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Report on the implementation of the Water Framework Directive River Basin Management Plans
Member State: CROATIA

Accompanying the document

COMMUNICATION FROM THE EUROPEAN COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

Actions towards the 'good status' of EU water and to reduce flood risks

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TABLE OF CONTENTS

1. GENERAL INFORMATION 4

2. STATUS OF RIVER BASIN MANAGEMENT PLAN REPORTING AND COMPLIANCE 6

3. GOVERNANCE 7

3.1. TIMELINE OF IMPLEMENTATION 7
3.2. ADMINISTRATIVE ARRANGEMENTS 8
3.3. RBMPS - STRUCTURE, COMPLETENESS, LEGAL STATUS 9
3.4. CONSULTATION OF THE PUBLIC, ENGAGEMENT OF INTERESTED PARTIES 9
3.5. COOPERATION AND COORDINATION WITH THIRD COUNTRIES 9
3.6. INTEGRATION WITH OTHER SECTORS 9

4. CHARACTERISATION OF RIVER BASIN DISTRICTS 10

4.1. WATER CATEGORIES IN THE RBD 10
4.2. TYPOLOGY OF SURFACE WATERS 10
4.3. DELINEATION OF SURFACE WATER BODIES 10
4.4. IDENTIFICATION OF SIGNIFICANT PRESSURES AND IMPACTS 11
4.5. PROTECTED AREAS 12

5. MONITORING 12

5.1. MONITORING OF SURFACE WATERS 13
5.2. MONITORING OF GROUNDWATER 18
5.3. MONITORING OF PROTECTED AREAS 19

6. OVERVIEW OF STATUS (ECOLOGICAL, CHEMICAL, GROUNDWATER) 19

7. ASSESSMENT OF ECOLOGICAL STATUS OF SURFACE WATERS 24

8. DESIGNATION OF HEAVILY MODIFIED WATER BODIES (HMWB) AND ASSESSMENT OF GOOD ECOLOGICAL POTENTIAL 27

9. ASSESSMENT OF CHEMICAL STATUS OF SURFACE WATERS 29

10. ASSESSMENT OF GROUNDWATER STATUS 30

10.1. GROUNDWATER QUANTITATIVE STATUS 30
10.2. GROUNDWATER CHEMICAL STATUS 30
10.3. GROUNDWATER TREND ASSESSMENT 31
10.4. GROUNDWATER-DEPENDENT TERRESTRIAL ECOSYSTEMS 31
10.5. GROUNDWATER PROTECTED AREAS 31

11. ENVIRONMENTAL OBJECTIVES AND EXEMPTIONS 32

12. PROGRAMMES OF MEASURES 33

12.1. PROGRAMME OF MEASURES – GENERAL 33
12.2. MEASURES RELATED TO AGRICULTURE 34
12.3. MEASURES RELATED TO HYDROMORPHOLOGY 35
12.4. MEASURES RELATED TO GROUNDWATER 35
12.5. MEASURES RELATED TO CHEMICAL POLLUTION 36
12.6. MEASURES RELATED TO ARTICLE 9 (WATER PRICING POLICIES) 36
12.7. ADDITIONAL MEASURES IN PROTECTED AREAS 37

13. CLIMATE CHANGE ADAPTATION, WATER SCARCITY AND DROUGHTS, FLOOD RISK MANAGEMENT AND OTHER EMERGING AND LINKED ISSUES AS PART OF THE RBMP 38

13.1. ADAPTATION TO CLIMATE CHANGE 38

14. RECOMMENDATIONS 38

1. GENERAL INFORMATION

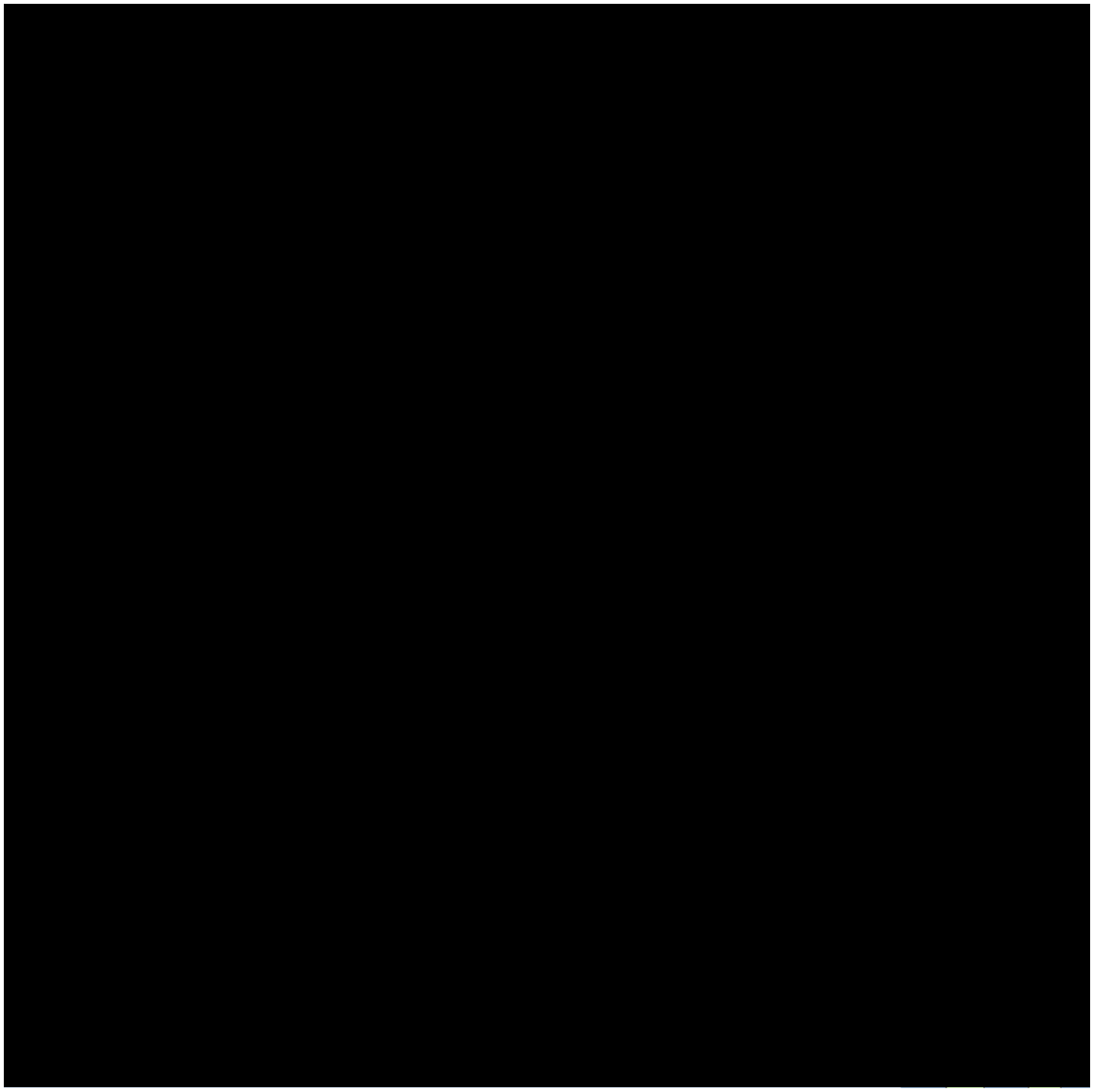

Figure 1.1: Map of River Basin Districts

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, Eurostat (country borders)

Croatia has a population of 4.4 million and a surface area of 56.6 thousand square km[1]. Its geography ranges from the lowlands of the Pannonian basin to the Dinaric Alps and the Dalmatian coastline, over 1700 km long. In addition, Croatia has over 1 200 coastal islands. The Dinaric Alps, coastal areas and islands have a predominantly karstic geology.

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

Croatia has two river basin districts (RBDs): the Danube RBD and the Adriatic RBD (see Table 1.1). Croatia's Danube RBD (HRC) is part of the international Danube river basin district, which covers 14 Member States and third countries. Among these, HRC borders on Slovenia, Hungary, Serbia and Bosnia and Herzegovina.

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

RBD	Name (English / *Croatian*)	Size (km^2) *				Countries sharing borders
		Mainland	Islands	Coastal Waters	Total	
HRC	Danube / *Dunav*	35 101			35 101	Bosnia and Herzegovina, Hungary, Serbia, Slovenia
HRJ	Adriatic / *Jadransko*	18 185	3 262	13 842	35 289	Bosnia and Herzegovina, Montenegro, Slovenia

Table 1.1: Overview of Croatia's River Basin Districts
Source: RBMP
Note: * Area in Croatian territory

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

International river basin	National RBD	Surface area in Croatia (km^2)	Croatia's share of total basin surface area (%)	Co-ordination category
Danube	HRC	35 100	4.4%	1
Sava *	HRC	25 370	26.0%	1

Table 1.2: Transboundary river basins by category (see CSWD section 8.1) and % share in Croatia[2].
Category 1: Co-operation agreement, co-operation body and 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: International Commission for the Protection of the Danube River; International Sava River Basin Committee; WISE/EC Comparative study of pressures and measures in the major river basin management plans in the EU.
Notes: Data on surface areas differ slightly among sources; * the Sava is a sub-basin of the Danube IRBD.

In addition, Croatia's Adriatic river basin district (HRJ) shares four smaller river basins with Bosnia and Herzegovina: Cetina (the basin's surface area in Croatia is 1 531 km^2 while the entire surface area is 2 614 km^2); Neretva (surface area in Croatia is 280 km^2 while the basin's full surface area is 10 520 km^2); Trebišnjica (in Croatia Trebišnjica appears as a series of underwater springs and as the Ombla river, which is only 30 m long but with a relatively large discharge, 24 m^3/sec); and Krka (the source of the river is located on the border between Croatia and Bosnia and Herzegovina). As of 2014, according to the Croatian authorities, joint management plans had been not prepared for any of these river basins. Cooperation for the preparation of joint management plans is on the agenda of the Bilateral Commission of Bosnia and Herzegovina and Croatia for Water Management Issues.

[2] 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).

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

2. STATUS OF RIVER BASIN MANAGEMENT PLAN REPORTING AND COMPLIANCE

In June 2013, Croatia's government adopted a single river basin management plan (RBMP) that covers both the Danube and the Adriatic RBDs.[3] Information on the RBMP was reported to the European Commission in February 2014 (see table 2.1).

