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Working Group on Integrated Water Resources Management

Sixth meeting
Geneva, 4 and 5 May 2011
Item 3 (a) of the provisional agenda

Status and finalization of the second Assessment of transboundary rivers, lakes and groundwaters in the UNECE[1] region: main findings of the second Assessment for all subregions

Working Group on Monitoring and Assessment

Twelfth meeting
Geneva, 2–4 May 2011
Items 5 (a) and 9 (a) of the provisional agenda

Assessment of the status of transboundary waters in the UNECE region: assessment of transboundary rivers, lakes and groundwaters in Western and Central Europe

Status and finalization of the second Assessment of transboundary rivers, lakes and groundwaters in the UNECE region: main findings of the second Assessment for all subregions

Finalization of the second Assessment of transboundary rivers, lakes and groundwaters in the United Nations Economic Commission for Europe region[2]

Major findings of the assessment for Western and Central Europe

Note by the secretariat*

[1] United Nations Economic Commission for Europe.

[2] This document was submitted for publication without formal editing.

* The present document has been submitted on the present date due to late receipt of inputs by concerned countries and resource constraints in the secretariat.

Summary

This document was prepared pursuant to decisions taken by the Meeting of the Parties to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes at its fifth session (Geneva, 10–12 November 2009), which entrusted the Working Group on Monitoring and Assessment, in cooperation with the Working Group on Integrated Water Resources Management, with finalizing the second Assessment of Transboundary Rivers, Lakes and Groundwaters in time for its submission to the Seventh "Environment for Europe" Ministerial Conference, to be held in Astana, from 21 to 23 September 2011 (ECE/MP.WAT/29, para. 81 (e)). The document presents the main conclusions and trends of the second assessment for Western and Central Europe, drawing upon the detailed assessments by basin and aquifer presented in documents ECE/MP.WAT/WG.2/2011/14, ECE/MP.WAT/WG.2/2011/15 and ECE/MP.WAT/WG.2/2011/16.

Contents

I. Background and proposed action by the Working Group on Monitoring and Assessment and the Working Group on Integrated Water Resources Management

1. The subregional assessment of transboundary waters in Western and Central Europe covers transboundary rivers, lakes and groundwaters shared by two or more of the following countries: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom. It has been prepared by the secretariat of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) with the assistance of a consultant — on the basis of information provided by countries. The present document contains the main findings, tendencies and conclusions of the Western and Central Europe assessment. It draws upon the assessments of the different transboundary rivers, lakes and groundwaters in Western and Central Europe that are presented in documents ECE/MP.WAT/WG.2/2011/14 (transboundary waters discharging into the Mediterranean), ECE/MP.WAT/WG.2/2011/15 (transboundary waters discharging into the North Sea and Eastern Atlantic) and ECE/MP.WAT/WG.2/2011/16 (transboundary waters discharging into the Baltic Sea).

2. An important step in the assessment preparation was the workshop on transboundary water resources management in Western and Central Europe which was held from 8 to 10 February 2011 in Budapest. The workshop was jointly organized by the Ministry of Rural Development of Hungary— in the framework of the Hungarian EU Presidency — and the United Nations Economic Commission for Europe, in cooperation with the International Water Assessment Centre (IWAC).

3. The assessment of transboundary waters in the Western and Central Europe also contains an assessment of a number of selected Ramsar Sites[3] and other wetlands of transboundary importance (see Table 1). These assessments were prepared in cooperation with the secretariat of the Ramsar Convention on Wetlands and the Parties to that Convention.

4. The present document incorporates information and comments provided by riparian countries including in response to questionnaires from the secretariat and also builds on reports and assessments prepared by the European Environment Agency. Brief descriptions of the water resources management framework in the countries concerned, a compilation of existing agreements related to the management of transboundary waters and a summary of the status of ratification of selected international agreements relevant to transboundary water management in the subregion are also included in the present document as annexes.

5. The content of the draft summary reflects the information made available to the secretariat. Unfortunately, not all countries completed the questionnaires or submitted information in other forms. Thus some gaps in the information remain. In order to keep the length of the whole Assessment manageable, the secretariat has had to shorten the text.

6. The Working Group on Monitoring and Assessment and the Working Group on Integrated Water Resources Management may wish:

(a) To review the assessments of transboundary rivers, lakes and groundwaters in the Western and Central Europe, and in particular the present document with the major findings, and to endorse the document in terms of content;

[3] Wetlands designated as internationally important under the Ramsar Convention.

