i>605</i>		

Table 5.2: Number of monitoring sites by water category.
Surv = Surveillance, Op = Operational, Quant = Quantitative
Source: WISE and BG

The selection of monitoring parameters has been based on the different types of pressures and the possible impacts.

The development of the monitoring continued after the finalization of the RBMPs. In 2011 the development of the monitoring system for hydromorphology began. The following new BQEs were introduced as a first step of the monitoring system improvement: phytoplankton in lakes, macrophytes in rivers and lakes, macrozoobenthos in lakes, phytobenthos in rivers, and fish fauna in rivers and lakes. The monitoring of the coastal waters has been assigned to the Institute of Oceanology under the Bulgarian Academy of Sciences.

5.1 Monitoring of surface waters

Many quality elements are not being monitored. Prior to the preparation of the RBMP, the only data available for rivers was macrozoobenthos and only the biological indicator Chlorophyll-A has been monitored in lakes. For the remaining BQEs, single data and assessments from 2009 have been used.

The development of the monitoring of the biological quality elements is still in progress. Currently phytoplankton is monitored in the Danube RBD and in lakes, whilst fish fauna is monitored in rivers and lakes through an on-going contract with a scientific organisation. Regular sampling has been carried out so far only for Chlorophyll-A, macrophytes and macrozoobenthos in lakes, and phytobenthos in rivers. A decision has been made to exclude some of the quality elements in the littoral zone (macrozoobenthos and macrophytes) in reservoirs with highly variable surface level, and also the fish fauna in the reservoirs, where

⁶ The total number of monitoring sites may differ from the sum of monitoring sites by type because some sites are used for more than one purpose.

practically all water bodies of this kind are being used for fish breeding, aquaculture development and sport fishing. The detailed justification is currently under development and is not yet included in the RBMPs. All physicochemical QEs are being monitored. Regarding hydromorphological quality elements, the information is not complete on river continuity, except for the rivers Struma, Maritsa and the rivers in the Black Sea RBD. The development of the national system for monitoring of the hydromorphological elements was initiated in 2011. Eighty four monitoring stations have been selected.

An operational monitoring programme has been established. Expert judgement is widely used to select the relevant BQEs.

Not all priority and other river basin specific pollutants are monitored because of a lack of availability of methodologies for analysis and assessment. Work in this field is currently ongoing.

All 4 RBDs in the country should be considered as international ones, but this is not reflected in the RBMPs. As far as the monitoring is concerned, there is a good co-operation for the Danube co-ordinated by the ICPDR and the monitoring in this RBD was designed to serve both national and international information and assessment needs; some reporting also takes place in the Black Sea RBD to the Commission on the Protection of the Black Sea against Pollution. No specific action towards the establishment of international river basins has been taken so far in the river basins shared with Greece and with Turkey.

5.2 Monitoring of groundwater

A quantitative groundwater monitoring programme has been established based on metering water levels or water flow where appropriate.

A surveillance monitoring programme and an operational monitoring programme have been established for groundwater in all 4 RBDs. The parameters in the operational monitoring programme have been chosen based on an expert judgement and taking into consideration the existing pressures. The groundwater monitoring is reported to be sufficient and used to detect significant and sustained upward trends.

International monitoring activities related to groundwater take place in the Danube RBD within the international Danube river basin and bilaterally with Romania in the North-East part of the region. There is no international co-ordination in respect of transboundary groundwater bodies and monitoring programmes with Greece, Turkey and Macedonia.

5.3 Monitoring of protected areas

There is a specific programme for monitoring of the drinking water protected areas, both for surface and groundwater.

Bulgaria's submissions to WISE provide information on the number of monitoring sites associated with protected areas; the number of the monitoring stations by RBD is presented below.

For most of the categories the new data shows an increased number of monitoring stations since the last reporting in 2007.

RBD	Surface waters									Ground-water drinking water
	Surface drinking water abstraction	Quality of drinking water	Bathing water	Birds sites	Fish	Habitats sites	Nitrates	Shellfish	UWWT	
BG1000	81	91*	0	43	1	83	112	0	218	73
BG2000	3	0	0	36	26	17	38	3	67	23
BG3000	19	0	3	42	0	110	76	0	119	134*
BG4000	17	2*	0	22	0	45	25	0	23	19
<i>Total</i>	<i>120</i>	<i>93</i>	<i>3</i>	<i>143</i>	<i>27</i>	<i>255</i>	<i>251</i>	<i>3</i>	<i>427</i>	<i>249</i>

Table 5.3.1: Number of monitoring stations in protected areas⁷.

Note: *Number of monitoring sites reported at programme level.

Source: WISE and BG

6. OVERVIEW OF STATUS (ECOLOGICAL, CHEMICAL, GROUNDWATER)

Almost 40% of all surface water bodies in Bulgaria have been assessed as being at good ecological status and nearly 5% are at high status. One fourth of the surface water bodies are in poor or bad status. There are differences across RBDs, the highest proportion of poor and bad status WBs can be found in the Eastern Aegean RBD.

RBD	Total	High		Good		Moderate		Poor		Bad		Unknown	
		No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
BG1000	111	2	1.8	57	51.4	35	31.5	10	9.0	7	6.3	0	0
BG2000	108	11	10.2	48	44.4	36	33.3	12	11.1	1	0.9	0	0
BG3000	205	15	7.3	65	31.7	69	33.7	32	15.6	24	11.7	0	0
BG4000	108	5	4.6	48	44.4	37	34.3	11	10.2	7	6.5	0	0
<i>Total</i>	<i>532</i>	<i>33</i>	<i>6.2</i>	<i>218</i>	<i>41.0</i>	<i>177</i>	<i>33.3</i>	<i>65</i>	<i>12.2</i>	<i>39</i>	<i>7.3</i>	<i>0</i>	<i>0</i>

Table 6.1: Ecological status of natural surface water bodies

Source: WISE

⁷ Number of sites calculated from data reported at site level. If no data reported at site level, then table supplemented with data reported at programme level.

RBD	Total	High		Good		Moderate		Poor		Bad		Unknown	
		No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
BG1000	55	0	0.0	25	45.5	18	32.7	9	16.4	2	3.6	1	1.8
BG2000	45	3	6.7	13	28.9	15	33.3	6	13.3	8	17.8	0	0
BG3000	103	0	0	26	25.2	25	24.3	28	27.2	24	23.3	0	0
BG4000	24	0	0	11	45.8	7	29.2	1	4.2	5	20.8	0	0
<i>Total</i>	<i>227</i>	<i>3</i>	<i>1.3</i>	<i>75</i>	<i>33.0</i>	<i>65</i>	<i>28.6</i>	<i>44</i>	<i>19.4</i>	<i>39</i>	<i>17.2</i>	<i>1</i>	<i>0.4</i>

Table 6.2: Ecological potential of artificial and heavily modified water bodies

Source: WISE

More than three-quarters of Bulgaria's surface water bodies are in good chemical status and only 2% are in poor chemical status according to the information reported to WISE.

However, it has to be noted that there are strong differences across the RBDs: three quarter of surface water bodies in the Black Sea RBD and one third of the surface water bodies in the Western Aegean RBD are in unknown status.

RBD	Total	Good		Poor		Unknown	
		No.	%	No.	%	No.	%
BG1000	111	109	98.2	2	1.8	0	0
BG2000	108	27	25.0	0	0	81	75.0
BG3000	205	196	95.6	8	3.9	1	0.5
BG4000	108	69	63.9	0	0	39	36.1
<i>Total</i>	<i>532</i>	<i>401</i>	<i>75.4</i>	<i>10</i>	<i>1.9</i>	<i>121</i>	<i>22.7</i>

Table 6.3: Chemical status of natural surface water bodies

Source: WISE

RBD	Total	Good		Poor		Unknown	
		No.	%	No.	%	No.	%
BG1000	55	52	94.5	2	3.6	1	1.8
BG2000	45	28	62.2	0	0	17	37.8
BG3000	103	92	89.3	11	10.7	0	0
BG4000	24	23	95.8	0	0	1	4.2
<i>Total</i>	<i>227</i>	<i>195</i>	<i>85.9</i>	<i>13</i>	<i>5.7</i>	<i>19</i>	<i>8.4</i>

Table 6.4: Chemical status of artificial and heavily modified water bodies

Source: WISE

Bulgaria has reported that more than two thirds of its groundwater bodies have good chemical status while 30% of them are in poor status. There are large differences across the RBDs, for example, all groundwater bodies in the Western Aegean RBD are in good status whereas 42% of the groundwater bodies in the Black Sea RBD are in poor status. All groundwater bodies have been assessed.

RBD	Total	Good		Poor		Unknown	
		No.	%	No.	%	No.	%
BG1000	50	32	64	18	36	0	0
BG2000	40	23	57.5	17	42.5	0	0
BG3000	48	29	60.4	19	39.6	0	0
BG4000	39	39	100	0	0	0	0
<i>Total</i>	<i>177</i>	<i>123</i>	<i>69.5</i>	<i>54</i>	<i>30.5</i>	<i>0</i>	<i>0</i>

Table 6.5: Chemical status of groundwater bodies

Source: WISE

Nearly all groundwater bodies are assessed at good quantitative status according to Bulgaria's reporting, there are only 7 groundwater bodies in poor status in the Danube RBD out of the total 170 in Bulgaria. All groundwater bodies have been assessed.

RBD	Total	Good		Poor		Unknown	
		No.	%	No.	%	No.	%
BG1000	50	43	86	7	14	0	0
BG2000	40	40	100	0	0	0	0
BG3000	48	48	100	0	0	0	0
BG4000	39	39	100	0	0	0	0
<i>Total</i>	<i>177</i>	<i>170</i>	<i>96</i>	<i>7</i>	<i>4</i>	<i>0</i>	<i>0</i>

Table 6.6: Quantitative status of groundwater bodies

Source: WISE

In total nearly one third of Bulgaria's surface water bodies were assessed as being of good status in 2009; according to the information reported to WISE and later corrected by the Bulgarian authorities the number of surface water bodies of good status is expected to increase by 34% in 2015 reaching good status for nearly two third of the surface water bodies. There are differences across the RBDs.

Two thirds of the groundwater bodies were assessed as being of good status in 2009. There is a slight improvement expected in the Black Sea RBD by 2015, but no improvement is expected in the Danube RBD (currently 64% of the groundwater bodies are in good status) and in the Eastern Aegean RBD (60% of groundwater bodies are in good status).