RBD	RBMP Date of Adoption	RBMP Date of Reporting
HRC and HRJ	26 June 2013	18 February 2014

Table 2.1: Adoption and reporting to the Commission of Croatia's RBMPs
Sources: RBMP, EIONET

Prior to the RBMP, Croatia had prepared pilot management plans for two sections of the Danube RBD and two small river basins in the Adriatic RBD.

The RBMP is to be revised in 2015, on the same time frame as those in other Member States. The current plan represents a preliminary exercise, undertaken without a number of key methodologies and approaches in place; these are under development and are being put in place for the 2015 plan.

Key strengths include the following:

- The RBMP was prepared *in time for Croatia's accession* to the EU. The RBMP provides a key step forward for river basin management.
- Croatia has recently put in place *new legislation* to support water management, including the transposition of EU legislation. The new legislation includes government regulations on water quality and on minimum fees for water service utilities (though implementation of some key legislation was only starting at the time that the RBMP was published).
- Monitoring has been carried out for *chemical status* based on almost all priority substances. Information is well developed for transitional and coastal waters. However, some methodological elements still need to be developed, including monitoring of biota and sediment.
- *Protected areas* have been identified across the country, including drinking water protected areas, bathing water areas, Natura 2000 sites (the latter on a preliminary basis), and fish and shellfish areas.
- Croatia is engaged in *international cooperation* for water management with neighbouring countries in multilateral forums and through bilateral agreements (Art. 13 of the WFD). The RBMP cites international work on the Danube, along with the work for its tributary, the Sava, as well as agreements with neighbouring Member States and third countries. The RBMP, however, provides relatively little information on cooperation related to its preparation, an important issue for HRC in particular.

Key weaknesses include the following:

[3] "O.G.", No. 82/13

- The RBMP does not provide justification on *exemptions* for specific water bodies (Art. 4(4)), even though it notes that some water bodies will not attain good status by 2015.
- There is no systematic review of the existing water permits to ensure that they are consistent with the achievement of the WFD environmental objectives.
- While potential *HMWB and AWB* have been identified and preliminary data on their attainment of good ecological potential is presented, the designation of these bodies will be made in the second RBMP (Annex II). Moreover, the current RBMP does not provide information on a methodology for identifying HMWBs, nor one for establishing GEP (Annex II and Annex V).
- The monitoring and assessment of *ecological status* (as per Annex V of the WFD) was not developed for the first RBMP. In particular, WFD-compliant assessment methods and reference conditions for rivers and lakes were not in place at the time the RBMP was prepared. The RBMP refers to ongoing scientific work to develop these. Monitoring data and assessment methods have been further developed for coastal and transitional waters.
- Groundwater operational monitoring has not been established. The *assessment of groundwater status* is not fully developed. Groundwater dependent ecosystems appear not to have been considered in HRC.
- The current *Programme of Measures* only includes basic measures and not supplementary measures (e.g. hydromorphological measures), though these appear to be needed as not all water bodies will achieve good status by 2015. The costs for some measures are provided, including those requiring major investments such as wastewater treatment plants. While potential sources of finance are indicated, further detail is not provided.
- Croatian legislation provides a broad definition of *water uses*, but a restrictive definition of *water services*: the latter focuses on municipal water utilities. National legislation contains provisions for *cost recovery* for water services (Art. 9). These provisions, however, are still in the process of being implemented. A preliminary assessment of cost recovery was carried out for the RBMP, which underlines that further work is needed. Methods to calculate environmental and resource costs have not yet been put in place.

The RBMP indicates in a number of places the intention to address shortcomings in the next RBMP, to be adopted by December 2015, including via ongoing scientific projects.

3. GOVERNANCE

3.1. Timeline of implementation

The RBMP was adopted in June 2013, just before Croatia joined the EU on 1 July 2013. The draft RBMP was presented in December 2010.

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**
HRC	01/08/2010	09/09/2010	03/12/2010	03/12/2010	03/12/2010	26/06/2013
HRJ	01/08/2010	09/09/2010	03/12/2010	03/12/2010	03/12/2010	26/06/2013

Table 3.1.1: Timeline of the different steps of the implementation process
Source: WISE (Summary 1.3.2 for each RBD) except for Final RBMP
Note: * Due dates refer to those set in the Water Framework Directive. Croatia acceded to the EU on 1 July 2013. The Accession Agreement does not set different due dates for Croatia, and thus the requirements take force from the date of accession.

According to information reported to WISE, a single period for consultation was provided for both the significant water management issues and the draft RBMP; however, a separate document indicating the significant water management issues has not been found. The period for written comments lasted 20 months.

3.2. Administrative arrangements

The RBMP was prepared by Hrvatske vode (Croatian Waters), the national body responsible for water management under the Ministry of Agriculture. A single, national approach is followed for both RBDs.

A range of government bodies are responsible for policy areas that affect water use and water management (see Figure 3.2.1). Permitting – notably for IPPC facilities – is carried out by the Ministry of Environment and Nature Protection in coordination with other authorities, including the Ministry of Agriculture, while reporting by IPPC facilities is done to the Croatian Environment Agency, the Ministry of Environment and Nature Protection, Hrvatske vode and competent county authorities. The Ministry of Construction and Physical Planning is responsible for Spatial Planning, along with regions and local authorities. Nature Conservation is under the Ministry of Environment and Nature Protection and the State Institute for Nature Protection. The Ministry of Maritime Affairs, Transport and Infrastructure is responsible for navigation in both marine and inland waters (both the Danube and the Sava rivers have significant navigation). The Ministry of Economy is in charge of energy. The Ministry of Agriculture is in charge of fisheries and aquaculture. The Ministry of Culture leads on policy for the protection of historic monuments.

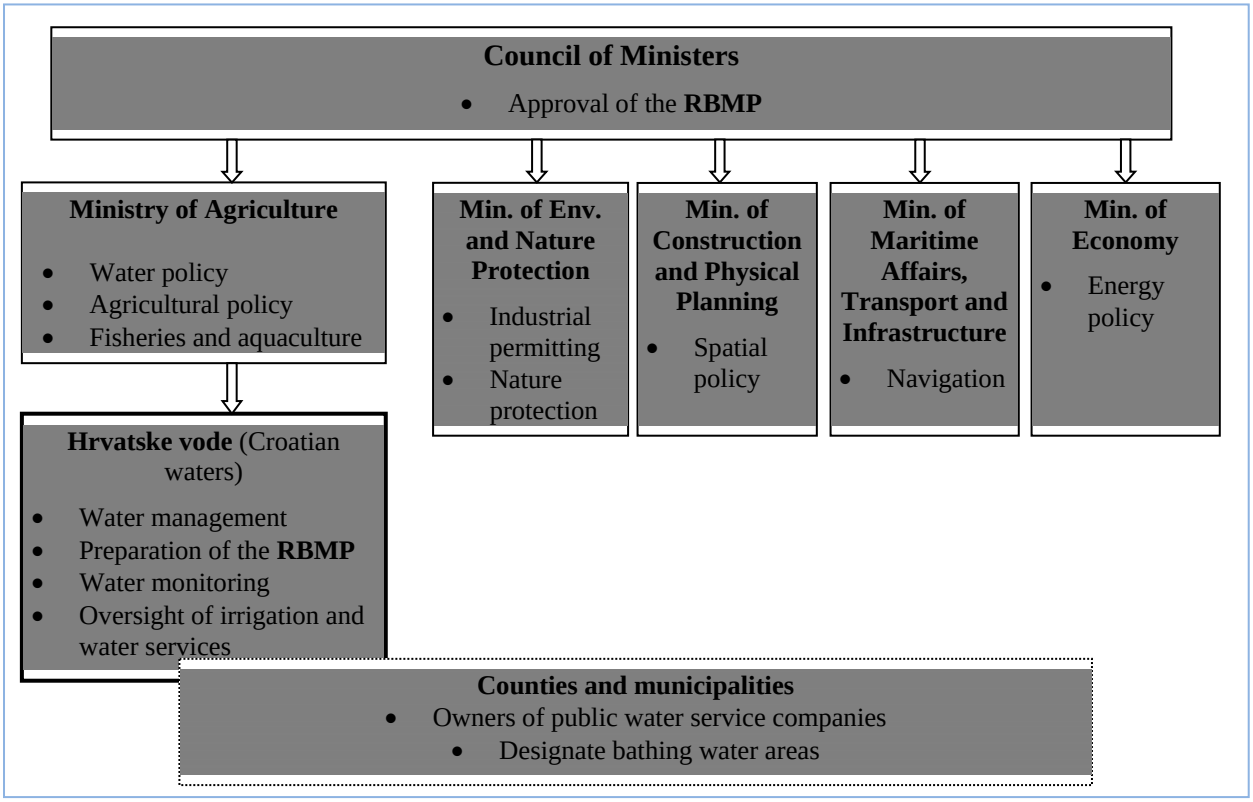

Figure 3.2.1 Key authorities for water management and the RBMP in Croatia

3.3. RBMPs - Structure, completeness, legal status

The RBMP refers to the work underway for the Danube international RBMP and the Sava international RBMP – however, it does not provide details on the relationship between these international actions and river basin planning in Croatia's HRC river basin district.
The RBMP was approved by a regulation of the national government: as such, it is binding on government bodies but not on individuals or enterprises.

3.4. Consultation of the public, engagement of interested parties

Public consultation on the RBMP was carried out via the Internet, written comments and also a series of public consultation meetings that involved academia, water service companies, energy, industry, agriculture, inland navigation and nature protection stakeholders.

According to the RBMP, two-thirds of the 172 written comments were accepted in the plan. Discussions at workshops also had an influence. The plan does not, however, specify the changes that were introduced due to comments.

No information was found on transboundary aspects of public participation for the Croatian RBMPs.

3.5. Cooperation and coordination with third countries

As noted in Section 1, Croatia is part of the Danube international RBD and also the Sava international basin, a sub-basin of the Danube. Both the Danube and the Sava have permanent bodies that oversee cooperation and the preparation of their RBMPs: Croatia is a full member of the International Committee for the Protection of the Danube River, and also of the Sava River Commission.

An international RBMP was adopted for the Danube international RBD in 2009, and a revision is currently in preparation for 2015 as part of the second RBMP cycle. A draft RBMP for the Sava has been prepared; public consultation was carried out from 21 December 2011 through 21 April 2012.

While Croatia's current RBMP mentions both the Danube and Sava processes, it does not explain how it is linked to these international RBMPs. Although Croatia provided information for the Danube and Sava processes, the timetables for the development of Croatia's first RBMP were not aligned with those of the international RBMPs (to be completed in 2015); the harmonisation of Croatian and international processes is expected to be on track for the second RBMP, also to be completed in 2015.