(b) To express its appreciation to the designated experts from Austria, the Czech Republic, Denmark, Finland, Germany, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Northern Ireland, Norway, Portugal, Slovakia, Slovenia, Spain, Switzerland as well as the secretariats of the commissions for the rivers Elbe, Meuse, Moselle and Saar, Oder, Rhine and Scheldt, the secretariat of the Convention on Wetlands of International Importance (Ramsar Convention) and the Parties to that Convention as well as the Water Convention secretariat, for the substantive work done;

(c) To invite Parties to provide any necessary corrections to the information contained in documents ECE/MP.WAT/WG.2/2011/8–ECE/MP.WAT/WG.1/2011/8, ECE/MP.WAT/WG.2/2011/14, ECE/MP.WAT/WG.2/2011/15 and ECE/MP.WAT/WG.2/2011/16 **by 20 May 2011;**

(d) To entrust the secretariat with the finalization of the assessment, including the relevant comments and performing the needed editing and shortening to meet editorial needs.

II. Introduction

7. The assessment for Western and Central Europe focuses on surface and groundwater shared by Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden Switzerland, and the United Kingdom.

8. The transboundary rivers, lakes and groundwaters in the sub-region as well as selected Ramsar sites are listed in Table 1. Apart from the small tributaries of the upper Danube, the transboundary basins of the sub-region drain dominantly westwards and southwards towards the Baltic Sea, the North Sea, the Eastern Atlantic and the Mediterranean (Table 1). Many of the transboundary waters listed in Table 1 provide vital water resources and countries are often dependent on flows generated from outside their borders. Within this subregion, The Netherlands is probably the prime example of this dependence and, as a result, river basin agreements have existed for many years.

9. The River Rhine is the most intensively used watercourse in Europe. For many centuries it has been an important shipping lane and 800 km of the river from Rotterdam to Basel is navigable. It has also been a source of food and water and the basis for human settlement and intensive industrial development which has taken place on the banks of the Rhine and its tributaries. The River Rhine provides drinking water for 30 million of the 58 million people who live in the basin, either by direct abstraction (e.g. from Lake Constance), via river bank filtration or filtered through the dunes between Amsterdam and the Dutch coast.

10. Since its adoption in 2000, water management in the sub-region has been dominated by the EU Water Framework Directive (WFD). Countries have transposed the WFD and its various articles into their own national legislation and have been required to follow the implementation timetable set out in the Directive. The non-member countries in the sub-region, Norway and Switzerland, have also largely adopted the principles of the WFD in their approaches to water management.

11. There are many transboundary wetland areas in the sub-region, which is most advanced in terms of transboundary cooperation. In some cases, two or even three bordering countries have agreed to cooperate for the management of their shared wetland. Of the 13 officially designated transboundary Ramsar Sites worldwide, six are in Western and Central Europe. Four of these have been assessed in cooperation with secretariat of the Ramsar Convention and the Parties to that Convention, and included in this assessment (Table 1); the Neusiedler See-Seewinkel - Fertö-Hanság shared between Austria and Hungary designated in 2009; the Floodplains of the Morava-Dyje-Danube Confluence

shared by Austria, the Czech Republic and Slovakia designated in 2004; the Upper Rhine (Rhin supérieur/Oberrhein) shared between France and Germany (2008) and the Krkonose/Karkonosze subalpine peatbogs, shared by Poland and the Czech Republic (2009).

12. Additional Ramsar Sites are included in the assessment which have been declared by one country but extend into the territory of another country where they are not yet protected under Ramsar. These include the Txingudi (Spain) of which parts of the ecosystem extend into France and Lough Foyle (United Kingdom) which extends into Ireland. Further, other Ramsar Sites have been designated separately on each side of the border without joint official designation as a transboundary wetland to enable joint management of the ecosystem. These include the Wadden Sea, which is shared by Denmark, the Netherlands and Germany. While all three countries have declared parts of this ecosystem under the Ramsar Convention, a joint official designation is absent, despite the existence of a trilateral Common Waddensea Secretariat. Lastly, the Lake Geneva ecosystem contains several Ramsar Sites designated by France and Switzerland independently, although joint designation of the lake area as a transboundary wetland of international importance has not been made.