RBD	Total	Global status (ecological and chemical)					Good ecological status 2021		Good chemical status 2021		Good ecological status 2027		Good chemical status 2027		Global exemptions 2009 (% of all SWBs)			
		Good or better 2009		Good or better 2015		Increase 2009 - 2015									Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	No.	%	No.	%	%	%	%	%
BG1000	166	84	50.6	118	71.1	20.5	146	88	161	97	165	99.4	165	99.4	27	2	0	0
BG2000	153	21	13.7	125	81.7	68	140	91.5			153	100	153	100	18	0	0	0
BG3000	308	103	33.4	188	61	27.6	298	96.8	304	98.7	308	100	308	100	39	0	0	0
BG4000	132	36	27.3	71	53.8	26.5									17	5	0	3
Total	759	244	32.1	502	66.1	34									28	1	0	1

Table 6.7: Surface water bodies: overview of status in 2009 and expected status in 2015, 2021 and 2027⁸

Water bodies with good status in 2009 fall into the following category:

1. Ecological status is high or good and the chemical status is good, exemptions are not considered

Water bodies expected to achieve good status in 2015 fall into the following categories:

1. Ecological status is high or good and the chemical status is good, exemptions are not considered

2. Chemical status is good, and the ecological status is moderate or below but no ecological exemptions

3. Ecological status is high or good, and the chemical status is failing to achieve good but there are no chemical exemptions

4. Ecological status is moderate or below, and chemical status is failing to achieve good but there are no ecological nor chemical exemptions

Note: Water bodies with unknown/unclassified/Not applicable in either ecological or chemical status are not considered

Source: WISE and BG (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)

⁸ Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.

RBD	Total	Ecological status					Good ecological status 2021		Good ecological status 2027		Ecological exemptions (% of all SWBs)			
		Good or better 2009		Good or better 2015		Increase 2009 - 2015					Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	%	%	%	%
BG1000	111	59	53.2	87	78.4	25.2	103	92.8	111	100	18.9	2.7	0	0
BG2000	108	60	55.6	94	25.0	32.4	101	93.5	108	100	14.8	0	0	0
BG3000	205	80	39.0	149	96.1	33.7	198	96.6	205	100	27.3	0	0	0
BG4000	108	53	49.1	84	63.9	28.7					20.4	4.6	0	3.7
<i>Total</i>	<i>532</i>	<i>252</i>	<i>47.4</i>	<i>414</i>	<i>77.8</i>	<i>30.6</i>					<i>21.4</i>	<i>1.7</i>	<i>0</i>	<i>0.8</i>

Table 6.8: Natural surface water bodies: ecological status in 2009 and expected status in 2015, 2021 and 2027⁹

Source: WISE and BG (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)

RBD	Total	Chemical status					Good chemical status 2021		Good chemical status 2027		Chemical exemptions (% of all SWBs)			
		Good or better 2009		Good or better 2015		Increase 2009 - 2015					Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	%	%	%	%
BG1000	111	109	98.2	109	98.2	0	109	98.2	111	100	0.9	0	0	0
BG2000	108	27	25.0	27	25.0	0					0	0	0	0
BG3000	205	196	95.6	197	96.1	0.5	203	99	205	100	3.4	0	0	0
BG4000	108	69	63.9	69	63.9	0					0	0	0	0
<i>Total</i>	<i>532</i>	<i>401</i>	<i>75.4</i>	<i>402</i>	<i>75.6</i>	<i>0.2</i>					<i>1.5</i>	<i>0</i>	<i>0</i>	<i>0</i>

Table 6.9: Natural surface water bodies: chemical status in 2009 and expected status in 2015, 2021 and 2027¹⁰

Source: WISE and BG (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)

⁹ Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.

¹⁰ Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.

RBD	Total	GW chemical status					Good chemical status 2021		Good chemical status 2027		GW chemical exemptions (% of all GWBs)			
		Good or better 2009		Good or better 2015		Increase 2009 - 2015					Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	%	%	%	%
BG1000	50	32	64.0	32	64.0	0	32	64	50	100	22	14	0	0
BG2000	40	23	57.5	25	62.5	5.0	36	90	40	100	28	3	8	0
BG3000	48	29	60.4	29	60.4	0	29	60	48	100	40	0	0	0
BG4000	39	39	100	39	100	0	39	100	39	100	0	0	0	0
<i>Total</i>	<i>177</i>	<i>123</i>	<i>69.5</i>	<i>125</i>	<i>70.6</i>	<i>1.1</i>	<i>136</i>	<i>76.8</i>	<i>177</i>	<i>100</i>	<i>23</i>	<i>5</i>	<i>2</i>	<i>0</i>

Table 6.10: Groundwater bodies: chemical status in 2009 and expected status in 2015, 2021 and 2027¹¹

Source: WISE (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)

RBD	Total	Groundwater quantitative status					Good quantitative status 2021		Good quantitative status 2027		GW quantitative exemptions (% of all GWBs)			
		Good or better 2009		Good or better 2015		Increase 2009 - 2015					Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	%	%	%	%
BG1000	50	43	86.0	43	86.0	0	49	98	50	100	2	12	0	0
BG2000	40	40	100	40	100	0	40	100	40	100	0	0	0	0
BG3000	48	48	100	48	100	0	48	100	48	100	0	0	0	0
BG4000	39	39	100	39	100	0	39	100	39	100	0	0	0	0
<i>Total</i>	<i>177</i>	<i>170</i>	<i>96.0</i>	<i>170</i>	<i>96.0</i>	<i>0</i>	<i>176</i>	<i>99.4</i>	<i>177</i>	<i>100</i>	<i>1</i>	<i>3</i>	<i>0</i>	<i>0</i>

Table 6.11: Groundwater bodies: quantitative status in 2009 and expected status in 2015, 2021 and 2027¹²

Source: WISE (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)

¹¹ Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.

¹² Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.

RBD	Total HMWB and AWB	Ecological potential					Good ecological potential 2021		Good ecological potential 2027		Ecological exemptions (% of all HMWB/AWB)			
		Good or better 2009		Good or better 2015		Increase 2009 - 2015					Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	%	%	%	%
BG1000	55	25	45.5	31	56.4	10.9	44	80	54	98.2	41.8	0	0	0
BG2000	45	16	35.6	33	73.3	37.8	39	86.7	45	100	26.7	0	0	0
BG3000	103	26	25.2	43	41.7	16.5	100	97.1	103	100	61.2	0	0	0
BG4000	24	11	45.8	23	95.8	50.0					4.2	4.2	0	0
<i>Total</i>	<i>227</i>	<i>78</i>	<i>34.4</i>	<i>130</i>	<i>57.3</i>	<i>22.9</i>					<i>43.6</i>	<i>0.4</i>	<i>0</i>	<i>0</i>

Table 6.12: Heavily modified and artificial water bodies: ecological potential in 2009 and expected ecological potential in 2015, 2021 and 2027¹³

Source: WISE and BG (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)

RBD	Total HMWB and AWB	Chemical status					Good chemical status 2021		Good chemical status 2027		Chemical exemptions (% of all HMWB/AWB)			
		Good or better 2009		Good or better 2015		Increase 2009 - 2015					Art 4.4	Art 4.5	Art 4.6	Art 4.7
		No.	%	No.	%	%	No.	%	No.	%	%	%	%	%
BG1000	55	52	94.5	52	94.5	0			54	98.2	3.6	1.8	0	0
BG2000	45	28	62.2	28	62.2	0					0	0	0	0
BG3000	103	92	89.3	92	89.3	0	101	98.1	103	100	10.7	0	0	0
BG4000	24	23	95.8	23	95.8	0					0	0	0	0
<i>Total</i>	<i>227</i>	<i>195</i>	<i>85.9</i>	<i>195</i>	<i>85.9</i>	<i>0</i>					<i>5.7</i>	<i>0.4</i>	<i>0</i>	<i>0</i>

Table 6.13: Heavily modified and artificial water bodies: chemical status in 2009 and expected status in 2015, 2021 and 2027¹⁴

Source: WISE and BG (for data on status in 2009, 2015 and exemptions) and RBMPs (for data on status in 2021 and 2027)

¹³ Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.

¹⁴ Data for 2009 and 2015 extracted from WISE. Data for 2021 and 2027 established during the compliance assessment of the RBMPs.

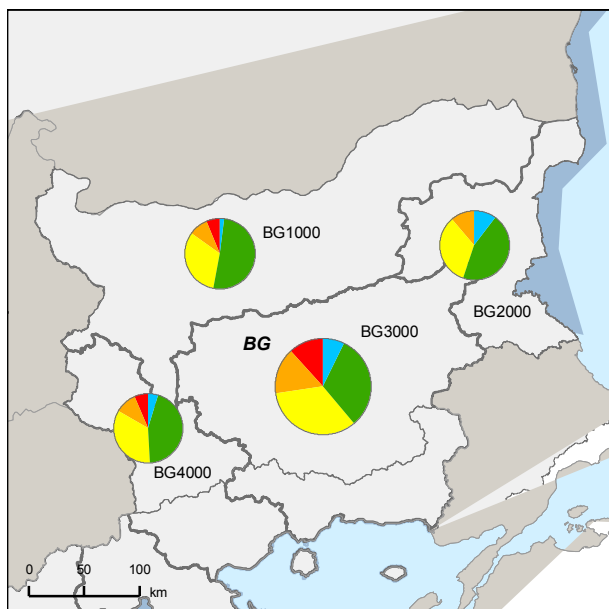


Figure 6.1: Map of ecological status of natural surface water bodies 2009

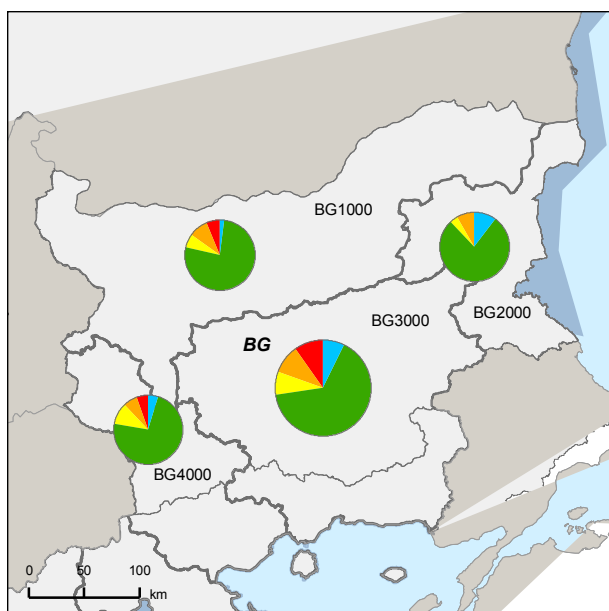
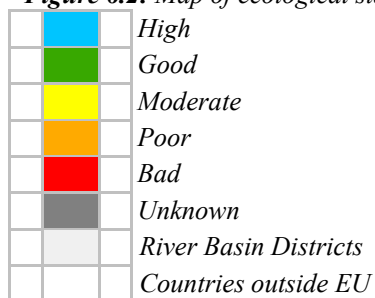