Croatia has signed bilateral agreements on water management with its two neighbouring Member States and with two of its three neighbouring third countries: Hungary (1994); Bosnia and Herzegovina (1996); Slovenia (1997), Montenegro (2008).

3.6. Integration with other sectors

The RBMP does not describe integration with other sectors or sectoral plans. It does not, for example, refer to possible links with spatial and land use planning (the 1997 Spatial Planning Strategy of the State and the 1999 Spatial Planning Programme of the State provide a framework for land use planning).

4. CHARACTERISATION OF RIVER BASIN DISTRICTS

4.1. Water categories in the RBD

Croatia contains all four water categories; however, its Danube RBD (HRC) is land-locked and thus does not include transitional or coastal waters (see Table 4.1.1).

RBD	Rivers	Lakes	Transitional	Coastal
HRC	29	10	0	0
HRJ	27	4	6	5

Table 4.1.1: Surface water body types at RBD level
Source: WISE

4.2. Typology of surface waters

The typology of surface waters is contained in Annex 12 of the Regulation on the Standard of Quality of Waters[4]: this annex contains a list of river types, lake types, transitional water types and surface water types. The Regulation entered into force on the same day as the RBMP was adopted (26 June 2013). According to the Croatian authorities, the typology was tested against biological data and was used for the RBMP.

4.3. Delineation of surface water bodies

In total, Croatia has delineated over 1 300 surface water bodies; over 90% of these are river water bodies. The RBMP indicates that a future process may redefine some water bodies[5].

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)*
HRC	897	12	29	4	0	0	0	0	20	-
HRJ	334	7	5	8	28	5	22	625	12	-
Total	*1231*	*10.6*	*34*	*4.6*	*28*	*5*	*22*	*625*	*32*	*1942*

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

The RBMP refers to small water bodies. These are defined by their catchment area (less than 10 km^2) for river water bodies and by their surface for lakes (less than 0.5 km^2). Small water bodies make up a significant share of rivers: about 80% of the total length of rivers in HRC are small water bodies.

For small water bodies, analysis and typology is not carried out: where needed, these water bodies are treated in accordance with criteria applicable to the connected larger surface water bodies.

[4] "O.G.", No. 73/13

[5] The RBMPs reports 2 additional surface water bodies (total 1317) which are water bodies DSRI115004 (ecotype T03B) and DSRI115003 (ecotype T04C), located on the Croatian – Serbian border. Their position is such that the watercourses with a catchment area larger than 10 km^2 are situated in the Republic of Serbia, and a part of the watercourses with a catchment area smaller than 10 km^2 are situated on the territory of the Republic of Croatia.

The RBMP outlines the criteria for the delineation of transitional water bodies: this was done on the basis of ecoregions, salinity, tides and composition of the substrate.

4.4. Identification of significant pressures and impacts

According to the Croatian authorities, pressures and impacts were analysed at the water body level. Criteria for determining the level of a significant pressure were not developed. Pollution pressures and impacts were analysed using a model balancing nutrient and pollution inputs with their transport measured at surrounding monitoring stations as well as the interpolation of water status for water bodies lying between those with monitoring stations.

The following pressures were analysed:

- point source pollution (in particular, discharges of urban wastewater systems and industrial wastewater systems) and
- diffuse pollution from farms and agricultural land and settlements without a sewerage system

The analysis was carried out for organic pollution parameters (BOD_5 and COD) and nutrients (N and P) as well as some of the parameters on the list of dangerous and priority substances.

The pressures and impact analysis of morphological and hydrological modifications was carried out according to available data on existing modifications as well as through expert assessments of the sensitivity of individual water body types to certain changes and the impact magnitude of specific hydromorphological elements on water status.

Water abstraction and its impact on the status of water bodies was also considered for the RBMP. According to the Croatian authorities, legislation is in place prescribing that records must be kept of groundwater abstractions for public water supply and for commercial use.

RBD	No pressures		Point source		Diffuse source		Water abstraction		Water flow regulations and morphological alteration		River management		Transitional and coastal water management		Other morphological alterations		Other pressures	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
HRC	27	2.9	276	29.7	893	96.2	8	0.9	312	33.6	372	40.1	0	0.0	187	20.2	0	0
HRJ	16	4.3	36	9.8	320	87.0	8	2.2	81	22.0	157	42.7	22	6.0	72	19.6	0	0
Total	43	3.3	312	24.1	1213	93.6	16	1.2	393	30.3	529	40.8	22	1.7	259	20.0	0	0

Table 4.4.1: Significant pressures affecting water bodies (by number of water bodies and per cent of RBD total)
Source: Information provided to the Commission by Croatian authorities on 3 November 2014. The information was provided as a follow up to the bilateral meeting with Croatia concerning the implementation of the Water Framework Directive in Croatia, which took place on 3 July 2014.

Table 4.4.1 indicates the number of water bodies affected by significant pressures. Pressures were attributed to water bodies:

- in which a point of discharge for point sources of pollution was located;
- whose direct catchment includes the area from which diffuse pollution originates; and
- those in which a morphological alteration is located.

This approach was adapted to assess the cumulative effect of a large number of smaller pressures and also the relationship between point and diffuse loads, particularly on smaller watercourses.

According to the Croatian authorities, a similar analysis will be undertaken for the second planning cycle; however, the inclusion of additional pressures, such as diffuse pollution from transport, is planned, with the aim of providing fuller coverage of the list of pressures in Guidance Document No 3 on Analysis of Pressures and Impacts.

4.5. Protected areas

In Croatia, over 2 700 protected areas have been designated (see Table 4.5.1): over 900 areas are designated for drinking water abstraction under Art. 7 of the WFD and a similar number are designated as bathing protected areas. Nearly 700 areas were designated under the Habitats Directive.

RBD	Number of PAs										
	Article 7 Abstraction for drinking water	**Bathing**	**Birds**	**European Other**	**Fish**	**Habitats**	**Local**	**National**	**Nitrates**	**Shellfish**	**UWWT**
HRC	649	2	12		21	263		69	10		1
HRJ	254	905	4		21	428		77	1	18	55
Total	*903*	*907*	*16*		*42*	*691*		*146*	*11*	*18*	*56*

Table 4.5.1: Number of protected areas of all types in each RBD and for the whole country, for surface and groundwater[6]
Source: WISE

According to the RBMP, Hrvatske vode is establishing an electronic register of protected areas: protected areas for drinking water will be included. Croatia has developed an ecological network of protected sites, providing the basis for proposed Natura 2000 sites. Areas for bathing, for the protection of freshwater fish and for shellfish have been designated.

5. MONITORING

Croatia has a single national approach to monitoring. National legislation includes a requirement to put in place a monitoring programme. According to the RBMP, the plan was being harmonised with the WFD's approach during the preparation of the RBMP. Croatia has established programmes which provide both operational and surveillance monitoring.

[6] 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.

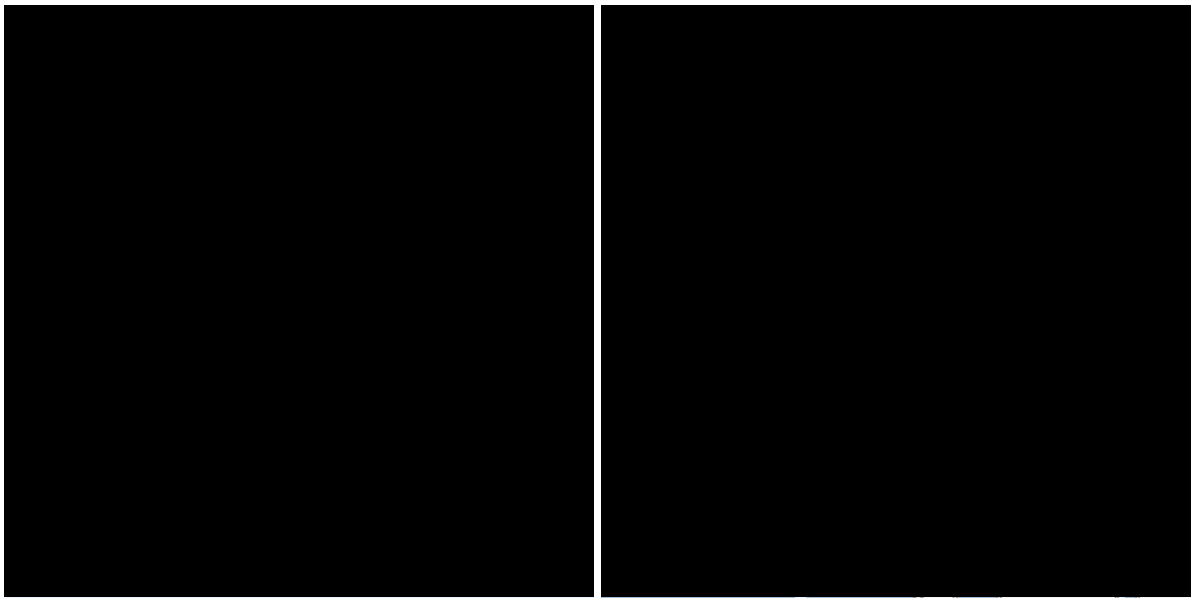

Figure 5.1: Maps of surface water (left) and groundwater (right) monitoring stations

- 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)

5.1. Monitoring of surface waters

According to information provided by Croatia in WISE, most of the required biological quality elements are being monitored in rivers and lakes. However, in terms of the supporting hydromorphological quality elements, only the hydrological regime is reported to be monitored in rivers and not the morphological conditions. Hydromorphology is not monitored in lakes, transitional and coastal waters.

In transitional waters several biological quality elements were not monitored. Those missing are: macroalgae; angiosperms and benthic invertebrates.

In coastal waters all expected biological quality elements were reported to be monitored.

General physico-chemical QEs are reported to be monitored, but it is not clear whether or not all the expected determinants associated with the physico-chemical elements have been monitored.

In addition, the RBMP states that surveillance monitoring of rivers used for the plan only provided data for the “saprobic index”, using macrozoobenthos. Moreover, as noted also below, the preliminary ecological assessment of rivers and lakes only considered available physico-chemical and hydromorphological parameters.

In 2014, the Croatian authorities were in the process of adopting two supporting documents for the monitoring programmes: the Methodology of sampling, laboratory analyses and determination of the ecological quality ratio for biological quality elements; and the Methodology for monitoring and assessment of hydromorphological indicators.