13. Besides those mentioned above, Central and Western Europe holds more than 30 wetlands for which at least one side of the border has been designated under the Ramsar Convention. This underlines the need for transboundary cooperation as management decisions often impact several countries and the numerous services provided by the wetlands extend far beyond a country's boundary. In addition to international protection under Ramsar or World Heritage, many wetland areas in the region are protected under national and EU legislation, especially under NATURA 2000.

Table 1
Transboundary river basins, lakes and groundwaters as well as selected Ramsar sites in Western and Central Europe

Basin/sub-basin(s)	*Recipient*	*Riparian countrie* [a]	*Lakes in the basin*	*Transboundary groundwaters within the basin (aquifers or groundwater bodies)*	*Ramsar sites and other wetlands*
Torne	Baltic Sea	FI, NO, SE			
Glama	North Sea	NO, SE	…		
Klaralven	North Sea	NO, SE	…		
Lech	Danube	AT, DE			
Inn	Danube	AT, CH, DE, IT			
Morava	Danube	AT, CZ, PL, SK			Floodplains of the Morava-Dyje-Danube Confluence
Raab/Raba	Danube	AT, HU			
	Danube	AT, HU	Lake Neusiedl		Lake Fertı/Neusiedl
Wiedau	North Sea	DE, DK	…		Wadden Sea
Elbe	North Sea	AT, CZ, DE, PL	…	Lainsitz Area/ Trebon Pan, Cheb Pan, Decinsky Sneznik Dolni Krmenice and Krimice Cretaceous, Upper Ploucnice Cretaceous, Glaciofluvial Sediments in Frydlant Offspur, Police Pan and Hronov-Porici Cretaceous	Krokonose/ Karkonosze
Ems	North Sea	DE, NL	…	DE_GB_:37_01, 39_10. NLGW:0001, 0008, 2 - 5, 15, 101, 105, 109 - 113. DE_GB_3_: 01 - 20. DE_GB_36_01 – 05. DE_GB_:37_02 - 03, 38_01 - 02.	Wadden Sea

Basin/sub-basin(s)	*Recipient*	*Riparian countrie* [a]	*Lakes in the basin*	*Transboundary groundwaters within the basin (aquifers or groundwater bodies)*	*Ramsar sites and other wetlands*
Rhine	North Sea	AT, BE, CH, DE, FR, IT, LI, LU, NL	Lake Constance	DE_GB_39_01- 09. DE_GB_3_:01, 04, 08, 09, 11 - 14, 19, 20. DE_GB_37_:01, 02. NLGW:0001, 0008, 109. Lower Lias sandstone of Hettange Luxembourg, confined non-mineralized Vosges sandstone, Pliocene of Haguenau and the aquifer of Alsace, unconfined Vosges sandstone, Lower Trias sanstone of Houiller Bassin, Limestones and Jurassic marls of Jura Mountains and, Jurassic limestones of Jura Mountains - BV Doubs and, Jurassic Limestones BV of Jougnena and Orbe, Sediments of Quaternary and Pliocene, Oberrheingraben Mitte/Süd, North-Germany/Netherlands, Hochrhein	Upper Rhine (Rhin supérieur/Oberrhein), Wadden Sea
- Moselle	Rhine	BE, DE, FR, LU	…		
- Saar	Moselle	FR, DE	…		
- Vechte	Swarte water > Ketelmeer > Ijssel-meer > North Sea	DE, NL	…		
Meuse	North Sea	BE, FR, NL	…	Lower Lias Sandstones of Hettange Luxembourg, confined non-mineralized Vosges sandstones, Limestones of 'Avesnois, cks_0200_gwl_1, blks_1100_gwl_1s, blks_1100_gwl_2s, Chalk du Valenciennois, Brussels sands, Chalks de la Haine, Landenian sands (east), Schelde Basin Aquifer System, Roerdal Slenk System, Hard Rock, Venlo-Krefeld Aquifer	
Scheldt	North Sea	BE, FR, NL	…	Limestones of Avesnois, Carboniferous Limestone of Roubaix-Tourcoing, Chalk of Valenciennois, Chalks of Haine, Chalk of the valley of Deule, Chalks of Deûle, Chalk of the valleys of Scarpe and Sensée, Hard Rock Brussels sands, Landenian sands (east), Landenian sands of Flanders, Thanetian sands of Flanders, Sands of the valley of Haine, Landenian sands of Orchies, Saline groundwater in shallow layers of sand, Fresh groundwater in shallow layers of sand, Fresh groundwater in bay areas, Groundwater in deep layers of sand, Bruxellien_Brusseliaan_5, Landenien_Landeniaan_3, Hardrock of	