Figure 6.2: Map of ecological status of natural surface water bodies 2015



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

Source: WISE, Eurostat (country borders)

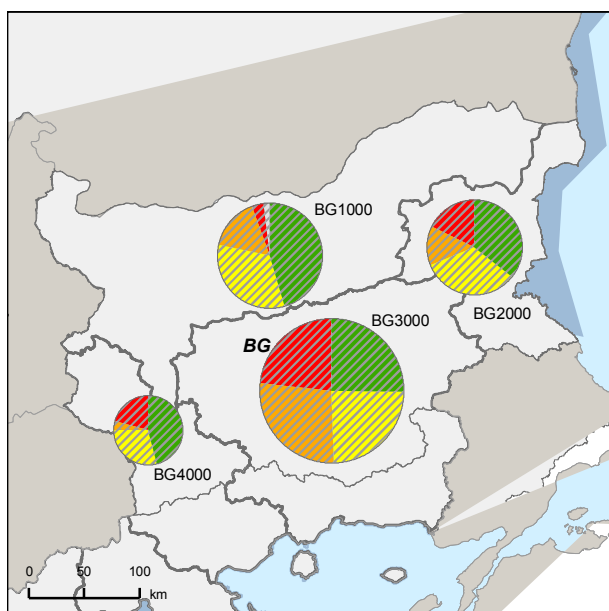


Figure 6.3: Map of ecological potential of artificial and heavily modified water bodies 2009

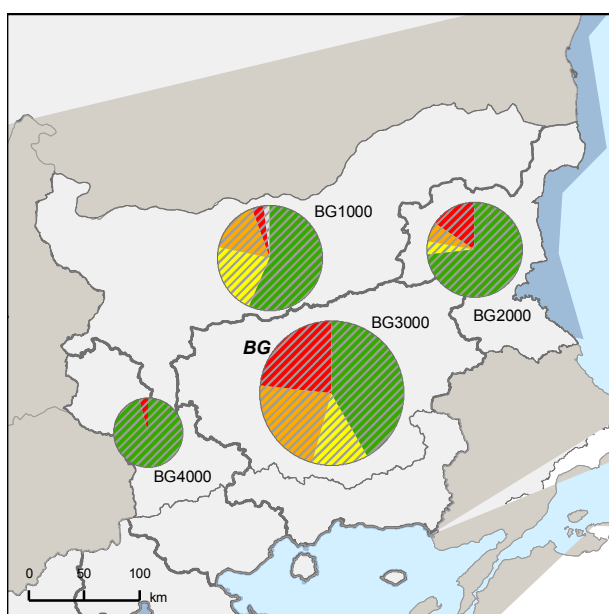
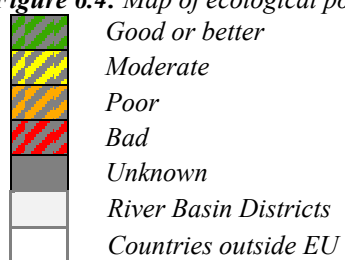


Figure 6.4: Map of ecological potential of artificial and heavily modified water bodies 2015



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

Source: WISE, Eurostat (country borders)

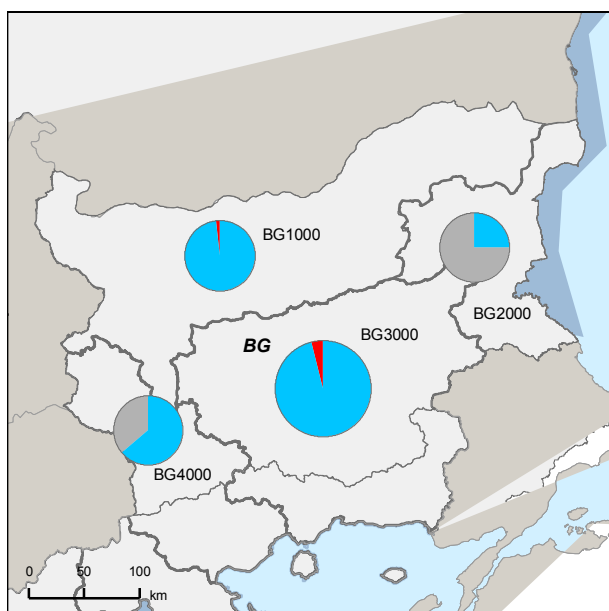


Figure 6.5: Map of chemical status of natural surface water bodies 2009

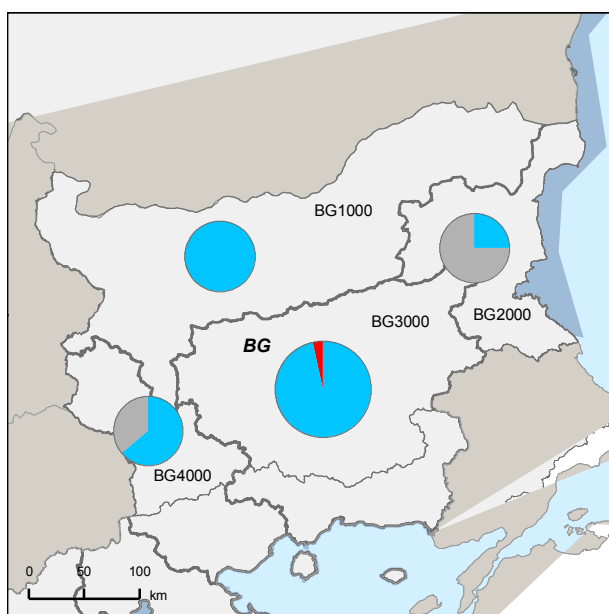
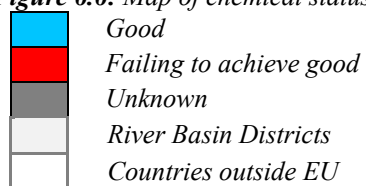


Figure 6.6: Map of chemical status of natural surface water bodies 2015



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

Source: WISE, Eurostat (country borders)

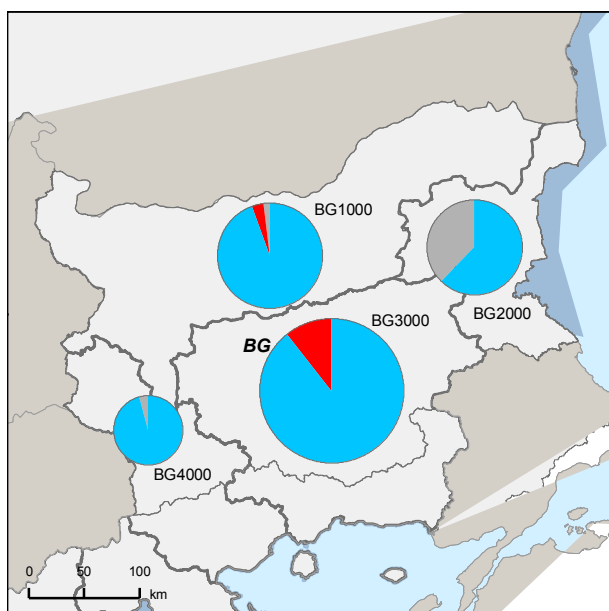


Figure 6.7: Map of chemical status of artificial and heavily modified water bodies 2009

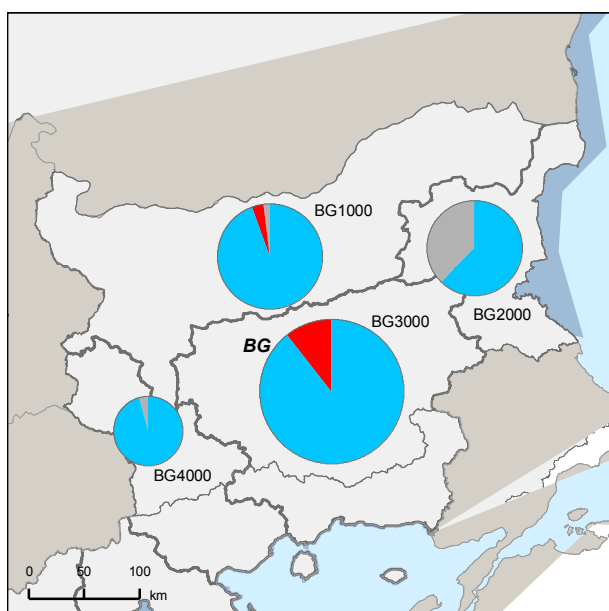
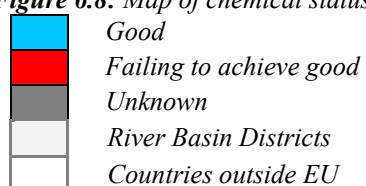


Figure 6.8: Map of chemical status of artificial and heavily modified water bodies 2015



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

Source: WISE, Eurostat (country borders)

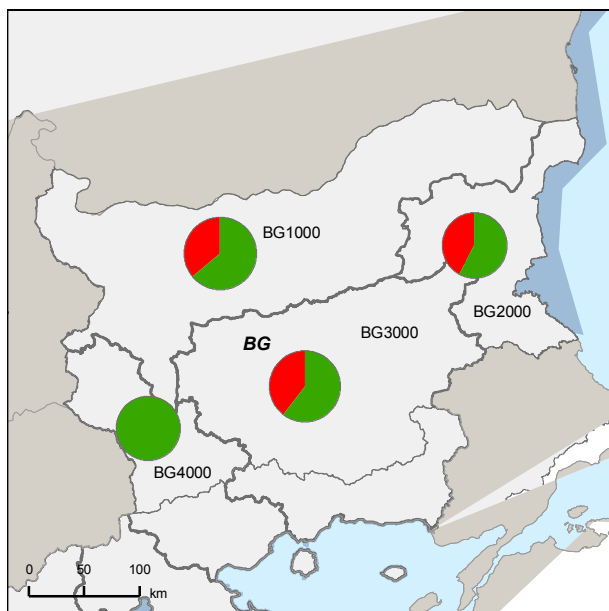


Figure 6.9: Map of chemical status of groundwater bodies 2009

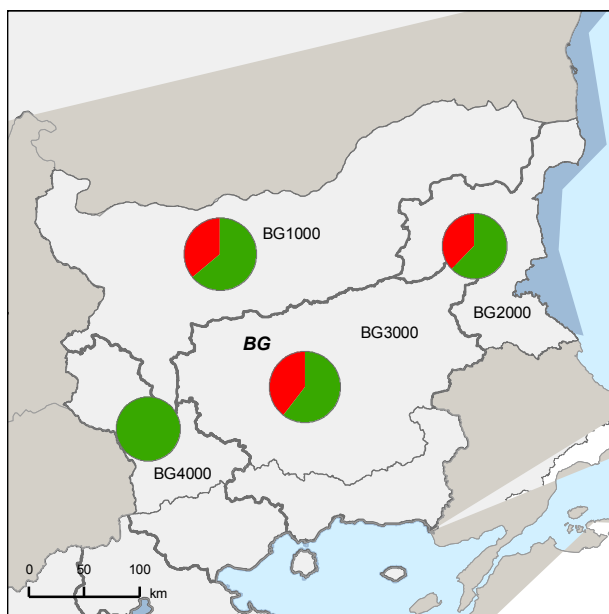
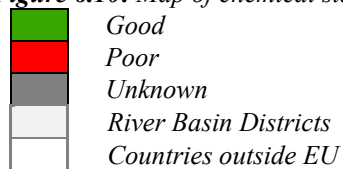


Figure 6.10: Map of chemical status of groundwater bodies 2015



Note: Standard colours based on WFD Annex V, Article 2.4.5.