According to the Croatian authorities, monitoring of hydromorphological quality elements in surface waters will be carried out in the period 2014 to 2018 (based on the new Methodology). Monitoring of hydromorphological elements for transitional and coastal waters was in development and testing in mid-2014, whereas for natural lakes monitoring will be developed only for the third RBMP cycle.

According to the Croatian authorities, the monitoring of fish in natural lakes was carried out in 2012 and 2013 (see Table 5.1 below). In the period 2015–2018, surveillance and operational monitoring of fish will be performed in all lakes and reservoirs and the Regulation on the Standard of Quality of Waters is planned to be supplemented with a classification system for fish in lakes and reservoirs only in 2018.

A review of the methodologies for the monitoring of physico-chemical and chemical quality elements were in preparation as of mid-2014.

RBD		HRC	HRJ
Rivers	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 QEs		
	QE3.1 General Parameters		
	QE3.3 Non priority specific pollutants		
	QE3.4 Other national pollutants	-	-
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 QEs		
	QE3.1 General Parameters		
	QE3.3 Non priority specific pollutants		
	QE3.4 Other national pollutants	-	-

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 Macroalgae	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
HRC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HRJ							-				-						-	-				-

Table 5.1: Quality elements monitored

	QE Monitored
	QE Not monitored
-	Not Relevant

Source: WISE

RBD	Rivers		Lakes		Transitional		Coastal		Groundwater		
	Surv	**Op**	**Surv**	**Op**	**Surv**	**Op**	**Surv**	**Op**	**Surv**	**Op**	**Quant**
HRC	107	32	3	1	0	0	0	0	225	0	102
HRJ	10	6	3	4	0	52	0	87	39	0	42
Total by type of site	*117*	*38*	*6*	*5*	*0*	*52*	*0*	*87*	*264*	*0*	*144*
Total number of monitoring sites[7]	132		10		52		87		371		

Table 5.2: Number of monitoring sites by water category
Surv = Surveillance, Op = Operational, Quant = Quantitative
Source: WISE
Note: Some sites are used for both surveillance and operational monitoring

Croatia reported to WISE that there are 281 surface water monitoring sites (see Table 5.2).

According to Croatia's RBMP, biological quality elements in operational monitoring are chosen in relation to existing pressures. However, no information was found on which BQEs have been selected to monitor which significant pressures. The RBMP also states that operational monitoring is only carried out in relation to point source pressures, not diffuse sources.

Operational monitoring of chemical status appears to cover most priority substances (not covered, according to information provided on WISE, are trifluralin and pentabromodiphenylether compounds). According to the latest information available, surveillance monitoring of PAHs (polycyclic aromatic hydrocarbons) and all relevant priority substances is planned to be carried out at 117 monitoring stations.

Croatia's 2013 Regulation on the Standard of Quality of Waters incorporates the WFD's requirements as regards monitoring substances in sediment and biota; however, neither the information reported on WISE nor in the RBMP indicate whether this monitoring was carried out for the first RBMP. As of mid-2014, Croatia reported to the Commission that it has started monitoring in sediments and will ensure that trends are monitored in sediments and/or biota according to Article 3(3) of the EQS Directive.

Design of the operational monitoring was adapted to financial and organisational capacities.

During the development of first RBMP, a need was identified to carry out a more detailed assessment and also modify water body typology. In this process, it was decided to keep the original monitoring network to maintain historical data for the new classification to be established for the development of the second RBMP.

Croatia's monitoring programmes are linked to the Trans National Monitoring Network (TNMN), which coordinates monitoring across the international Danube River Basin District, as well as to the bilateral monitoring programme with Slovenia and bilateral agreements with Hungary.

[7] 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.

5.2. Monitoring of groundwater

Croatia has established quantitative and chemical surveillance monitoring programmes for groundwater. It appears that chemical operational monitoring was not carried out for the RBMP. The expected core parameters are reported to be monitored for surveillance monitoring of chemical status.

Croatia differentiates monitoring of groundwater in karst and Pannonian (alluvial) geological areas (HRJ contains mostly karst areas, but also some Pannonian areas; HRC contains mostly Pannonian areas but also some karst).

According to the RBMPs, chemical surveillance monitoring in karst areas will in the future be expanded in terms of the monitoring network and will include the core parameters under the WFD, additional parameters under the Groundwater Directive and supplementary parameters relevant for establishment of the state of water (for example, free CO_2, temperature, orthophosphates, iron, turbidity, manganese and mineral oils).

Surveillance monitoring of the quantitative status of groundwaters in karst areas will encompass in the future abstraction sites for public water supply.

The RBMP states that operational monitoring will be organised in karst areas for all grouped groundwater bodies which are under risk.

In the Pannonian area, the RBMP states that surveillance monitoring will include sites of existing and planned hydropower plants.

The RBMP states that the operational monitoring of the Pannonian area will be carried out for all grouped groundwater water bodies which are at risk and that the monitoring should be carried out once a month for a number of specified parameters (NO_3; pesticides; pH-value; EC; saturated oxygen; NH_4; As; Cd; Pb; Hg; Fe; Mn; Cl; SO_4; trichlorethylene and tetrachlorethylene).

In the future, in the Pannonian area, groundwater quality monitoring will be aligned with the need to monitor the status of water in relation to nitrate pollution from agriculture.

The RBMP and WISE do not indicate how the groundwater chemical status monitoring programmes will be designed in order to detect significant and sustained upward trends in pollutants.

In terms of the results of groundwater monitoring in the first RBMP, one of the problems identified is saline intrusion in some coastal areas (HRJ). In some of these areas, higher water abstraction during summer months results in an increase of chloride; in addition, in some points saline intrusion is the result of entirely natural conditions. The Croatian authorities have confirmed that the reasons for salt water intrusion caused by water abstraction will be further investigated under the second RBMP.

The Danube TNMN, which has focused on surface waters, is starting to address groundwater monitoring, focusing on groundwater bodies of basin-wide importance. The relationship between this and national monitoring in Croatia, however, is not indicated in the RBMP or WISE.

5.3. Monitoring of protected areas

Croatia did not report to WISE information on monitoring programmes for drinking water protected areas or other protected areas. This is not indicated in the RBMP either; however, Croatia's Law on Waters[8] specifies that monitoring should be carried out for surface water and groundwater bodies supplying more than 100 m^3 of drinking water a day.[9] Croatian authorities indicated in 2014 that the monitoring of water status in protected areas is carried out as per the Law on Waters and the Regulation on the Standard of Quality of Waters.

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

In WISE, Croatia has reported information on the ecological status/potential and chemical status of its water bodies (see tables 6.1 to 6.6 and figure 6.1 to 6.6)[10].

RBD	Total	High		Good		Moderate		Poor		Bad		Unknown	
		No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
HRC	682	144	21.1	214	31.4	143	21.0	90	13.2	91	13.3	0	0
HRJ	335	132	39.4	130	38.8	39	11.6	18	5.4	14	4.2	2	0.6
Total	*1017*	*276*	*27.1*	*344*	*33.8*	*182*	*17.9*	*108*	*10.6*	*105*	*10.3*	*2*	*0.2*

Table 6.1: Preliminary assessment of Ecological status of natural surface water bodies
Source: WISE

RBD	Total	High		Good		Moderate		Poor		Bad		Unknown	
		No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
HRC	92	5	5.4	12	13.0	19	20.7	36	39.1	20	21.7	0	0
HRJ	2	0	0.0	1	50.0	0	0.0	0	0.0	1	50.0	0	0
Total	*94*	*5*	*5.3*	*13*	*13.8*	*19*	*20.2*	*36*	*38.3*	*21*	*22.3*	*0*	*0*

Table 6.2: Preliminary assessment of Ecological potential of candidate artificial and heavily modified water bodies
Source: WISE

RBD	Total	Good		Poor		Unknown	
		No.	%	No.	%	No.	%
HRC	682	667	97.8	15	2.2	0	0.0
HRJ	335	330	98.5	3	0.9	2	0.6
Total	*1017*	*997*	*98.0*	*18*	*1.8*	*2*	*0.2*

Table 6.3: Chemical status of natural surface water bodies
Source: WISE

RBD	Total	Good		Poor		Unknown	
		No.	%	No.	%	No.	%
HRC	92	90	97.8	2	2.2	0	0.0
HRJ	2	2	100.0	0	0.0	0	0.0
Total	*94*	*92*	*97.9*	*2*	*2.1*	*0*	*0.0*

Table 6.4: Chemical status of candidate artificial and heavily modified surface water bodies
Source: WISE

[8] "O.G.", No. 153/09, 63/11, 130/11, 56/13 and 14/14
[9] Art. 88(2)
[10] Data reported to WISE is slightly different from that presented in the RBMP

RBD	Good		Poor		Unknown	
	No.	%	No.	%	No.	%
HRC	18	90.0	2	10	0	0.0
HRJ	10	83.3	2	16.7	0	0.0
Total	*28*	*87.5*	*4*	*12.5*	*0*	*0.0*

Table 6.5: Chemical status of groundwater bodies
Source: WISE

RBD	Good		Poor		Unknown	
	No.	%	No.	%	No.	%
HRC	19	95.0	1	5.0	0	0.0
HRJ	8	66.7	2	16.7	2	16.7
Total	*27*	*84.4*	*3*	*9.4*	*2*	*6.2*

Table 6.6: Quantitative status of groundwater
S**ource***:* WISE

Croatia's RBMP indicates the number of river water bodies that are expected to achieve good ecological and chemical status in 2015 (although ecological status assessment method is not fully WFD compliant). It does so for two 'scenarios', depending on the schedule and transition periods for meeting key water legislation such as the Directive on Urban Wastewater Treatment. For lakes, an estimate of good chemical status in 2015 is provided. For transitional and coastal waters, there is an expert assessment of the number of water bodies expected to fail objectives in 2015.

The RBMP reports that in both scenarios, all rivers are expected to attain good chemical status by 2015 (all rivers in HRJ already attain good chemical status).
The RBMP indicates that exemptions are expected to be needed as some water bodies will likely not achieve good status by 2015. The plan does not, however, set out these exemptions as it states that further information and assessment are required; it indicates that the exemptions will be presented in Croatia's next RBMP.