Basin/sub-basin(s)	*Recipient*	*Riparian countrie* [a]	*Lakes in the basin*	*Transboundary groundwaters within the basin (aquifers or groundwater bodies)*	*Ramsar sites and other wetlands*
				Brabant, Socle_Sokkel_:1, 2. Ypresien_leperiaan_4, cks_0200_gwl_1, cvs_0400_gwl_1, cvs_0800_gwl_3, cvs_0160_gwl_1, cvs_0100_gwl_1, blks_0600_gwl_1, blks_1100_gwl_ : 1s, 2s. ss_1000_gwl_:1, 2. ss_1300_gwl_:1, 2, 4. kps_0160_gwl_: 1, 2, 3. kps_0120_gwl_: 1, 2.	
Yser	North Sea	BE, FR	…		
Bidasoa	Eastern Atlantic	ES, FR	…		Txingudi
Mino	Eastern Atlantic	ES, PT	Frieira reservoir	Alluvium of Minho/Bajo Miño (U.H. 01.26)	
Lima	Eastern Atlantic	ES, PT	Alto Lindoso reservoir		
Douro	Eastern Atlantic	ES, PT	Miranda reservoir	Nave de Haver/ Ciudad Rodrigo-Salamanca (U.H.02-19)	
Tagus	Eastern Atlantic	ES, PT	Cedillo reservoir	Toulóes / Moraleja (U.H.03-13)	
Guadiana	Eastern Atlantic	ES, PT	…	Miocene-Pliocene-Quatenary of Elvas-Campo Maior / Vegas Bajas (U.H.04-09), Mourão-Ficalho	
Erne	Eastern Atlantic	GB, IE	…	IEGBNI_NB_G_:011, 012, 014, 019. IEGBNI_NW_G_:005, 009 - 015, 017, 021, 025, 027, 028, 030 - 036, 039, 040, 044, 050, 063. IE_NW_G_: 018, 042, 043, 045 - 047, 061, 062, 067 - 074, 076 - 084, 086 - 092, 095 - 098. IE_NB_G_:013, 036.	
Foyle	Eastern Atlantic	GB, IE	…	IEGBNI_NW_G_:005, 010, 011, 014, 017, 044, 048, 050, 051, 059, 094. IE_NW_G_: 018, 043, 045 - 047, 049, 052, 054, 056, 058, 067 - 071, 073, 075 - 079, 082 - 087, 089 - 091.	Lough Foyle
Bann	Eastern Atlantic	GB, IE	…	IEGBNI_NB_G_:007, 011, 012, 014, 019. IEGBNI_NW_G_:025, 028, 063. IE_NB_G_:013, 015 - 018, 021 - 035, 037, 038. IE_NW_G_061.	
Castletown	Eastern Atlantic	GB, IE	…		
Fane	Eastern Atlantic	GB, IE	…		
Flurry	Eastern Atlantic	GB, IE	…		
Oder	Baltic Sea	CZ, DE, PL		Miocene Sediments of Zitava Pan, Kralik Ramp, Glacial Sediments of Zulov Hilly Country and Zlata Hora Mountains, Fluvial and Glacial Sediments in the Opava River Catchm. Area, Lusatian Neisse (from the border of county Saxonia to the mouth of river Oder) / Pomeranian Region	Krokonose/Karkonosze
- Neisse	Oder	CZ, DE, PL			

Basin/sub-basin(s)	*Recipient*	*Riparian countrie* [a]	*Lakes in the basin*	*Transboundary groundwaters within the basin (aquifers or groundwater bodies)*	*Ramsar sites and other wetlands*
- Olse	Oder	CZ, PL			
Ebro	Mediterranean. Sea	AD, ES, FR	…	Domaine plissé Pyrénées axiales et alluvions lvair	
Rhone	Mediterranean. Sea	CH, FR, IT	Lake Emosson, Lake Geneva	Confined non-mineralized Vosges Sandstones, Folded terrain of BV Cenise and Pô, Jurassic Limestones and marnes of the Jura Mountains and, Jurassic Limestones of the Jura Mountains - BV Doubs and, Jurassic Limestones BV of Jougnena and Orbe, unconfined Vosges Sandstones, glacio-fluvial formations of Gex region, Sedimentary terrain of Geneva (molasses et form..), Jurassic Limestones below Gex region, , glacio-fluvial formations deep aquifer of Gen, Upper Jurassic Limestones below the cover of Belfort, Genevese aquifer	Lake Geneva/ Lac Léman wetland area
Roia	Mediterranean. Sea	FR, IT	…		
Po	Mediterranean. Sea	AT, CH, FR, IT	Lake Maggiore, Lake Lugano	Folded terrain of BV Roya Bévéra, Folded terrain of BV Cenise et Pô,	
Isonzo	Mediterranean. Sea	IT, SI		Brestovica	