Source: WISE, Eurostat (country borders)

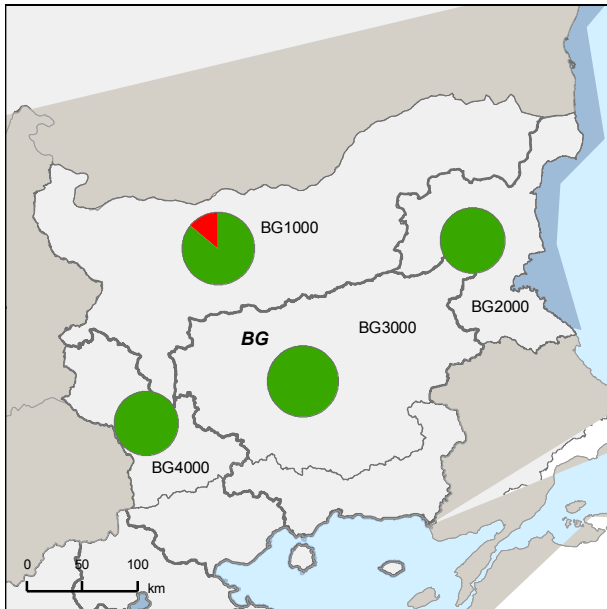


Figure 6.11: Map of quantitative status of groundwater bodies 2009

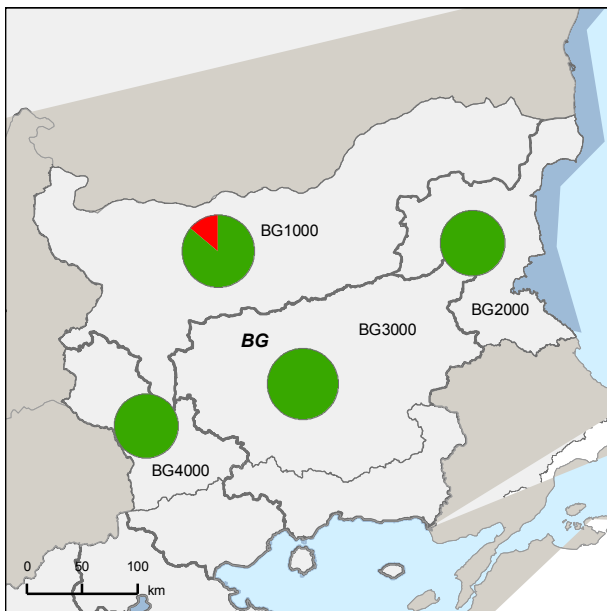
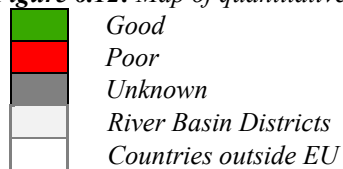


Figure 6.12: Map of quantitative status of groundwater bodies 2015



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

Source: WISE, Eurostat (country borders)

7. ASSESSMENT OF ECOLOGICAL STATUS OF SURFACE WATERS

A national approach for the assessment of the ecological status of surface waters has been developed under a specific technical assistance project, but it is not yet officially adopted. The methodology has been partially applied by two out of the four RBDs during process of development of the RBMPs; most of the work on the ecological status definition was based on an insufficient amount of data, and expert judgement.

The ecological objectives defined are of a very general character, except for the East Aegean RBD. There are no quantitative dimensions nor are there easily measurable and verifiable criteria for monitoring of their achievement.

7.1 Ecological status assessment methods

The initial assessment was based on the QEs in the table below; the other elements were either not used, or excluded, or taken into consideration by expert judgement.

Water category	Quality elements
Rivers	Macrozoobenthos, physicochemical elements
Lakes	Chlorophyll-A , physicochemical elements
Transitional	-
Coastal	Phytoplankton, macrophytes and macrozoobenthos

Table 7.1.1: QEs used in initial assessment

Source: RBMPs

The biological assessment methods used are able to detect some of the major pressures. The biotic index for rivers is sensitive to organic and general pollution but gives a relatively weak reaction to some of the specific priority substances and the bioaccumulation of heavy metals, and is not suitable for assessment of the hydromorphological parameters. Chlorophyll-A was used in lakes to assess the nutrient load and eutrophication.

The standards for physico-chemical and hydromorphological quality elements in support of the biological assessment have not been set and the supporting QEs are considered in ecological status classification only by expert judgement.

EQSs have not been set for all relevant river basin specific pollutants and the methodology of Annex V 1.2.6 WFD was not used.

There is a methodology for assessing confidence and precision in the different parts of the classification system for ecological status (only for macroinvertebrates in rivers, physico-chemistry and Chlorophyll-A). The assessment of ecological and chemical status of most of the WBs in the Danube RBD and East Aegean RBD was estimated as being of low confidence. In the West Aegean RBD the results were estimated as being of low confidence, except for rivers, where approximately 60% of the WBs were assessed as medium confidence. No specific results were presented for the Black Sea and East Aegean RBDs.

The RBMPs do not present explicit information on whether or not ecological status assessment methods have been developed for all national surface water body types or whether there are gaps. Currently these methods have been developed for most of the river types. Methods have been developed for some lake types. Problems exist with the reservoirs,

some of the alpine lakes and riverine wetlands. Methods for coastal waters also exist. All these methods are expected to be included in a specific regulation that is being developed by the environmental authorities.

With regard to the results of the intercalibration of phase 1 (published in COM Decision 2008), there are very limited cases where a relationship with the Bulgarian assessment system is possible.

Bulgaria has successfully participated in the intercalibration of phase 2 (2008-2011) with phyto-benthos in rivers, macroinvertebrates (macrozoobenthos) in rivers (some river types), macrophytes in rivers and lakes (some types), and partially with fish fauna in rivers/lakes, and with macroinvertebrates (macrozoobenthos) in lakes, as well as with BQEs for coastal waters (phytoplankton, marine benthic macrophytes – macroalgae and angiosperms, benthic macroinvertebrates).

The biological quality elements that have not yet been intercalibrated are:

- Phytoplankton (composition, abundance and biomass) in lakes and the Danube River;
- Fish fauna in lakes (composition, abundance and age structure);
- Certain problems with intercalibration of benthic macroinvertebrates (macrozoobenthos) in lakes.

A background document or national/regional guidance document is not yet available.

Currently a new assessment system for rivers and lakes is being developed to be proposed to the authorities. It is expected that it will be enacted by a specific regulation.

7.2 Application of methods and ecological status results

In the RBMPs for the Danube RBD and the West Aegean RBD only a few BQEs (mostly macrozoobenthos in rivers and Chlorophyll-A in lakes) have been used in ecological status assessment. General physico-chemical parameters have also been used, with some old classification systems (not validated by biological data). For the Black Sea RBD and the East Aegean RBD, all BQEs have been used in ecological status assessment. However, the hydromorphological QEs have been missed from the ecological status assessment, except for some non-validated expert judgements. The Black Sea coastal zone has been covered by all required BQEs (phytoplankton, marine benthic macrophytes – macroalgae and angiosperms, benthic macroinvertebrates) and supporting physico-chemistry. The hydromorphological QEs have not yet been methodologically developed for coastal waters.

After the finalisation of the RBMPs, there were some further developments: ecological status assessment methods were established for rivers (all BQEs, physico-chemical QEs and river basin specific pollutants) and partially for lakes (phytoplankton, macrophytes, physico-chemical QEs and river basin specific pollutants). These are cases where ecological status methods have been developed but not fully applied yet. The fish fauna and benthic macroinvertebrate fauna (macrozoobenthos) in lakes have not been used in ecological status assessment of surveillance monitoring sites. Such assessment methods are under preparation

and testing. The ecological status assessment methods of hydromorphological QEs are not yet developed.

The substances which are supposed to cause failure of ecological status are dissolved inorganic nitrogen and heavy metals (Cd, Pb, Ni) especially in East Aegean RBD. Zn and Cu concentrations in the Black Sea RBD as well as the river basin specific pollutants in surface water of category 'lake' in the West Aegean RBD were assessed after the approval of the RBMPs.

Currently a proposal for EQSs for the river basin specific substances has been prepared by complying with the requirements of the procedure set out in Annex V Section 1.2.6 WFD. These standards have yet to be validated.

In general, the most sensitive biological quality elements for ecological status assessment were not selected for operational monitoring sites. In many cases BQEs for which assessment methods are available have all been included in operational monitoring programmes to assess the general trends or any changes in the status of such bodies resulting from the programmes of measures.

The existing pressures are not being sufficiently detected, particularly where complex pressure factors exist, e. g. combined pollution from diffuse and point sources, or combined pressures by pollution and hydromorphological alterations.

The information on confidence and precision or uncertainty has not yet been provided for the ecological status. With regard to the operational monitoring, it is not clear whether the selected monitoring sites are geographically representative, how severe is the impact etc.

RBD	Rivers							Lakes							Transitional							Coastal						
	Phytoplankton	Macrophytes	Phytobenthos	Benthic invertebrates	Fish	Physico-Chemical	Hydromorphological	Phytoplankton	Macrophytes	Phytobenthos	Benthic invertebrates	Fish	Physico-Chemical	Hydromorphological	Phytoplankton	Macroalgae	Angiosperms	Benthic invertebrates	Fish	Physico-Chemical	Hydromorphological	Phytoplankton	Macroalgae	Angiosperms	Benthic invertebrates	Physico-Chemical	Hydromorphological	
BG1000															-	-	-	-	-	-	-	-	-	-	-	-	-	
BG2000	-																											
BG3000	-														-	-	-	-	-	-	-	-	-	-	-	-	-	
BG4000	-														-	-	-	-	-	-	-	-	-	-	-	-	-	

Table 7.2.1: Availability of biological assessment methods

-

Assessment methods fully developed for all BQEs

Assessment methods partially developed or under development for all or some BQEs

Assessment methods not developed for BQEs, no information provided on the assessment methods, unclear information provided

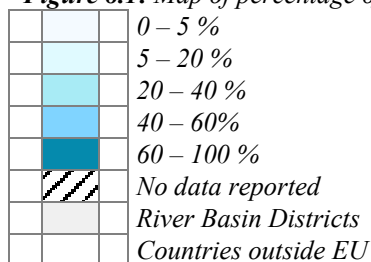
Water category not relevant

Source: RBMPs and BG

8. DESIGNATION OF HEAVILY MODIFIED WATER BODIES (HMWB) AND ASSESSMENT OF GOOD ECOLOGICAL POTENTIAL



Figure 8.1: Map of percentage of Heavily Modified and Artificial water bodies by River Basin District



Source: WISE, Eurostat (country borders)

8.1 Designation of HMWBs

The number of HMWBs and AWBs in Bulgaria is reported in WISE and given in the table below. 24% of the surface water bodies in Bulgaria has been designated as HMWBs or AWBs.