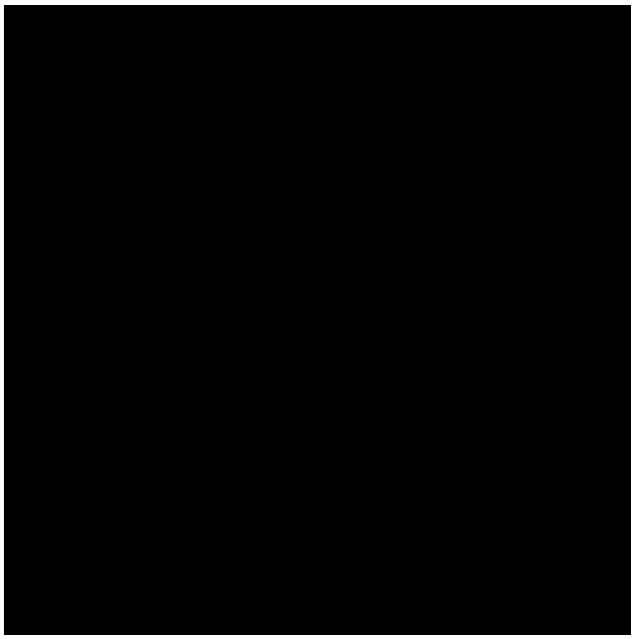

Figure 6.1: Map of preliminary assessment of ecological status of natural surface water bodies, 2009

Figure 6.2: Map of preliminary assessment of ecological potential of candidate artificial and heavily modified water bodies, 2009

Good or better
Moderate
Poor
Bad
Unknown
River Basin Districts
Countries outside EU

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

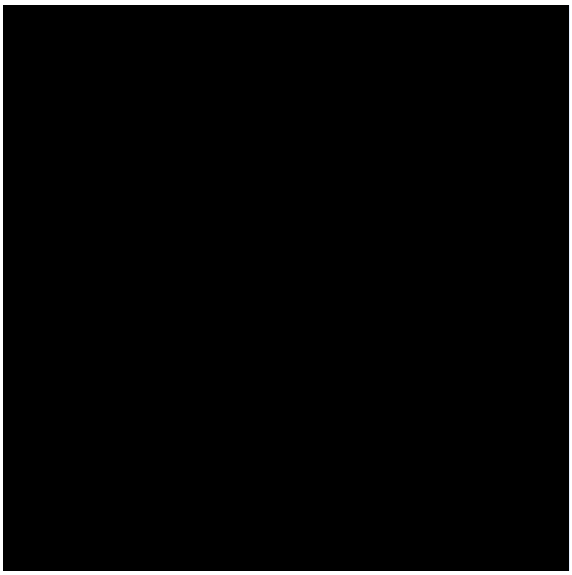

Figure 6.3: Map of chemical status of natural surface water bodies, 2009

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

Source: WISE, Eurostat (country borders)
Note: Standard colours based on WFD Annex V, Article 1.4.3.

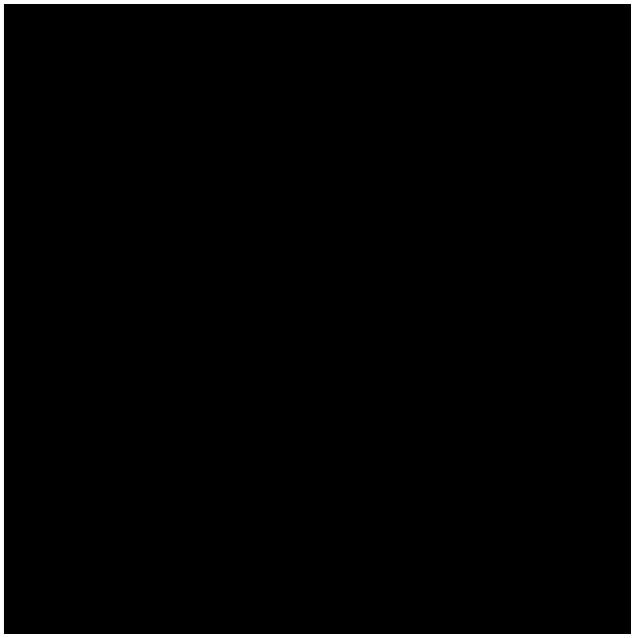

Figure 6.4: Map of chemical status of candidate artificial and heavily modified water bodies 2009

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

Source: WISE, Eurostat (country borders)
Note: Standard colours based on WFD Annex V, Article 1.4.3.

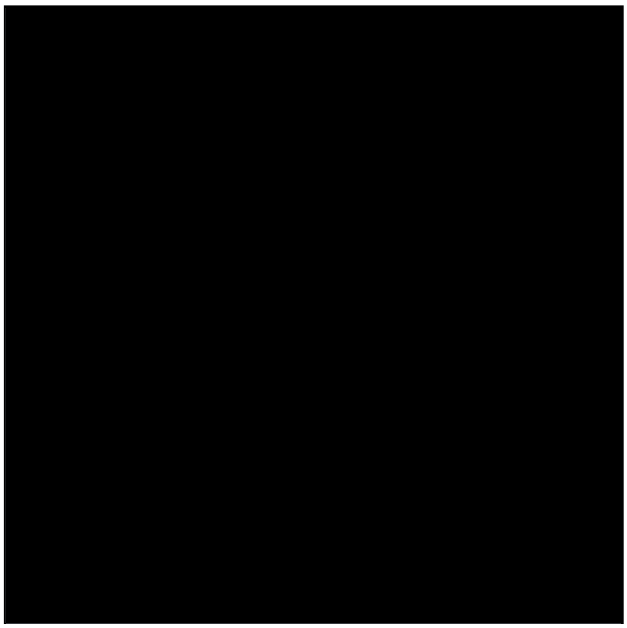

Figure 6.5: Map of chemical status of groundwater bodies 2009

Good
Poor
Unknown
River Basin Districts
Countries outside EU

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

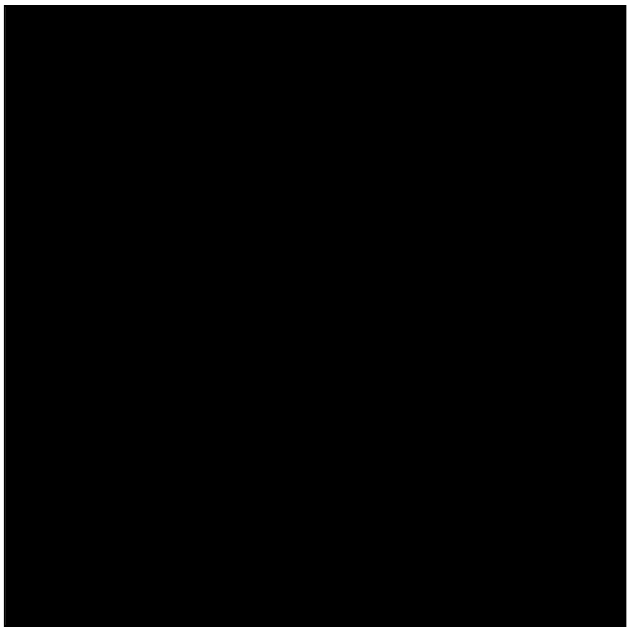

Figure 6.6: Map of quantitative status of groundwater bodies 2009

Good
Poor
Unknown
River Basin Districts
Countries outside EU

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

7. ASSESSMENT OF ECOLOGICAL STATUS OF SURFACE WATERS

Croatia has a single, national approach to the assessment of ecological status. However, the approach for assessment was still in development at the time that the RBMP was prepared.
The assessment of rivers for the RBMP used a prior approach, the "saprobic" method, which is not compliant with WFD requirements. For the RBMP, a preliminary assessment of the ecological status of rivers was made using only physico-chemical[11] and hydromorphological quality elements – but these could not have been linked to BQEs as the latter had not been established. The required biological quality elements are reported to be monitored in rivers but are not used in ecological status classification indicating that WFD compliant biological assessment methods are not yet available. The assessment of the hydromorphological status is reported in WISE as being based on an expert analysis of hydromorphological pressures. In terms of overall classification of status reported to WISE, often a worse overall class is reported than indicated by either the physicochemical or hydromorphological QEs: the reasons for this are not known.

The classification of ecological status of lakes is also only based on physico-chemical QEs and hydromorphological QEs even though BQEs are reported to be monitored, again indicating the lack of appropriate biological assessment methods for lakes. Also as for rivers the overall status classification for lakes is often worse than indicated by the supporting QEs.

The RBMP cites a scientific project underway on biological assessment for ecological status of rivers and lakes: this project will work on reference conditions and class boundaries for several BQEs (fish, macroinvertebrates, macrophytes and phytobenthos). On the basis of this information, it appears that biological assessment methods were not available for rivers and lakes at the time the RBMP was prepared.

Most transitional water bodies were classified according to phytoplankton, fish, physico-chemical and hydromorphological QEs and a few also using macroinvertebrates.

In terms of coastal waters, all water bodies are classified according to phytoplankton, physico-chemical and hydromorphological QEs and a few also using macroinvertebrates. Angiosperms and macroalgae are also reported to be monitored but are not used in the classification. Hydromorphological QEs are used in the classification but are not reported to be monitored.

For coastal and transitional waters, the RBMP reports that methods are being developed, also taking into consideration methods in other Member States (see Table 7.2.1). There appear to be methods and at least preliminary reference conditions for phytoplankton and macroinvertebrates but those for fish, macroalgae and angiosperms are only partly developed at best.

The RBMP does not refer to the use of the one-out-all-out principle for assessing ecological status of rivers and lakes. However, the description of the assessment of coastal and transitional waters for HRJ indicates that this principle was followed. Moreover, Croatia's 2013 Regulation on the Standard of Quality of Waters cites this approach, which thus could be expected to be used in future RBMPs.

[11] The RBMP reports that four physico-chemical QEs are currently used: biochemical oxygen demand; chemical oxygen demand; total nitrogen; and total phosphorus.

The RBMP notes that the assessment of the status of rivers and lakes (general physico-chemical and hydromorphological status and general chemical status) is affected by uncertainties stemming from the current system of monitoring and assessment. To address this, water bodies were split into three groups, depending on the estimated degree of certainty of the assessed status of water bodies: first, water bodies which meet the environmental objectives (with high degree of certainty); second, water bodies for which there is a uncertainty whether they meet the environmental objectives; and third, water bodies which do not meet the environmental objectives (with high degree of certainty). The WISE Summary does not, however, explain how uncertainties themselves are addressed in the three categories. According to the information provided in WISE, intercalibration results had been implemented in Croatia for the first RBMP. According to the Croatian authorities, the Carlit method (macroalgae of coastal waters) and POMI (Posidonia oceanica method) used in Croatia are intercalibrated in the framework of the EU process (specifically, the MED GIG group), and the limit values for biological quality elements for macrozoobenthos and chlorophyll a (for transitional and coastal waters) have been adopted from the results obtained during the intercalibration process in MED GIG. Croatia is also undertaking initiatives for the intercalibration of methods for assessment of biological quality elements with neighbouring countries: this is planned as an initiative in cooperation with Slovenia.