[a] Country names have been abbreviated as follows: Austria (AT); Belgium (BE); Czech Republic (CZ); Denmark (DK); Finland (FI); France (FR); Germany (DE); Hungary (HU), Ireland (IE); Italy (IT); Luxembourg (LU); Netherlands (NL); Norway (NO); Poland (PL); Portugal (PT); Slovakia (SK); Slovenia (SI); Spain (ES); Sweden (SE); Switzerland (CH); United Kingdom (GB).

III. Legal, policy and institutional frameworks for transboundary water management

14. Under the overall framework of the WFD, other related legislation targets specific waters, activities or groups of pollutants. The Urban Wastewater Treatment Directive (UWWTD) and the Nitrates Directive will both improve water quality with respect to nutrients. The chemical quality of Europe's surface waters is addressed by the recently established Environmental Quality Standards directive (EQSD), a daughter directive of the WFD which defines annual average and maximum allowable concentration limits for a wide range of pollutants known as priority substances. The Registration, Evaluation, Authorisation and Restriction of Chemical substances (REACH) aims to protect human health from potentially harmful chemicals by giving greater responsibility to industry to manage the risks and provide better safety information. The Bathing Water Directive (BWD) aims to protect the health of the public using Europe's inland and costal bathing waters.

15. As a result of the emphasis given in the WFD, the concept of integrated water resources management (IWRM) is well established. In particular, the requirement to publish by December 2009 River Basin Management Plans (RBMP) has been a strong driver for this approach, and management by river basin is now firmly embedded.

16. Also Norway, even if it is not an EU Member State, introduced voluntary implementation of the WFD in selected parts of the country between 2007 and 2009. River basin management plans for these sub-districts were adopted by the local councils in 2009 and approved by the national government in 2010. River Basin Management Plans will be prepared for the whole of Norway between 2010 and 2015; the time frame of the second cycle of implementation for the EU Member States.

17. In the past ten years, Europe has suffered more than 175 major floods. However, due to the different timetables, the EU Flood Directive is one cycle behind the WFD. Consideration of water quality in RBMPs is therefore one cycle ahead of flooding, whereas integrated water management would be more effective if both were considered together.

18. Moreover, management of water quantity is not fully integrated into EU legislation. Water quality may be highly dependent on flow regime and the potential changes to water quality resulting from hydromorphological alterations are not always well understood. Thus, while IWRM has brought surface water and groundwater closer together, this may be less true for quantity and quality which are not always considered together. Established institutional arrangements in which surface water and groundwater, and quantity and quality have been the responsibility of separate organisations may hamper IWRM on a river basin scale.

19. The large river basins are formally subdivided under the RBMPs into Working Areas for detailed management planning. The Rhine, for example, has nine international and national Working Areas. Within these, the pressures and impacts are very different and the corresponding management responses need to be tailored accordingly. Similarly, the Oder has six Working Areas; each Working Area contains many water bodies.

20. In preparation for the RBMPs, one of the essential steps under the WFD was the identification and delineation of bodies of surface water and groundwater as management units and their characterisation as being at risk of not achieving good status by 2015. This has process has been completed throughout the subregion for both surface waters and groundwaters, although not always clearly identifying transboundary water bodies.

21. Differences in geological settings across the sub-region combined with differences in national approaches to the definition of groundwater bodies have resulted in the fact that transboundary groundwater bodies have been rather slow to be defined. Nineteen of the twenty seven EU Member States recently provided GIS mapped information of their groundwater bodies[4]. Of the 7019 bodies in the database, 124 were reported as being transboundary. However, in the Scheldt International River Basin District, 42 of the 67 groundwater bodies in the basin are designated and mapped as being transboundary. In contrast, 103 groundwater bodies have been designated in the Oder basin, some of which must be transboundary even though they have not yet been defined as such. At a national level, Slovakia identified 15 candidate transboundary groundwater bodies, and after official bilateral negotiations seven were confirmed by both riparians. Of the 71 groundwater bodies in the Moselle/Saar basin, 26 are close to a national border and some of these may be transboundary.