RBD	Rivers	Lakes	Transitional	Coastal
BG1000	42	13	-	-
BG2000	32	3	10	0
BG3000	89	14	-	-
BG4000	18	6	-	-
Total	181	44	10	0

Table 8.1.1: Number of HMWBs and AWBs

Source: WISE and BG

There is general information on the methodology given in the RBMPs where the water uses of the heavily modified water bodies in the respective RBDs are given. These water uses are water abstraction and storage for drinking water supply and power generation as well as water regulation. The most frequent physical modifications are dams, reservoirs, dredging, channelization/straightening, bank reinforcement, river bed corrections. Both numeric criteria and expert judgement were used. In the information presented in the RBMPs there is no direct link to these uses and modifications at WB level. The methodology used is presented in the RBMPs in a very simplified way and it is reported to follow the stepwise approach of the CIS Guidance n°4 until step 6. Step 7 was followed only in Black Sea and East Aegean RBD, and step 8 only in Black Sea RBD.

The uncertainty in relation to the designation of HMWB is not mentioned in the RBMPs. Indirectly, the lack of sufficient data for hydromorphological elements, together with certain problems with the hydromorphological monitoring as a whole, are mentioned. Currently the situation is improving by the commencement of the hydromorphological monitoring in three out of the four RBDs in 2011.

In the Danube and West Aegean RBDs the significant adverse effects of restoration measures have not been defined for every water body. In the Black Sea and East Aegean RBDs, the approach is based on expert judgement.

In the Danube and West Aegean RBDs no alternatives for achieving the beneficial objectives by other means have been analysed (a significantly better environmental option, technical feasibility and disproportionate costs). In the Black Sea and East Aegean RBDs, the approach is based on expert judgement.

8.2 Methodology for setting good ecological potential (GEP)

GEP has been defined for all RBDs in Bulgaria. The approach used is similar to the reference-based method but it is not fully harmonised in all RBDs in Bulgaria therefore the results are not always comparable and consistent.

By the time of development of the RBMP there was not enough hydromorphological monitoring data and hydromorphological monitoring was not carried out therefore expert judgement was used in all RBDs.

The same methodology is used for ecological status and GEP i.e. there is no difference between natural and heavily modified water bodies. For lakes (reservoirs) GEP has been defined based on Chlorophyll-A and transparency, but it is questionable how this relates to the hydromorphological alterations. Some mitigation measures are planned for all RBDs, but for the Danube and the West Aegean RBDs the ecological benefits have not been assessed.

8.3 Results of ecological potential assessment in HMWB and AWB

Bulgaria has reported assessment results for HMWBs and AWBs, but their confidence is generally low. The reliability is expected to improve after the introduction of the first hydromorphological monitoring data in 2012 and the planned approval of the assessment methodologies for more BQEs.

9. ASSESSMENT OF CHEMICAL STATUS OF SURFACE WATERS

No national methodology for assessing the chemical status has been adopted at the RBD level. The methodology for assessing chemical status at the RBD level has been described in each RBMP.

Generally, it was declared that all standards of the Directive 2008/105/EC have been used to assess the pressure within the RBDs. EQSs pursuant to Directive 2008/105/EC have been applied for those priority substances, for which there were results from monitoring. More stringent EQSs for water have not been applied.

In some RBMPs, only the sampling frequencies are given. At least six of the 33 priority substances have not been monitored in any of the RBDs because of the lack of analytical methods and reference materials in Bulgaria.

All EQSs of the Directive 2008/105/EC have been directly transposed in the national water legislation. The standards which are used match those listed in Annex I of the EQSD.

Standards and a programme for monitoring sediments and biota has not been developed or applied. The background concentrations and bioavailability factors have not been considered in the chemical status assessment.

Mixing zones have not been used in the RBMPs, technical guidelines on their identification were published in 2010.

The RBMPs provided information on substances causing failures to achieve good chemical status in only two of the RBDs: BG1000 and BG3000.

RBD	CAS Number	Name of substances	Number of water bodies failing good chemical status	% of water bodies failing good chemical status
BG1000	7439-92-1	Lead	4	3.25
	7439-97-6	Mercury	1	0.81
	7440-02-0	Nickel and its compounds	1	0.81
BG3000	7439-92-1	Lead	10	3.25
	7440-43-9	Cadmium and its compounds	4	1.3
	7440-02-0	Nickel and its compounds	7	2.27

Table 9.1: Substances causing failure to achieve good chemical status

Source: RBMPs

10. ASSESSMENT OF GROUNDWATER STATUS

10.1 Groundwater quantitative status

The assessment of the quantitative status of the groundwater bodies follows a national approach, based on the objective that the available groundwater resource is not exceeded by the long term annual average rate of abstraction.

The needs of the terrestrial groundwater dependent ecosystems have not been considered in the assessment of the quantitative status. There is not enough information on the links to the associated surface water bodies.

The intrusion of saline waters is also taken into consideration in the coastal area in the Black Sea RBD.

10.2 Groundwater chemical status

The assessment of the chemical status of the groundwater bodies was carried out by water body using conceptual models of the hydrogeological systems/aquifers and analyses of the data on the chemical parameters of the groundwater bodies.

The assessment of the chemical status is carried out in single monitoring sites for different pollutants. If one or more pollutants exceed the threshold values, poor status is determined. If there is not enough confidence in the results, some pollutants might be excluded from the assessment. The general assessment of the groundwater bodies is made through a comparison of the relevant values and the threshold values (TVs). In most of the cases TVs are calculated based on the drinking water standards.

There is a general statement that all substances of Annex II Part B of the GWD have been taken into account. The methodology for the establishment of threshold values is described in detail in the RBMPs; Directive 2006/118/EC and the CIS Guidance Document No. 18 have been taken into consideration when establishing the methodology.

Background levels have been reported to be considered in the assessment. The groundwater dependent terrestrial ecosystems are reported to be considered in the assessment of chemical status in the Danube and the East Aegean RBDs, but not in the Black Sea and West Aegean RBDs.

Trend assessments have been performed in the Danube and Black Sea RBDs, the information is unclear in the East Aegean and the West Aegean RBDs. Trend reversals seem not to have been performed yet.

Transboundary groundwater bodies have been identified with Serbia and Romania. No information was provided on the co-ordination of TVs in transboundary groundwater bodies.

10.3 Protected areas

The main sources of risk of not achieving good status are associated with diffuse pollution: inappropriate agricultural practices, old landfills and also untreated wastewaters.

Bulgaria reported information in WISE on the status of groundwater drinking water protected areas, more than two thirds of them are reported to be in good status.

RBD	Good	Failing to achieve good	Unknown
BG1000	31	18	0
BG2000	17	15	0
BG3000	29	19	0

RBD	Good	Failing to achieve good	Unknown
BG4000	32	0	0
<i>Total</i>	<i>109</i>	<i>52</i>	<i>0</i>

Table 10.3.1: Status of groundwater drinking water protected areas

Source: WISE

11. ENVIRONMENTAL OBJECTIVES AND EXEMPTIONS

The percentage of surface and groundwater bodies in Bulgaria that will meet the criteria for good or higher status by RBD and planning cycle is presented in the following tables as well as the percentage of the exemptions applied. According to the reporting, all water bodies would reach good status by 2027.

RBD	Total no. of SWBs	Percent of SWBs at good ecological status				Percent of SWBs at good chemical status			
		Now	2015	2021	2027	Now	2015	2021	2027
BG1000	166	44%	72%	89%	100%	98%	98%	98%	100%
BG2000	153	49%	82%	92%	100%	36%	100%	100%	100%
BG3000	308	33%	61%	97%	100%	94%	95%	99%	100%
BG4000	132	49%	82%	100%	100%	100%	70%	100%	100%

Table 11.1: Objectives for surface water bodies
Source: WISE and BG

RBD	SWB exemptions (percent of all SWBs)			
	Art. 4.4	Art. 4.5	Art. 4.6	Art. 4.7
BG1000	27%	1.8%	0	0
BG2000	18%	0	0	0
BG3000	39%	0	0	0
BG4000	19%	0	0	0

Table 11.2: Exemptions for surface water bodies
Source: WISE

RBD	Total no. of GWBs	Percent of GWBs at good quantitative status				Percent of GWBs at good chemical status			
		Now	2015	2021	2027	Now	2015	2021	2027
BG1000	50	86%	98%	100%	100%	64%	90%	100%	100%
BG2000	40	100%	100%	100%	100%	58%	63%	90%	100%
BG3000	48	100%	100%	100%	100%	60%	60%	60%	100%
BG4000	39	100%	100%	100%	100%	100%	100%	100%	100%

Table 11.3: Objectives for groundwater bodies
Source: WISE

RBD	GWB exemptions (percent of all GWBs)			
	Art. 4.4	Art. 4.5	Art. 4.6	Art. 4.7
BG1000	24%	22%	0	0
BG2000	28%	3%	8%	0
BG3000	40%	0	0	0
BG4000	0	0	0	0

Table 11.4: Exemptions for groundwater bodies
Source: WISE

The environmental objectives and justification of the exemptions are given for each groundwater body (chemical status) and for each surface water body (ecological and chemical status) where impacts and drivers are described. A comprehensive analysis of the drivers causing the application of exemptions is provided.

The application of exemptions Article 4.4 (later deadline) and 4.5 (lower objective) was not carried out for transboundary groundwater bodies.

11.1 Additional objectives in protected areas

Additional objectives have been defined for protected areas for drinking water, bathing water and Natura 2000, but their application varies across the RBDs. No additional objectives were established for shellfish.

No additional objectives were defined in the Danube and Black Sea RBDs.

For the East Aegean and West Aegean RBD, individual additional objectives have been identified for each protected area, as well as the year by which they are expected to be implemented. In the East Aegean RBD such objectives have been identified both for the drinking water protected areas, for the bathing water areas and for the Nature 2000 areas. In order to achieve the specific objectives the Programme of Measures contains specific measures corresponding to the requirements for the respective protected area specified by water body.