According to the latest information available, Croatia intends to review its list of River Basin Specific Pollutants in the light particularly of a study on pollutants from agriculture, and will also review the EQS set for the RBMPs according to the 2011 Technical Guidance Document on Deriving EQS.

Croatia's 2013 Regulation on the Standard of Quality of Waters (Annex 2B and Annex 2C) includes all quality elements required according to Annex V of the WFD, with the exception of fish in lakes and hydromorphological indicators in lakes, transitional and coastal waters. This will be used for the second RBMP.

The Regulation on the Standard of Quality of Waters[12] is planned to be amended as the database of biological and other environmental data grows. In addition, Croatia plans to adopt a methodology of sampling, laboratory analyses and determination of the Ecological Quality Ratio for Biological Quality Elements and a methodology for monitoring and assessment of hydromorphological indicators, to fill key gaps in the setting of reference conditions.

[12]"O.G.", No. 73/13

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
HRC															-	-	-	-	-	-	-	-	-	-	-	-	-
HRJ																											

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

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

The RBMP indicates that HMWBs and AWBs have not been designated in Croatia, though a preliminary identification has been made. These candidate water bodies were identified on the basis of expert judgement; the RBMP states that further research is needed for designation.
In HRC, 92 potential AWBs have been identified (70 RWBs and 22 LWBs), according to information provided on WISE, and 2 potential AWBs were identified in HRJ. The RBMP indicates 206 potential HMWBs, although this has not been reflected in the WISE reporting (see Tables 8.1.1a and 8.1.1b). Also, information contained in Tables 8.1.1a and 8.1.1b differs slightly concerning AWB for rivers and lakes in HRC.

Neither the RBMP nor recent water legislation sets out a clear methodology and criteria for the designation of HMWBs and AWBs.

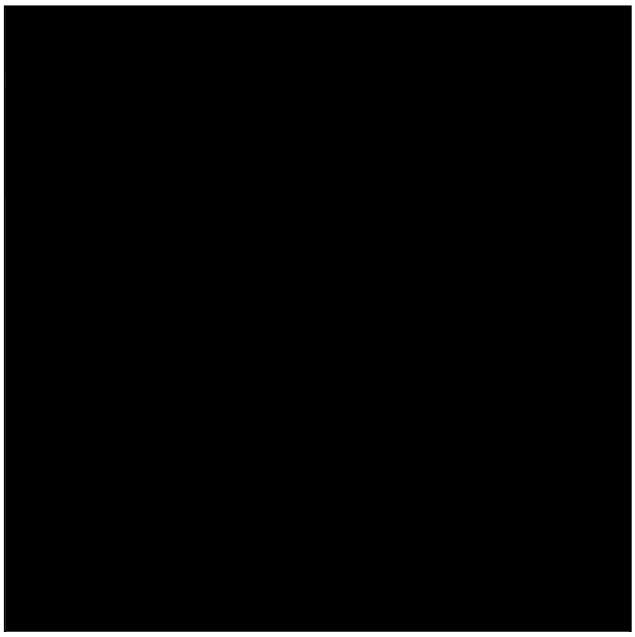

Figure 8.1: Map of the percentage of candidate heavily modified and artificial water bodies by River Basin District

0 – 5 %
5 – 20 %
20 – 40 %
40 – 60%
60 – 100 %
No data reported
River Basin Districts
Countries outside EU

Source: WISE, Eurostat (country borders)

HMWB or AWB	RBD	Water category									
		Rivers		Lakes		Transitional water		Coastal water		All water bodies	
		Number	% of category	Number	% of category	Number	% of category	Number	% of category	Number	%
HMWB	HRC	0	0	0	0	0	0	0	0	0	0
	HRJ	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0
AWB	HRC	70	7.8	22	75.9	0	0	0	0	92	9.9
	HRJ	2	0.6	0	0	0	0	0	0	2	0.5
	Total	*72*	*5.85*	*22*	*64.7*	*0*	*0*	*0*	*0*	*94*	*7.1*

Table 8.1.1a: Number and percentage of candidate HMWBs and AWBs, according to information on WISE
Source: WISE

HMWB or AWB	RBD	Water category									
		Rivers		Lakes		Transitional water		Coastal water		All water bodies	
		Number	% of category	Number	% of category	Number	% of category	Number	% of category	Number	%
HMWB	HRC	150	16.6	2	7.1	0	0	0	0	152	16.4
	HRJ	42	12.5	0	0	8	29.6	4	17.3	54	13.8
	Total	*192*	*15.5*	*2*	*6*	*8*	*29.6*	*4*	*17.3*	*206*	*15.6*
AWB	HRC	71	7.8	21	75	0	0	0	0	92	9.9
	HRJ	2	0.6	0	0	0	0	0	0	2	0.5
	Total	*73*	*5.9*	*21*	*63.6*	*0*	*0*	*0*	*0*	*94*	*7.1*

Table 8.1.1b: Number and percentage of candidate HMWBs and AWBs, according to information provided in the RBMP
Source: RBMP

The RBMP does not provide information regarding whether the definition of a methodology for good ecological potential (GEP) has been defined in Croatia. According to Article 18(1) of the Regulation on the Standard of Quality of Waters, the ecological potential for an artificial or heavily modified surface water body is established on the basis of monitoring results of BQEs, as well as physico-chemical, chemical and hydromorphological QEs.

According to the Croatian authorities, a methodology for assessment of GEP will be developed during the second RBMP cycle, and it should be ready only in 2017. A scientific research project will develop GEP for rivers and lakes. A classification system for ecological potential of transitional and coastal waters is being developed in the framework of the Programme of systematic testing of transitional and coastal water quality.

The preliminary assessment of ecological potential reported to WISE indicates that 92 of the 94 candidate AWBs reach good ecological potential. These results, however, are preliminary as a final designation of HMWBs and AWBs hasn't been made and further analysis is needed. Moreover, the method used for these results is not explained.

9. ASSESSMENT OF CHEMICAL STATUS OF SURFACE WATERS

According to the RBMP, the assessment of chemical status was carried out on the basis of annual average concentrations of priority substances. Priority substances are reported to be monitored in all four surface water categories. The RBMP indicates that the following priority substances were not considered in the assessment of chemical status: trifluralin compounds and brominated diphenylethers.

It can be noted that Annex 3.A of the 2010 Regulation[13], cited in the RBMP, provided a first transposition of Part A of Annex I of the EQS Directive. However, one difference was observed: no values were provided for Cadmium and its compounds for MAC-EQS in other waters. This omission was corrected in Annex 5.B of the 2013 Regulation on the Standard of Quality of Waters, which replaced the 2010 Regulation.

The RBMP does not refer to standards for biota or sediment. The 2013 Regulation provides EQS for biota (this was not found in the previous, 2010 Regulation), and according to the latest information, biota EQS or equivalent protective water EQS will be applied where relevant.

Information was not found in the RBMP or national legislation on whether mixing zones are used, on how background concentrations are considered, or on the bioavailability of metals.

Substances causing exceedances have been identified for a small share of water bodies in both HRC and HRJ (Table 9.1.1).

Substance causing exceedance	Exceedances per RBD	
	HRC	HRJ
Heavy Metals - aggregated	8	
Mercury	5	
Chlorpyriphos	2	
Chlorvenfinphos	1	
Endosulfan	10	
C10-13-chloroalkanes		3

[13] "O.G.", No. 89/10

Substance causing exceedance	Exceedances per RBD	
	HRC	HRJ
Di(2-ethylhexyl)phthalate (DEHP)	4	
Aldrin	3	
Dieldrin	3	
Endrin	3	
Isodrin	3	
Pentachlorophenol	1	
Tributyltin compounds		1

Table 9.1.1: Substances responsible for exceedances
Source: WISE

10. ASSESSMENT OF GROUNDWATER STATUS

10.1. Groundwater quantitative status

There is a single national methodological approach in Croatia for the assessment of groundwater quantitative status, based on Guidance Document No. 18 on Groundwater Status and Trend Assessment.

Further work is planned on the methodology. For example, in the karst areas, monitoring will include all significant springs, so that a better water balance could be made of groundwater bodies. This monitoring will be implemented at the beginning of 2015. In addition, by the end of 2014, a final plan for monitoring of groundwater levels in aquifers with intergranular porosity will be completed. Due to the high costs of establishing this monitoring, its full implementation is planned over a period of several years.

The results provided in the first RBMP show that one groundwater body in HRC and two in HRJ are assessed to be of poor quantitative status (Table 10.1). For the groundwater body in HRC, located in the vicinity of Zagreb, abstraction is reportedly the main pressure leading to poor status. In HRJ, two groundwater bodies are in poor quantitative status related to high water abstraction during summer months which produce saline intrusions.

A comparison of annual average groundwater abstractions against ‘available groundwater resource’ in the groundwater body has been reported to be calculated for a subset of groundwater bodies.

For number and percentage of groundwater bodies and their quantitative status, please see Tables 6.5 and 6.6.

RBD	Good	Failing to achieve good	Unknown
HRC	733	0	0
HRJ	291	0	0
Total	*1024*	*0*	*0*

Table 10.3.1: Status of groundwater drinking water protected areas
Source: WISE

10.2. Groundwater chemical status

According to the Croatian authorities, the assessment of chemical status follows the methodology of Guidance Document No. 18 on Groundwater Status and Trend Assessment. Threshold values were established at the national level. These were determined according to

water use criteria: values were determined based on the maximum allowable concentrations for individual parameters pursuant to regulations on health and safety of drinking water. All substances of Annex II Part B of the Ground Water Directive were taken into account. Also, all pollutants posing risk were considered. According to information provided on WISE, parameters include iron, manganese and zinc, as well as the temperature, pH value, dissolved oxygen and transparency. Also according to WISE, a method for determining background levels has been established.

Croatian legislation now requires monitoring of groundwater quality for all abstraction sites used for public water supply as well as in protection zones of larger abstraction sites.