22. At the same time, there are some transboundary aquifers that have been jointly recognised by neighbouring countries, in some cases for many years. One with important groundwater resources is the Genevese aquifer formed of alluvial sediments along the Rhone at the outlet of Lake Geneva. This aquifer is shared by France and Switzerland and a joint agreement for its management and protection was first signed in 1978 (Annex II). Other jointly agreed transboundary aquifers include those shared by Belgium and the

[4] European Environment Agency (EEA), 2011. Groundwater GIS reference layer: submission/compilation status and evaluation. Draft report.

Netherlands, Belgium and France, Austria and Hungary, Germany and the Czech Republic, and Spain and Portugal.

23. It is also important for the establishment of truly integrated management to know where groundwater and surface water are in close connection with each other, potentially affecting each other's status and impacting on their respective uses. On the basis of local hydrogeological knowledge, ecological criteria and the presence of Natura 2000 sites, 34 of the groundwater bodies in the Scheldt basin were identified as being in close connection with surface water. Even for the well-established river basin commissions, addressing transboundary groundwaters is a new challenge.

24. Institutional arrangements for the management of transboundary waters must reflect the physical complexity of large basins. In the Po basin, for example, the upper part is characterised by high mountain terrain, fast streams and the large alpine lakes of Lugano, Maggiore, Como, Iseo, Idro and Garda. Surface water concerns are dominant and related mainly to the impacts of hydro-electric power production, flooding and landslides. In the lower part, as well as the main river there are large aquifers and many individual groundwater bodies, all within the Italian part of the basin, and here the pressures come from surface and groundwater pollution from agriculture and industry and from abstraction of surface water and groundwater for irrigation. The most important stakeholders are very different in the two parts of the basin, and the institutional framework for transboundary water management must take account of this. Similar situations characterise the Danube, Rhine and Rhone basins.

25. The WFD is strongly focussed on reaching good status of waters that are currently in poor status, with less focus on the preservation and protection of waters that are already of high quality. It is very important not to lose the high quality of these waters, and it is equally important to give due recognition of the ecological services they provide, to determine their real value and to communicate this to all stakeholders.

26. The WFD has had a major positive influence on water management in the subregion, but is not by itself a sufficient basis for transboundary cooperation. The subregion is fortunate to have a number of well-established transboundary commissions for its largest river basins, including the Danube, Rhine, Meuse, Oder, Elbe, Moselle & Saar, and Scheldt (Annex II). These have provided a strong framework for collaboration between riparian countries and have facilitated the preparation of transboundary RBMPs and the establishment of joint monitoring programmes. In transboundary basins where international cooperation is less established and joint bodies/river commissions are less effective, implementation of the WFD has either been limited to the national borders or at the basin level has mostly been a compilation of national plans without real coordination and cooperation.

27. Beside regional frameworks such as the UNECE Water Convention or multilateral agreements and relevant river basin commissions, cooperation at the bilateral cooperation at a more local scale is also needed to ensure joint implementation of all aspects of transboundary water management.

28. Similarly, in the Ems River Basin District, management is overseen by a high level "International Ems Management Group" (ISE) where decisions are made by representatives of the responsible ministries in the Netherlands and Germany. At a lower administrative level, professionals from the Netherlands, from North Rhine-Westphalia and Lower Saxony work in the "International Coordination Group Ems" (IKE) which implements the decisions of the ISE and agrees on joint implementation of WFD activities. Within the Scheldt International River Basin District, there are also a separate set of memoranda and agreements between the Flemish Region and the Netherlands for policy and management related to the deepening, shipping, safety and nature of the Scheldt estuary covered by the Vlaams Nederlandse Schelde Commissie.