11.2 Exemptions according to Article 4(4) and 4(5)

Most of the exemptions in Bulgaria are applied under Article 4(4) (extension of the deadline for meeting good status) and only a few under Article 4(5) (lower objective).

Most exemptions relate to technical infeasibility and natural conditions.

Applying the argument of technical feasibility is based on expert judgement and justification is only given in the Eastern Aegean RBD.

The approach to the application of the exemption of natural conditions (i.e. ecological recovery time) is varied across RBDs: it is used for 44 surface water bodies in the Danube RBD whereas natural conditions are only applied to groundwater bodies in the East Aegean RBD.

The unavailability of a technical solution is one of the reasons to formulate exemptions, basically when good potential is to be achieved in HMWBs or AWBs within the "lake" category where intensive fish farming is taking place.

Another reason for the exemptions is that in some problematic areas a long application period for certain measures is required. It is envisaged that investigative monitoring programmes will start for these water bodies. This is related to the cases of poor status of the biological quality elements where there is high concentration of chemical pollution and the source of the pollution is unknown.

The justification of disproportionate cost is used in some WBs of the Black Sea RBD. When assessing disproportionate costs, the methodology is based on the comparison of the overall costs for the PoM to the estimated funding, including the expected income from water services. Basic measures are not excluded from the calculations. Because of the lack of criteria and indicators for cost-effectiveness of the measures adopted at national level, no cost-benefit analysis has been undertaken (reflecting indirect costs and incidental expenses). Disproportionately high costs have been estimated on the basis of expert judgement, by comparing the costs for the execution of the measure with the costs for other similar measures and evaluating the benefits for society (i.e. the expected social implications), as well as the

length of execution, without carrying out a detailed, reasoned analysis with the necessary comparative calculations.

RBD	Global ¹⁵					
	Technical feasibility		Disproportionate costs		Natural conditions	
	Article 4(4)	Article 4(5)	Article 4(4)	Article 4(5)	Article 4(4)	Article 4(5)
BG1000	0	4	0	0	44	0
BG2000	6	0	7	0	27	0
BG3000	121	1	0	0	0	0
BG4000	23	6	0	0	0	0
<i>Total</i>	<i>150</i>	<i>11</i>	<i>7</i>	<i>0</i>	<i>71</i>	<i>0</i>

Table 11.2.1: Numbers of Article 4(4) and 4(5) exemptions

Source: WISE

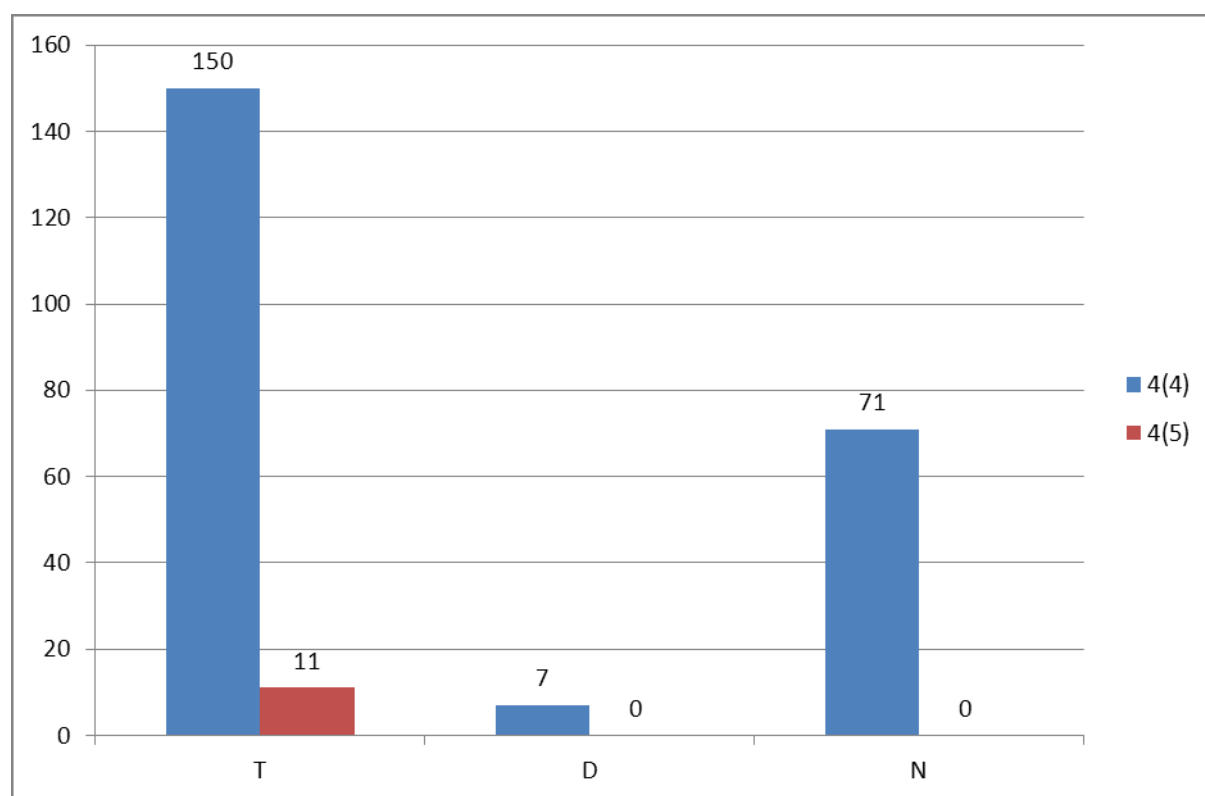


Figure 11.2.1: Numbers of Article 4(4) and 4(5) exemptions

T = Technical feasibility

D = Disproportionate costs

N = Natural conditions

Blue = Article 4(4) exemptions

Red = Article 4(5) exemptions

¹⁵ Exemptions are combined for ecological and chemical status

11.3 Exemptions according to Article 4(6)

Article 4(6) is referred to for 3 groundwater bodies in the Black Sea RBD. As a result of natural causes, sea water intrusion and unprotected and highly permeable upper layers are identified. Due to the lack of sufficient data this is assumed to be temporary. However, Article 4.6 should be used for a temporary deterioration only in case of unforeseen events, which does not seem to be the case in these 3 groundwater bodies. Also strict conditions should be followed when applying this exemption, but there is no information on specific conditions in the RBMP.

11.4 Exemptions according to Article 4(7)

According to the information received from the Bulgarian authorities there are new modifications planned in every RBD. Some of them were not foreseeable at the time when the RBMPs were prepared; some others are planned for the second cycle. For the ones that were known at the time of RBMP preparation it seems that the exemption of Article 4(4) was used instead of the exemption under Article 4(7).

11.5 Exemptions to Groundwater Directive

The exemptions concern polluted waters, as a result of historic human activities and require more detailed investigation on the spreading of pollution in the aquifers. There is very limited information provided on the reasons for these exemptions; for most of the groundwater bodies natural reasons are indicated to be the cause. Typical pollutants are nitrates, sulphates, iron, manganese and sodium.

No information is reported on the exemptions applied in drinking water protected areas.

12. PROGRAMMES OF MEASURES

According to Annex VII of the WFD, the RBMPs should contain a summary of the programmes of measures (PoM), including the ways in which Member States expect to achieve the objectives of Article 4 WFD. The programmes should have been established by 2009, but are required to become operational only by December 2012. The assessment in this section is based on the PoM as summarised by the Member State in its RBMP, and the compliance of this with the requirements of Article 11 and Annex VII of the WFD.

It therefore does not include a comprehensive assessment of compliance with the requirements of Article 11(3)¹⁶ on basic measures. It focuses in particular on key sets of measures. Member States will report to the Commission by December 2012 on the full

¹⁶ These are the minimum requirements to be complied with and include the measures required under other Community legislation as well as measures to achieve the requirements of other WFD Articles and to ensure appropriate controls on different activities affecting water management

implementation of their PoMs, including on the progress on the implementation of basic measures as required by Article 11(3). The Commission will assess what Member States report and will publish its assessment in accordance with Article 18 WFD.

12.1 Programme of measures – general

All of the RBMPs include a Programme of Measures (PoM).

There is no national approach as regards the PoMs for surface waters and groundwater. Moreover, in most cases there is only an indirect link between the measures taken and the pressures they are supposed to respond to, but it is not clearly indicated in all RBMPs. The measures are mainly targeted to the sectors, but not to the substances responsible for the pollution. No analysis of the expected ecological effect is presented therefore there is no indication of uncertainties in the effects of the measures taken.

The definition of the measures varies across RBDs in Bulgaria. The approach taken in the Danube basin is based on the legal grounds: the measures are structured based on the need to meet the requirements of the EU Directives and the national legislation. The PoM for the Black Sea RBD is based both on the legal instruments and some groups of pressures while in the other two RBDs the measures are designed entirely to respond to the pressures identified. In all RBMPs there are annexes presenting information on the measures attributed to every single water body together with data on its status and water body specific objectives.

Measures could be implemented at RBD, sub-basin and WB level. Most often they are defined at basin level. The responsibility of their implementation is shared between the national, regional and municipal authorities, enterprises and professional groups. The responsible bodies are identified in the RBMPs on measure-by-measure basis.

Costs are defined for some groups of measures at basin level. Funding sources are identified for all measures. These are the national and municipal budgets via some national programmes as the one for construction of WWTPs in agglomerations of more than 2000 population equivalent, improvement of the water cycle and water utilities in the regions, for good agricultural practices etc. The funding includes EU funds through the Operational Programmes 'Environment' and 'Regional Development Fund'. The RBMPs are approved by the Minister of Environment and Water. The commitment for funding of the PoMs is renewed on a yearly basis by the adoption of the Law on the National Budget.

The timing of the PoMs is frequently presented by planning cycles, and usually the deadline is 2015 so that it is not quite clear whether all measures will be operational by the end of 2012.

No international co-ordination mechanisms exist except for the joint activities in the Danube basin under the ICPDR, to some extent the Black Sea Commission (the Black Sea RBMP makes no reference to it) and some bilateral activities that started after the approval of the RBMPs.

12.2 Measures related to agriculture

According to the RBMP, agriculture is identified as a source of significant pressures in three RBDs in Bulgaria (the exception is the West Aegean RBD), both for surface and groundwater:

- On the water quality: nitrogen and phosphorus from diffuse sources, eutrophication, pesticides from point and diffuse sources.
- On water quantity: over-abstraction from surface water bodies.
- On the hydromorphology: significant impact of engineering activities (bank reinforcement, dams, flow regulation, weirs, drainage systems), significant soil erosion.

It has to be noted that monitoring data on phosphorus and nitrogen are lacking in many cases and the significance of pollutants is defined based on expert judgement. This makes it extremely difficult to correctly identify all agricultural pressures, and consequently the appropriate measures.