It is not clear, however, whether a complete chemical status assessment was performed for the first RBMP. The RBMP reports that two groundwater bodies in HRC and two in HRJ do not meet good chemical status. However, the pollutants causing poor status are not described. For HRC, information on background levels was only provided in a few areas and only related to nitrates. For HRJ, information reported to WISE indicates that background levels were established only for some parameters due to a lack of information.

Croatian authorities indicate that more complete monitoring data will be used for the assessment of chemical status of groundwater bodies in the future RBMPs.

10.3. Groundwater trend assessment

For the first RBMP, trends have not been assessed due to a lack of historical data: according to the RBMP, national groundwater data are available from 2007, and only in two areas (monitoring sites near Zagreb and Varazdin in HRC) are longer time series available. The RBMP states that for most sites in HRC, groundwater data are only available for the years 2007 and 2008 and thus do not provide a sufficient time series to make trend assessments. Longer time series are available at a few locations, but changes in monitoring methods make trend assessment difficult. In HRJ, trends were noted but were not characterised as significant or continuous. For HRJ, there is a reference to monitoring from 2000 to 2007.

According to the Croatian authorities, groundwater monitoring has been designed to detect trends, and trend assessment will be carried out for the second RBMP. It is not clear, however, if a methodology for trend reversals has been established as of mid-2014, nor on the extent to which the approach in Guidance Document No. 18 on Groundwater Status and Trend Assessment has been implemented.

10.4. Groundwater-dependent terrestrial ecosystems

For HRC, the RBMP does not indicate whether associated surface waters and groundwater dependent terrestrial ecosystems are considered in the assessment of either chemical or quantitative status of groundwater. For HRJ, on the other hand, it is indicated that associated surface waters and groundwater dependent terrestrial ecosystems are considered in the assessment of quantitative status.

10.5. Groundwater protected areas

There are 30 groundwater bodies associated with Article 7 protected areas, all of which are of good status. There are a further 12 groundwater bodies protected under the Habitats Directive, all of which are of good status.

11. ENVIRONMENTAL OBJECTIVES AND EXEMPTIONS

No exemptions were reported to WISE. Nonetheless, it appears that some water bodies will not attain good status by 2015. The RBMP states that there are two sets of reasons for this (RBMP, section 3.3): transitional periods granted by Croatia's Accession Treaty with the EU (in particular, deadlines for the Wastewater Treatment Directive, Drinking Water Directive, and Industrial Emissions Directive); and technical reasons, in terms of a lack of data and insufficient time at the time of the preparation of the RBMP.

Croatia's RBMP does not indicate, however, the total number of water bodies that will not attain good status by 2015, though an estimate is provided for river water bodies.

The RBMP does not provide information on methodologies to establish exemptions, such as for the estimate of disproportionate costs, reasons of technical feasibility or natural conditions that would make it impossible to achieve the environmental objectives on time. The plan notes that preliminary work has been prepared by the Zagreb Economic Institute on economic and financial analysis related to the WFD.

Although the RBMP does not refer to the application of Article 4(7), new hydropower projects are under consideration in Croatia[14]. It is not clear if there has been effective coordination of these project proposals with WFD requirements. All new infrastructure projects that are liable to cause deterioration of status of water bodies or prevent the achievement of good status should only be authorised is they fulfil the conditions under WFD article 4(7).

With regard to objectives, the RBMP indicates that additional objectives have been established for drinking water protection areas and for bathing water areas.

For drinking water, Article 5 of the Law on Water Intended for Human Consumption[15] contains provisions on what is considered water suitable for consumption including reference to a by-law containing more detailed requirements. Article 7 of the Law stipulates that all water intakes must be protected from pollution impacting the quality of water. Article 90 of the Law on Waters stipulates that the area around water intakes for water supply (including water intended for human consumption) must be protected from pollution and other impacts on the quality of water.

Bathing water issues are governed by the Regulation on the Quality of Bathing Water[16], which transposes the Bathing Water Directive. The Regulation sets microbiological quality standards for bathing waters and obligatory measures for the management of bathing waters. Local authorities are the responsible authorities for bathing waters. The Regulation also contains an obligation to pass a decision establishing bathing water areas; monitoring of bathing water; and relevant activities for management of bathing water. Further provisions for the protection of surface waters intended for bathing are set out in the Ordinance on wastewater emission limit values. According to the Ordinance, after treatment, urban wastewater must additionally meet specific requirements if it is discharged into surface waters

[14] For example, *Hrvatske elektroprivreda*, a national power company in Croatia, plans investments for the Senj-Kosinj Energy-Water protection Project (the project consists of creation of two water reservoirs, construction of two hydropower plants, reconstruction of an existing hydropower plant, construction of a feeding tunnel, and other actions).
[15] "O.G.", No 56/13 (Articles 5 and 7)
[16] "O.G.", No. 51/10

which are used for bathing and recreation: limit values of microbiological parameters (intestinal enterococci and *Escherichia coli*) are proscribed separately for discharges into inland surface waters and for discharges into coastal waters.

No additional objectives have been set for water-dependent protected habitats and species. The assessment of quantitative and qualitative requirements of these habitats and species to achieve favourable conservation status has not been done.

12. PROGRAMMES OF MEASURES

12.1. Programme of measures – general

The RBMP underlines that the Programme of Measures (PoM) only contains basic measures; supplementary measures will be presented in Croatia's second RBMP in 2015.

The RBMP does not state that status assessments have been used for the planning of the Programme of Measures. The description of some measures does, however, refer to emissions or other pressures. At the same time, as noted above, the basic measures indicated in the PoM should be implemented irrespective of the status assessment.

Croatia's RBMP cites the 2009 Danube River Basin District Management Plan and the draft international Sava River Basin Management Plan on several occasions. It is not clear, however, whether the PoMs have been coordinated among these plans. Measures have not been coordinated with neighbouring MS and third countries.

In terms of geographical scale, nearly all the measures indicated in the RBMP are applicable on the entire territory of Croatia; a few, however, refer to action in specific areas, such as drinking water protection areas and vulnerable zones in Croatia in accordance with Article 5 of the Nitrates Directive.

The RBMP contains some information on the authorities and stakeholders responsible for implementing the PoM. The government of Croatia, the Ministry of Agriculture, Hrvatske vode and water supply providers (local authorities) are responsible for implementation of measures aimed at ensuring recovery of operational costs for public water supply and encouragement of efficient use of water supplied for public use. These authorities as well as local authorities also have roles in the implementation of the UWWT Directive[17] (the enterprises running UWWT plants are under local governments or in concession). Under Croatia's Accession Treaty[18], there are specific deadlines for agglomerations according to the number of PE and the sensitivity of the area of water. The RBMP notes that, consequently, the prioritisation of the relevant agglomerations should be carefully considered, as well as supplementary measures under the WFD. Furthermore, Croatia will need to also comply with other relevant directives (Bathing Water Directive[19], Drinking Water Directive[20], MSFD[21], Groundwater Directive[22], Industrial Emissions Directive[23] and others) and this needs to be

[17] Urban Waste Water Directive (91/271/EEC)
[18] Annex V, section 10, OJ L 112, 24.04.2012, p. 1
[19] Bathing Water Directive (2006/7/EC).
[20] Drinking Water Directive (98/83/EC).
[21] Marine Strategy Framework Directive (2008/56/EC).
[22] Ground Water Directive (2006/118/EC)
[23] Industrial Emissions Directive (2010/75/EU)

considered together with the requirements of the UWWT Directive with the aim to achieve good water status in accordance with the WFD.

The Ministry of Agriculture, Ministry of Environment and Nature Protection, Hrvatske vode, and IPPC installation operators are responsible for measures aimed at reducing pressures on water from IPPC installations. The Ministry of Agriculture, Hrvatske vode, producers of fertilisers and plant protection products, custom authorities and farmers are responsible for measures aimed at reducing pollution from nutrients, especially nitrates.

The RBMP provides some information on costs related to basic measures. For example, the RBMP states that estimated costs for total investment concerning wastewater treatment in Croatia is estimated at 23.2 billion HRK (approx. 3 billion EUR) for the period 2010 – 2023, with investments of 8.5 billion HRK (1.1 billion EUR) foreseen to 2015. Investments for drinking water supply should amount to 5.4 billion HRK (700 million EUR) through the end of 2015. Furthermore, the Plan gives estimates of total costs for the implementation of the IPPC Directive (over 2 billion EUR for all aspects, not only water) and Nitrates Directive (50.2 million EUR).

12.2. Measures related to agriculture

The RBMP refers in particular to agricultural pressures on water quality, due to the use of manure and mineral fertilisers as well as pesticides; runoff from livestock grazing is also noted. Water use for agriculture is not indicated as a pressure. The RBMP cites a range of measures to address these pressures (as noted above, the RBMP only contains basic measures). An overview of the measures is set out in Table 12.2.1.

Measures	HRC	HRJ
Technical measures		
Reduction/modification of fertiliser application	✓	✓
Reduction/modification of pesticide application	✓	✓
Change to low-input farming	✓	✓
Hydromorphological measures		
Measures against soil erosion		
Multi-objective measures	✓	✓
Water saving measures	✓	✓
Economic instruments		
Compensation for land cover		
Co-operative agreements		
Water pricing	✓	✓
Nutrient trading		
Fertiliser taxation	✓	✓
Non-technical measures		
Implementation and enforcement of existing EU legislation	✓	✓
Controls		
Institutional changes		
Codes of agricultural practice		
Advice and training		
Awareness raising		

Measures	HRC	HRJ
Measures to increase knowledge for improved decision-making		
Certification schemes		
Zoning		
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

Specific measures include:

- the development of "ecological agricultural production" in drinking water protection areas, and construction of storage capacities for manure in these areas;
- control and reduction of use of nutrients, especially nitrogen;
- the establishment of vulnerable zones and the adoption of an action programme for protection of water from agricultural pollution under the Nitrates Directive;
- a water protection fee on fertiliser producers, depending on the amount of fertiliser placed on the market;
- establishment of maximum permitted levels of pollution of soil; and
- issuance of water abstraction permits for irrigation.

It is not clear, however, whether measures related to diffuse pollution from agriculture address problems outside nitrate vulnerable zones, which only account for 9% of the territory.

The RBMP does not provide information on the cost of these measures. It refers to EU funds as well as state, regional and local budgets and the proceeds from water fees as funding sources for the programme of measures, but does not specify sources of funding for individual measures. The RBMP does not refer to the use of the Rural Development Programme (RDP) to implement measures that contribute to the achievement of the WFD. According to Croatian officials, the second RBMP will incorporate measures from the RDP.