29. There are good examples of formalized cooperation on transboundary wetlands, although experience shows that developing suitable transboundary institutional arrangements for major wetland sites takes considerable time. Cooperation on management of the trilateral transboundary Ramsar site at the Morava-Dyje-Danube confluence was initiated in 1994 by NGOs in Austria, the Czech Republic and Slovakia. In 2001 a Trilateral Ramsar Platform (TRP) was established by a memorandum of understanding between the environment ministries of the three countries. The platform includes representative of the ministries, local government, site managers and NGOs. Common goals and principles for site management plans were agreed by the TRP in 2003 and a common management strategy is currently being developed. In the case of the Upper Rhine floodplain, designation as a Ramsar site in 2008 was the result of 16 years of efforts but still much remains to be done. Even though there is good collaboration, the best way forward would be to create a transboundary park with one management authority which could develop and implement programmes to apply all of the Ramsar guidelines. Similarly, the history of the Fertö-Hanság wetland shared by Austria and Hungary stretches from designation as Landscape Protection Areas, recognition as site under the Man and Biosphere Programme of the United Nations Educational, Scientific and Cultural Organization in the 1970s to Ramsar designation in 1989, National Park status in the 1990s and World Heritage site in 2001.

IV. Monitoring of transboundary rivers, lakes and groundwaters

30. Monitoring in particular needs bilateral and multilateral agreements and institutional frameworks for full implementation of the requirements of the WFD and detailed cooperation at more local scales. Although not very prescriptive on monitoring and assessment, the WFD nevertheless envisages a general consistency of approach throughout the EU and guidance has been developed under the Common Implementation Strategy to this end. However, many differences remain in the implementation of monitoring programmes, and the issues of comparability and inter-calibration in particular provide challenges for transboundary monitoring. The difficulties of comparability may be particularly acute where countries select different biological monitoring elements and different methods for monitoring the status of surface waters.

31. Implementation of the WFD has often required substantial revision and improvement of monitoring networks. In the Meuse basin, for example, surveillance monitoring programmes required under Article 8 of the WFD were established by States and regions in parallel to each other in 2005-2006 for both surface water and groundwater. These were tested against each other by the International Meuse Commission (IMC) and reported on in 2007[5]. In the Morava basin, joint monitoring of water quality and quantity is performed several times each year and a yearly report submitted to the Slovak-Czech Commission.

32. Even before the adoption of the WFD, in the Scheldt River basin a joint homogenous monitoring network was established for the river in 1998 with 14 measuring points between source and estuary with a four week frequency, harmonised sampling protocol and inter-calibrated and fully comparable analytical methods. The results were reported jointly on a yearly basis and were able to show improvements in water quality in several parts of the basin. To fit better with the countries' WFD monitoring networks, from 2010 this has been augmented by sampling from 22 additional locations and analysis of additional parameters. Coordination of groundwater monitoring in the basin focuses particularly on the

[5] IMC, 2007. Report on the coordination of surveillance monitoring programmes in the International River Basin District Meuse.

quantitative and qualitative status of the 42 groundwater bodies which belong to transboundary aquifers composed of the Carboniferous Chalk, the Brusselian sands and the coastal Flemish-Dutch alluvium. A coordinated transboundary waters monitoring programme has also been established by Spain and Portugal for the Miño basin.

33. In the Oder basin, groundwater bodies are monitored for both quantitative and chemical status. For the former, the critical parameters are the volume of available groundwater resources, the amount abstracted and the groundwater levels. As in many similar locations, the complex multi-layer aquifer systems require different levels to be separately monitored.

34. Some of the countries of this sub-region have had national monitoring programmes for quantity and quality of surface waters and groundwater for many years. These have often produced long time series of historical data for river flows, spring discharges and groundwater levels, and for some chemical parameters such as nitrate. It is important that revisions to monitoring programmes under the WFD still ensure comparability and continuity with these historical data, which assume great value in relation to the assessment of climate change impacts, the effects of land use change, water quality trends and the beneficial impacts of programmes of measures.

35. Assessment of hydro-morphological characteristics is not included as a part of the basin characteristics under the WFD, and it may be necessary to develop separate monitoring for this purpose.

V. Main problems, impact and status

36. Compared with some of the other subregions, water is relatively abundant and water scarcity is easier to manage. Overall, less than 20% of the available water resources are used each year.[6] However, water availability and populations are unevenly distributed through the subregion and even within countries, and water scarcity occurs widely in the southern parts, where demand is often met by transfers from other river basins, water reuse and desalination.