Farmers have been identified as a target group during the consultation process for the development of the Black Sea and East Aegean RBMPs. The plans provide evidence for the involvement of all relevant stakeholders' groups in the discussions and presentation of proposals. The Danube RBD consultations were organized on a geographical basis, but farmers could take part in the consultations. The farmers were not identified as stakeholders in the West Aegean RBD because agriculture is not a significant pressure there.

The scope of the measures to address the pressures varies depending on the measure type and might be RBD-wide, WB-specific or sector specific.

The Programmes of Measures identify a broad range of measures to address pressures arising from agriculture but the measures applied significantly vary across RBDs.

There is only partial information on how and when these agricultural measures will be implemented. The information on the timing is limited in most of the cases to the respective planning cycle.

There is very limited information on the funding resources and the costs associated to part of the measures. A general description of the main funding sources for the PoM is given, but no specific information can be found on the measures related to agriculture. The only exception concerns the measures for introduction of good agricultural practices (most of all training) which will be supported with the Rural Development programme.

The RBMPs do not mention mechanisms to follow up the implementation of the agricultural measures.

Measures	BG1000	BG2000	BG3000	BG4000
Technical measures				
Reduction/modification of fertiliser application	✓	✓	✓	✓
Reduction/modification of pesticide application		✓		✓
Change to low-input farming (e.g. organic farming practices)		✓	✓	
Hydromorphological measures leading to changes in farming practices	✓	✓	✓	✓
Measures against soil erosion	✓		✓	✓
Multi-objective measures (e.g. crop rotation, creation of enhanced buffer zones/wetlands or floodplain management)	✓		✓	✓
Technical measures for water saving	✓	✓	✓	✓

Measures	BG1000	BG2000	BG3000	BG4000
Economic instruments				
Compensation for land cover				
Co-operative agreements				
Water pricing specifications for irrigators		✓		✓
Nutrient trading				
Fertiliser taxation				
Non-technical measures				
Additions regarding the implementation and enforcement of existing EU legislation				✓
Institutional changes				
Codes of agricultural practice				✓
Farm advice and training	✓	✓	✓	✓
Raising awareness of farmers	✓	✓	✓	✓
Measures to increase knowledge for improved decision-making	✓	✓	✓	
Certification schemes				
Zoning (e.g. designating land use based on GIS maps)				
Specific action plans/programmes				
Land use planning				
Technical standards				
Specific projects related to agriculture				
Environmental permitting and licensing			✓	

Table 12.2.1: Types of WFD measures addressing agricultural pressures, as described in the PoM
Source: RBMPs

12.3 Measures related to hydromorphology

All the Bulgarian RBMPs include measures related to hydromorphology, but the 4 RBMPs each take a different approach.

In the Danube region the plan provides a comprehensive analysis of the issue; a lot of information on the hydromorphological alterations is given in the Black Sea plan, but without presenting criteria for the assessment of the significance of the pressures. In the East and West Aegean RBMPs there is information on the water uses when describing the reasons for heavily modified water bodies, but these uses are not directly linked to pressures.

The water uses considered are navigation, irrigation, hydropower production, flood protection, fish breeding, drinking water supply, urban development and recreation. At the same time there are measures in the PoM that are clearly related to water flow regulations and morphological alterations of the surface water bodies, but the links between the water use, the hydromorphological pressure and the concrete measure are not considered and analysed. No assessment of the expected effects has been carried out, but an approach for the assessment of effects is included into the Eastern Aegean RBMP.

Measures are also envisaged for the HMWBs; they are listed by water bodies in the PoM.

Measures for achieving an ecologically based flow regime are taken under an order of the Minister of Environment and Water that establishes an ecological minimum flow in the rivers. In the East Aegean RBD the environmental minimum flow is determined for water bodies in protected areas in relation to the provision of the necessary amount of water for biodiversity. Guidance for the hydromorphological monitoring has been developed recently, but is not yet adopted. An assessment methodology is still missing.

Measures	BG1000	BG2000	BG3000	BG4000
Fish ladders	✓	✓	✓	✓
Bypass channels	✓		✓	✓
Habitat restoration, building spawning and breeding areas	✓		✓	
Sediment/debris management	✓		✓	✓
Removal of structures: weirs, barriers, bank reinforcement	✓	✓	✓	✓
Reconnection of meander bends or side arms	✓		✓	
Lowering of river banks				
Restoration of bank structure	✓		✓	✓
Setting minimum ecological flow requirements	✓	✓	✓	✓
Operational modifications for hydropeaking			✓	
Inundation of floodplains	✓	✓		
Construction of retention basins				
Reduction or modification of dredging	✓			
Restoration of degraded bed structure	✓		✓	
Remeandering of formerly straightened water courses	✓			

Table 12.3.1: Types of WFD measures addressing hydromorphological pressures, as described in the PoM
Source: RBMPs

12.4 Measures related to groundwater

Different groundwater measures are used in the different RBDs in Bulgaria (no national approach). Basic and supplementary measures are listed for both chemical and quantitative status in all RBDs, but they are different everywhere (also the level of detail is different).

The basic measures in terms of quantitative status are related to restrictions of water use and the review and updating of the permits issued, and the introduction of water saving practices predominantly in agriculture. There are also a large number of water abstractions for individual use (daily volume less than 10 m³) which, according to the national legislation, is under the registration procedure. Currently, it is agreed that they do not present a significant pressure on the groundwater bodies' quantitative status.

The supplementary measures identified by the RBMPs are related to: the control of the permit compliance, the recharge of the groundwater bodies, keeping a register of the water abstraction facilities for groundwater, the permitting regime for use, water uses prioritised by objectives, control mechanisms, sanctions and fines for non-compliance, the development of hydrogeological numerical models for the most used groundwater body, additional studies on the interactions between the surface and groundwater, reducing the amounts of sulphates, research on the impact of mining activity in soils, groundwater and distribution of heavy metals, the collection and mapping of information for leakage of mining water, and the promotion of organic farming.

The needs of the groundwater dependent terrestrial ecosystems were considered when designing the PoM. The PoM refers to measures related to groundwater within protected areas under the Birds and the Habitats Directives.

In terms of chemical status, measures are applied to: decrease pollution from point and diffuse sources; for WWTP and sewerage construction and upgrades; to establish safeguard zones; and permit compliance procedures. Significant pollution is caused by leakages of the sewerage systems and old storages of pesticides.

The selection of measures is related to limiting the input of pollutants into groundwater from household, industrial or agricultural sources. In cases where pollution has been established but the source has not been identified, investigation is planned in view of discovering the source of pollutants and their effects.

There are measures in the PoM of relevance to the prevention of inputs into groundwater of hazardous substances from diffuse or point sources except for the Black Sea RBD. These measures are: control on the application of fertilizers and pesticides; introduction of good agricultural practices; periodic review and update of the wastewater discharge permits to regulate point-source pollution; and compliance control for the integrated permits. These measures will also contribute to the limitation of the inputs of non-hazardous substances.

The measures in the PoM are associated with concrete water bodies and take into consideration their chemical status. The information is also identified by its geographical scope. Measures are also taken in groundwater bodies in good status where exceedance of the threshold values has been observed (local and temporary exceedances of the quality standards for nitrates, ammonium, sulphates in less than 30% of the groundwater bodies).

The RBMPs present clear evidence that international RBDs have not been established and there has been no co-ordination with the neighbouring countries on the development of the RBMPs. This is expected to be done in the future; currently attention is given to the monitoring stations in the boundary region and information exchange. An exception is the co-operation with Romania on the management of a shared groundwater body in the Dobrudzha region (Danube RBD).

12.5 Measures related to chemical pollution

The inventory of sources of chemical pollution includes priority substances and certain other pollutants, non-priority specific substances, deoxygenating substances, and nutrients. These groups of pollutants have been widely used in the pressures assessment. The significant sources of pressure identified are: WWTPs in urban areas; industrial sources not fitting into the specific effluent limits; rivers with significant input of pollutants to the coastal waters; small settlements without sewerage systems; and landfills not meeting the EU standards.

The measures related to chemical pollution from industry are mainly in the field of re-construction and/or upgrade of the treatment facilities and improvement of the maintenance and control, the study and mapping of different types of pollution, and the assessment of the impact of airborne pollution. For the urban areas the measures include wastewater collection and transportation, the re-construction and upgrade of WWTP and resolving the problems related to the solid waste, including closing of old or non-compliant landfills and resolving the problems coming from illegal waste dumping in river beds and reservoirs.

The measures provided to reduce/phase out the emissions including priority substances and specific substances are formulated in a very general way and never make reference to a concrete pollutant except for nitrogen and phosphorus. The measures relevant are the

development of integrated permits for construction of new or the operation of existing industrial installations, the review and updating of the permits, including modification of the effluent limits applied and introduction of new ones whenever appropriate, the regulation of the emission standards for hazardous substances, discharge permits and their review, and modification, monitoring and self-monitoring programmes.

Plans make reference to the national legislation, namely the Water Law, providing for the termination of the discharge of hazardous substances and development programmes to phase out the discharge of priority substances into the water environment.

12.6 Measures related to Article 9 (water pricing policies)

In the RBMPs a general, broad definition of the water services is used, which is based on the Bulgarian Water Law: *"Water services are all services to provide water for the households, public institutions, and any economic activity by water abstraction, accumulation, collection in reservoirs, treatment and supply of surface or groundwater, as well as the collection, transportation and treatment by treatment facilities of the wastewater, with subsequent discharge into surface water bodies"*.

For the purposes of the economic analysis, the definition of water services covers services related to water supply, wastewater treatment and discharge, irrigation, energy and tourism in the following sectors: industry (including hydro-energy), households, agriculture and services (including tourism). However for the purpose of the cost recovery calculation the definition of water services is limited to water supply and waste water treatment only.

The RBMPs include analyses of the significant water uses.

The contribution of the different water uses to the recovery of the costs for water services is calculated based on an economic analysis according to Annex III and with partial consideration of the polluter pays principle, using financial, resource and ecological costs. There is a clear statement that the objective of the assessment is to guarantee that the main water users (households, industry, and agriculture) make an adequate contribution to the recovery of the costs. The analyses in the RBMPs present the rate of cost recovery by sectors (households, agriculture, industry, public services, and tourism). The assessment itself is carried out by comparison of the profit and loss for each service by sectors. The methodology of the cost recovery rate calculation is not described in full detail, but it is claimed that financial, environmental and resource costs were taken into account (with the exception of resource and ecological costs, which have not been taken into consideration in the development of the RBMP for the East Aegean RBD because of the lack of sufficient data).

Resource costs are calculated based on statistical data on the population, together with the water supply regime, the water consumption and the average price of the water in those regions. The environmental costs are calculated using the method of 'assessment based on costs'.