12.3. Measures related to hydromorphology

The RBMP states that it does not include measures for existing hydromorphological pressures; it does, however, include a reference to a future measure to establish rules for the “maintenance of water flows”, with the goal of limiting hydromorphological changes by water construction.

12.4. Measures related to groundwater

The RBMP mentions few pressures on groundwater bodies. It notes that abstraction of groundwater is a potential risk in the Zagreb area.

A range of measures are reported to WISE as relevant for groundwater protection. These include:

- controls over the abstraction of fresh surface water and groundwater;
- the prohibition of direct discharge of pollutants to groundwater: only treated waters can be discharged; and

- a range of general measures on water discharges are noted: issuing authorisations for exploitation; water evaluation within the environmental conditions, whereby the conditions for the emission of wastewaters are determined; the obligation to request a renewable permit to release wastewaters (valid for six years), obligation to report any emission of wastewaters with limit values determined, and determination of limit values.

Croatia's RBMP does not provide information on the international coordination of measures related to groundwater.

12.5. Measures related to chemical pollution

The RBMP does not specify that Croatia has an inventory of sources of chemical pollution to water bodies. Croatia nonetheless has created an EPRTR, which provides an inventory of pollutant releases (including to water) for large facilities. While the RBMP does not refer to the EPRTR, it does provide information on total loads of several pollutants and sectors, including households and enterprises for several pollution indicators: BOD5, COD, total nitrogen and total phosphorus. It states that discharges from large facilities are monitored for these as well as additional pollutants: Zinc, Copper, Cadmium, Chromium, Nickel, Lead, Mercury, Arsenic, Iron, Manganese, Aluminium and Phenols. In addition, diffuse pollution from households and agriculture, including livestock grazing, is estimated. This information suggests that Croatia has data available for an inventory of chemical pollution sources.

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

Croatian authorities have indicated that a first inventory of emissions will be included in the second RBMP.

12.6. Measures related to Article 9 (water pricing policies)

Law on Waters defines water use as including water services, general use of water, free water use and any other type of human activity on water which may significantly impact water status. Croatia thus has a broad definition of water use. The RBMP then refers to a range of water uses, including abstractions for households, industry and agriculture; water supply and wastewater treatment; navigation and ports; and flood protection. Water services, in contrast, are currently defined in the same Law only as public water supply and public sewage.

According to Croatian authorities, national water pricing policy reflects the principle of cost recovery for water services and the polluter pays and user pays principles: these are incorporated in several pieces of legislation, including the Law on Waters and the Law on Financing of Water Management.

A 2010 Regulation[24] establishes a methodology for setting the minimum charges for municipal water utilities. The Regulation identifies costs that should be included in the prices

[24] The Regulation on the Lowest General Price of Water Services and Type of Costs which are Included in Water Services Price ("O.G.", No. 112/10)

of water supply and wastewater treatment. These include: operational costs, financial costs and long-term depreciation. Water charges are calculated on the basis of water consumption, as measured by a meter, as well as the quality of water discharged. The Law on Waters (Article 212) requires that all new buildings have individual meters for apartments. In existing buildings, a single shared water meter is common. Information was not found in the RBMP, however, on the extent to which individual users actually have meters.

The RBMP does report that minimum charges for public water supply were raised in January 2013 0.8 HRK (app. 0.1 EUR) to 1.35 HRK (app. 0.17 EUR) per cubic metre of water; and the minimum charge for discharge of waste water from 0.90 HRK (app. 0.1 EUR) to 1.35 HRK (0.17 EUR) per cubic metre.[25]

The Law on Financing of Water Management[26] establishes charges for the direct abstraction of water by households and enterprises, including for industry and for power generation. Agricultural users are required to pay charges on water they abstract directly or use from irrigation systems or municipal water systems. The charges for direct abstractions by farmers should include environmental and resource costs; charges for water from irrigation systems, however, only include operational and maintenance costs. Charges for irrigation water are based on volume where there is a water meter; otherwise, a lump sum is paid according to the area of irrigated land. All users of irrigation systems are required to have a concession, which should include an obligation to install a meter. Information is not available, however, on the extent to which existing irrigation schemes currently have meters. The Law on Financing of Water Management also establishes charges for water protection that are placed on plant protection products and fertilisers.

The RBMP does not provide information on the implementation of these legal provisions or on the extent of incentive water pricing policy across sectors. It does not discuss whether current policy provides adequate incentives for users to use water resource efficiently.

The RBMP provides initial information on cost recovery for municipal water supply and wastewater treatment for households and enterprises, based on a study prepared by the Zagreb Economic Institute. The results are, however, incomplete due to challenges related to collection of information from the municipal water service providers. The study does not provide information on recovery rates, though it contains a proposal for a methodology to calculate such rates. The RBMP does not provide information on cost recovery for other sectors.

According to the Croatian authorities, work for the second RBMP will include economic analysis of all water uses under Art. 5 of the WFD. The economic analysis will calculate cost recovery levels, including environmental and resource costs, as per national definitions. A methodology to determine environmental and resource costs, including for diffuse pollution, was in preparation in 2014.

12.7. Additional measures in protected areas

The RBMP does not provide information on additional measures in protected areas.

[25] This is as stipulated in the Regulation on amendment to the Decree on Fees for Use of Water and the Decree on Fees for Protection of Waters ("O.G." No, 83/12).
[26] "O.G.", No. 153/09, 90/11 and 56/13

13. CLIMATE CHANGE ADAPTATION, WATER SCARCITY AND DROUGHTS, FLOOD RISK MANAGEMENT AND OTHER EMERGING AND LINKED ISSUES AS PART OF THE RBMP

The RBMP makes few references to water scarcity or drought. Data on total annual water consumption and water availability are provided at a national level (sectoral and regional data are not provided). For HRC, there is one reference to a minor mention related to groundwater quantity in the Zagreb area: this issue is indicated as a risk that requires further monitoring. For HRJ, tourism demand is noted as an occasional, local issue in periods of "hydromorphological minimum" (e.g. certain summer periods), tied to water consumption in the tourism sector.

The RBMP provides little information on floods. The international Danube RBMP from 2009 mentions the issue of floods throughout the Danube basin and also cites a recommendation by the ICPDR to monitor flow of water during drought periods in relation to floods. The draft RBMP for the Sava River basin discusses floods and refers to the middle course of the Sava from Zagreb to Županja in Croatia as one of the areas prone to flooding. The draft RBMP contains several recommendations, including one on land use zoning in Croatia.

13.1. Adaptation to Climate Change

The RBMP for HRC and HRJ contains very little information on climate change. Croatia has prepared a draft of the National Strategy for Implementation of the UNFCCC and Kyoto Protocol in the Republic of Croatia with the Action Plan. Though not yet adopted, this draft Strategy addresses both mitigation and adaptation. The draft Strategy is not cited in the RBMP. The Plan does not identify any adaptation measures related to water bodies, nor does it indicate whether a climate check of the Programme of Measures has been carried out.

14. RECOMMENDATIONS

Croatia should:

- Review all existing permits and where necessary, amend them to ensure that they are compatible with the WFD objectives.
- Coordinate the preparation of the next RBMPs with the preparation of the international Danube RBMP and the Sava RBMP and ensure that cooperation with the neighbouring countries extends to all shared catchments. Coordination of measures in internationally shared karstic aquifers should be established.
- Review the pressures and impact analysis and status assessment in the 2nd RBMPs and ensure that the measures are based on the updated pressures and impact analysis and status assessment of water bodies. Besides basic measures, supplementary measures that are necessary to achieve the objectives set should also be included in the 2nd RBMPs.
- Ensure that the RBMPs clearly identify the gap to good status, and that the PoMs are designed and implemented to close that gap. Exemptions should be adequately justified at water body level.
- Complete the development of methods for the status assessment of water bodies and determination of reference conditions and apply them through the implementation of robust monitoring programmes (start monitoring hydro-morphological parameters in lakes and transitional and coastal waters and fish in lakes). An adequate WFD-compliant assessment and monitoring framework is a necessary pre-requisite to design effective PoMs and ultimately to achieve the WFD objectives.

- Make improvements to groundwater monitoring, investigate and address reasons for saline intrusions.
- Determine effectiveness of basic measures and what needs to be done in addition. Based on this gap analysis Croatia should take measures in addition to the action programme for nitrates and the use of plant protection products, if necessary. Those measures should be part of the next RBMPs.
- Review existing controls to ensure that agriculture practices do not cause hydro-morphological pressure and update controls where necessary for inclusion in the PoM of the 2nd RBMPs.
- Include hydro-morphological measures in the PoM of the 2nd RBMPs.
- Ensure that an ecological flow consistent with good status is established and review the existing permits where relevant.
- Ensure the appropriate designation of heavily modified water bodies and develop a methodology for establishing good ecological potential. These methodologies should be documented in the RBMPs.
- Justify adequately new hydro-morphological modifications, such as navigation projects or new hydropower plants. They should be supported by a proper strategic assessment of cumulative effects, an assessment of alternative options and include all necessary mitigation measures.
- Consider and prioritise the use of green infrastructure and/or natural water retention measures that provide a range of environmental (improvements in water quality, flood protection, habitat conservation etc.), social and economic benefits which can be in many cases more cost-effective than grey infrastructure.
- Establish an improved and harmonised approach to exemptions in the 2nd RBMPs. The methodology should include calculations of disproportionate costs, assessment methods for adverse effects and better environmental options.
- Review and update the list of river basin specific pollutants.
- Ensure that abstraction controls are in place by the time of the 2nd RBMPs.
- Provide in the 2nd RBMPs all the information on the level compliance and timing to reach compliance of agglomerations, including information on funding, in accordance with Directive 91/271/EEC (article 15 and following).
- Prioritize the agglomerations with more than 2.000 PE in terms of the WFD principles and of financing in the 2nd RBMPs but should also assess the pressures due to waste water from small agglomerations (less than 2.000 PE) in the 2nd RBMPs cycle.
- Ensure the compliance of Article 5 UWWTD for more stringent treatment, especially in big cities.
- Assess the need to take additional measures on point source pollution beyond the requirements of the UWWTD and IED to fulfil the WFD objectives.
- Croatia should set additional objectives for protected areas, monitor them and assess what additional measures are required to achieve those additional objectives (Species and Habitats, Drinking Water, Bathing Water).

- Develop fully the economic analysis of water use, including the calculation of Environmental and Resource Costs and ensure that the water tariff and the water fees lead to adequate recovery of the costs of water services. Measures that foster introduction of individual metering, where shared metering is in place should be proposed.