In the application of the cost recovery principle, the condition of common access and social affordability is observed. The water prices for household water supply are subject to administrative regulation under the Law on the regulation of the water and sanitation services. By this law a specific administrative body is established and restrictions to the price increase

are imposed in view of its social affordability, based on the average monthly income for the region. In this context the flexibility provisions of Article 9 were applied.

There is a set of measures in the RBMPs aimed at the implementation of incentive water policies in the water services which include: the development of taxation preferences for the introduction of mechanisms and practices for water efficiency; decreasing water losses in the water supply networks; water metering; and volumetric pricing etc.

The funding of significant part of the programmes of measures in the RBMPs in Bulgaria will be achieved through subsidies from the EU financial instruments and the Enterprise for Environmental Protection activities management (EEPAM). There are a limited number of cases of cross-subsidising when the fees collected in one sector are re-directed to investments in another one (for example water - solid waste). The subsidies are included in the calculation of the profit of the water service providers used for the cost recovery calculations.

The RBMPs include measures and actions aiming at the centralisation of some of the water development related funds, a clear differentiation between the financial resources and structures at national and regional level, the management of the financial resources following the strategic programs and plans, minimising the inexpedient use of these resources, the development of a clear system for the control of the raising and spending of the funds, and the protection of the public interest against the natural monopolies. Other measures provide for the development of additional studies and analyses where all measures would be assessed and considered, and a full analysis of the costs associated with the PoM, clarifying the structure of their funding and the shares of the state budget and excluding grant funding, etc.

The measures described are supporting the pricing policies. Any direct pricing policy change could happen at national level as the water prices are regulated the Law on regulation of the Water Supply and Sewerage Services and under a national body.

All measures and actions on the implementation of Article 9 provisions are taken at national level.

12.7 Additional measures in protected areas

The RBMPs clearly identify the water bodies where additional measures need to be applied. However it is sometimes unclear whether the additional measures are especially designed for the protected area.

Information on the type of measures is provided, but there are no details on the magnitude. The quality objectives are formulated following the WFD provisions. There are also 'sub-objectives' in some of the plans, defined especially on the protection of water in the protected areas, but they are not quantified therefore it is not possible to assess whether they are more stringent objectives relating to protected areas.

The RBMPs make reference to safeguard zones around drinking water abstraction facilities, areas related to Natura 2000 (Birds and Habitats Directives), fish and shellfish, sensitive and vulnerable areas. Links to other specific programmes are also provided.

The typical additional measures to protect drinking water include the establishment of safeguard zones, making provision for additional conditions in the wastewater discharge permits aiming at sustaining the good status of the water body, provisions for the

improvement of the waste collection and transportation in the region, more stringent control on the status of the protected areas, afforestation, administrative measures implementing the prohibitions and restrictions on activities in order to preserve the condition of the protected area. All measures related to the design, establishment or re-establish the safeguard zones are included in the PoM as basic measures.

The bathing waters are not considered in the PoMs in the Danube, East Aegean and West Aegean RBDs as the reason for introducing specific measures. They are very important for the Black Sea RBD and a number of basic measures are identified there; these are urban WWTP and sanitation development and upgrade, deep sea discharges, moving the discharges outside the bathing water use areas; the additional measures are related to development and implementation of educational programs and general public awareness.

13. CLIMATE CHANGE ADAPTATION, WATER SCARCITY AND DROUGHTS AND FLOOD RISK MANAGEMENT

13.1 Water Scarcity and Droughts

Water scarcity and droughts are typical phenomena in the Continental - Mediterranean climatic region that also covers significant parts of Bulgaria, mainly the south parts of the Maritsa and Tundzha watersheds and the basin of Arda river together with the east slopes of Rodopi mountain, and the Struma and Mesta rivers. This area is characterised by drought spells in the second half of summer and the beginning of autumn. The impact of climate change results in increased temperatures, a decrease in precipitation, and negative changes of the river flows and the dependent ecosystems. This impact on the waters, ecosystems and the different socio-economic activities is not sufficiently studied, but the available results already show some problems in certain regions, for example, these related to the so-called 'temporary rivers' in the downstream part of the sub-basins of the Maritsa, Tundzha, Arda and Byala rivers.

Water scarcity and droughts are practically always considered together in the RBMPs; the RBMPs make reference to a number of other national and sector plans and programmes.

The Black Sea RBD is an exception. The RBMP for this RBD makes a clear distinction between the two phenomena and identifies droughts as an issue, but not water scarcity, based on analysis of the water availability, including unfavourable conditions.

Limited statistical information on drought periods is presented in the RBMPs. There is no information on the impact of the past and expected water scarcity and drought periods over the water uses and the water status in the different RBDs. No clear link is given between the general statement of the expected increase of the water scarcity and droughts in the future and the other parts of the Plans. In the Eastern Aegean RBD there is information on precipitation and temperature patterns and pressures related to water scarcity and droughts. Measures in the PoM are connected to those pressures. Obviously some of the measures in the PoM address these issues, such as the re-construction of water supply networks to diminish the water losses, control over the water use permits, construction of new dams, reduction of groundwater abstraction, water re-use in the industry.

It is mentioned in the text of the RBMP that the climate change, causing water scarcity and droughts might have an impact on the future water needs for the households and agriculture. In part of the RBDs, the PoMs provide for a number of additional studies on the issue (reassessment of the water needs and efficient resource management, optimizing of the water transfer to/from other RBDs).

There are no trend scenarios for water availability and demand in view of water scarcity and droughts. The RBMP itself does not contain projections of the demand and availability in view of the climate change, water scarcity and droughts, etc.

Water scarcity and drought issues have not been internationally co-ordinated.

13.2 Flood Risk Management

Floods are addressed in the RBMPs as a pressure and specific measures are provided. They are also mentioned as a reason for HMWBs designation. No exemptions have been applied under article 4(6) or 4(7).

The measures in the RBMPs include renewal and maintenance of dams and river bed corrections, cleaning up of river beds, removal of obsolete facilities, restrictions on the gravel extraction in the river beds and terraces, control of the erosion of the banks, warning and decision support systems, and public awareness and information. Climate change is always mentioned as a factor to be taken into consideration.

The RBMPs make direct link to the Floods Directive and the work on flood management plans is in progress. The preliminary assessments of flood risk were performed in all RBDs.

13.3 Adaptation to Climate Change

Climate change is included in the plans in a general way. They contain preliminary considerations of climate change impact on the water status and other pressures and risks of water scarcity, droughts and floods.

The general analyses identify the main impacts of the climate change on the different sectors and pressures. There is a clear statement that trends of climate change are taken into account in the analysis of pressures and measures related to agriculture, both in terms of the agricultural practices in place and the water needs (water saving practices) for irrigation. The decrease of the water resource and hydropower production potential, the increase in the need for electricity, risks for the energy infrastructure, drinking water supply and the aquatic and water dependent ecosystems are specially mentioned.

The section on environmental objectives also makes reference to climate change as it is included in the main objective of the RBMP (reaching good status and mitigating the harmful effect of the climate change). The climate change aspects are not considered directly in the economic analysis.

The measures planned for saving water include changes in irrigation methods, upgrade of irrigation facilities, water cycles and re-use and water saving technologies in industry, water saving practices in households, water saving campaign in all sectors, decreasing of water losses in water supply and irrigation, adaptation of agriculture in regions with water scarcity

by changing the crops, afforestation and resolving erosion problems in the watershed, development of a methodology for fiscal incentives for water efficiency, and the development of water resource management plans in case of droughts. Measures are defined in a very general and descriptive way and not given at water body level.

14. RECOMMENDATIONS

Following the steps of river basin planning as set out in the WFD should ensure that water management is based on a better understanding of the main risks and pressures in a river basin and as a result, interventions are cost effective and ensure the long term sustainable supply of water for people, business and nature.

To deliver successful water management requires linking these different steps. Information on **pressures** and risks should feed into the development of **monitoring programmes**, information from the monitoring programmes and the **economic analysis** should lead to the identification of **cost effective programmes of measures** and justifications for exemptions. **Transparency** on this whole process within a clear governance structure will encourage **public participation** in both the development and delivery of necessary measures to deliver sustainable water management.

To complete the 1st river basin management cycle, and in preparing for the second cycle of the WFD therefore, it is recommended that:

- Co-ordination during the RBMP development between the basin and state level as well as among RBDs should be improved in the next RBMP cycle. Elaboration of common methodologies would be necessary.
- Monitoring should be strengthened as there is not enough monitoring data related to biological and chemical elements and this is also a reason for low confidence in the assessment of their status.
- The existing pressures are not being sufficiently detected, particularly where complex pressure factors exist, e.g. combined pollution from diffuse and point sources, or combined pressures from pollution and hydromorphological alterations. Pressures should be sufficiently detected.
- There is a significant gap in the intercalibration and the development of methodologies, the expert judgement approach is often used. There is no fully developed and formally adopted classification system for the assessment of the ecological status. These gaps should be filled.
- Where there are currently high uncertainties in the characterisation of the RBDs, identification of pressures, and in the 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.
- 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 combatting chemical pollution and that adequate measures are put in place.

- The ecological objectives defined are of a very general nature, there are no quantitative dimensions and easily measurable and verifiable criteria for monitoring their achievement. Ecological objectives should be better specified.
- The designation of HMWBs should comply with all the requirements of Article 4(3). The assessment of significant adverse effects on their use or the environment and the lack of significantly better environmental options should be specifically mentioned in the RBMPs. This is needed to ensure transparency of the designation process.
- Mercury, hexachlorobenzene and hexachlorobutadiene should be monitored in biota for comparison with the biota standards in the EQSD, unless water EQS providing an equivalent level of protection are derived. Biota EQS should also be considered for other substances where analysis in water is problematic. Trend monitoring in sediment or biota is specified for several priority substances in Directive 2008/105/EC Article 3(3) and will need to be reflected in the next RBMP.
- Groundwater trend assessments should be carried out at all RBDs.
- There are insufficient international cooperation/coordination mechanisms established with neighbouring countries like Greece and Turkey in international river basins. This cooperation needs to improve significantly. The river basins shared with Turkey should be correctly designated as international RBDs.
- The identification of exemptions is incomplete and should be completed in the next RBMP cycle. 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.
- It is unclear whether there are 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.
- Agriculture is indicated as exerting a significant pressure on the water resources in Bulgaria. This should be translated into a clear strategy that defines the basic/mandatory measures that all farmers should adhere to and the additional supplementary measures that can be financed. This should be developed with the farming community to ensure technical feasibility and acceptance. There needs to be a very clear baseline so that any farmer knows 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.

- 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 should 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. Information on how the polluter pays principle has been taken into account should be provided in the RBMPs.