37. Intensification of agriculture continues to be a major pressure factor. From a water quantity point of view, this is manifested in increased abstraction for irrigation, mainly in the southern countries. In the Duero basin, 92 % of water withdrawal in the Spanish part of the basin is for agricultural use and 88% in the Spanish part of the Guardiana basin. Water abstraction for irrigation is also a major pressure factor in the Po basin, being 80% of the total water use. Over exploitation of groundwater has, for example, resulted in declining water levels, salt water intrusion and the drying up of wetlands. Water demand in summer for agriculture and tourism is particularly acute in the Mediterranean coastal regions and islands.

38. Groundwater abstraction provides a major pressure in many parts of the sub-region. In the Scheldt Basin it is estimated that 844 x 10^6 m^3 of groundwater is abstracted per year, of which 581 x 10^6 m^3 is for drinking water supply. Groundwater abstraction is a major pressure in the aquifers in the Tagus basin and elsewhere in Spain, in particular for agricultural irrigation.

39. Hydromorphological changes disturb the natural flow and sediment regime of rivers, hinder the achievement of ecological objectives and destroy habitats for fish and other water organisms and prevent fish migration. These structural changes take two principle

[6] EEA, 2009. Water resources across Europe: confronting water scarcity and drought. EEA Report 2/2009.

forms – river bed straightening and maintenance to enable water transport and prevent flooding, and the construction of transverse structures for electricity generation, flood protection, flow regulation or water supply, or combinations of these objectives.

40. Almost all of the transboundary river basins refer to hydromorphological changes as one of the major pressures encountered in the basin, often extending back to the industrial development of the subregion. For many decades the Moselle and Saar have been developed as major shipping routes and the 28 locks on the Moselle and 6 on the Saar represent major barriers to fish migration.

41. During the last two centuries there has been a marked increase in the size and number of large storage reservoirs and there are now more than 7000 large dams in Europe and thousands of smaller ones.[7] Hydropower provided 16% of electricity generation in Europe in 2008, dominantly in the northern and alpine countries and mostly from large dams and reservoirs. Inland waterway transport plays an important role in the movement of goods in Europe with more than 4,000 km of navigable waterways. Twenty of the 27 Member States have inland waterways, 12 of which have interconnected transboundary waterway networks. Thus, there are major and long established civil engineering works whose presence for many decades means that the original, natural state of the river probably cannot be known.

42. The importance of the resulting hydromorphological changes was recognised in the WFD by the concept of "heavily modified" water bodies. In their first characterisation of river basins under Article 5 of the WFD, most EU Member States indicated that pressures derived from urban development, flood defence, power generation, navigation and straightening and land drainage were important in affecting the hydromorphological status of water bodies. Four Member States, Netherlands, Belgium, Slovakia and the Czech Republic provisionally identified more than 50% of surface water bodies as being heavily modified or artificial, largely in the major transboundary Rhine, Meuse and Oder basins.[8]

43. For instance, in the International Oder River Basin District, 227 surface water bodies are considered to be artificial and 294 as heavily modified out of a total of 2574. In the Scheldt the proportion of heavily modified water bodies in varies between 26 and 67% in the four riparian countries and artificial water bodies between 12% and 33%. For the Elbe basin, of a total of 3896 surface water bodies, 777 are classified as artificial and 1016 as heavily modified. Hydromorphological modifications have been even greater in the Rhine basin, with three major phases or river regulation taking place since the 19th century. Many barrages and locks were built for power generation and shipping. The construction of dykes and bank stabilisation measures cuts the adjacent alluvial floodplains off from the dynamics of river flow and shortens and straightens the river, such that the Upper Rhine lost 30 km in length, and 87% of the water meadows between Basel and Karlsruhe[9] and 60% of its alluvial forests.

44. Amongst other Member States, an average of 16% of surface water bodies was provisionally identified as heavily modified or artificial. In Switzerland, 46% of watercourses below 600 m altitude are heavily impacted and in Germany only 21% of rivers, mainly in the less populated areas, remain in their natural state or are only slightly to moderately altered. In Denmark the majority of streams have been directed into culverts and in Austria only about one third of the total length of the major rivers remains free

[7] EEA, 2009. Water resources across Europe: confronting water scarcity and drought. EEA Report 2/2009.
[8] EC, 2007 First report on the implementation of the Water Framework Directive 2000/60/EC.
[9] EEA, 2010. The European Environment: State and Outlook 2010.

flowing, the rest being impounded or otherwise modified for power generation, flood protection or control of erosion.[10]

45. The impacts of these hydromorphological pressures are felt in changes in hydrological regime and regulation of river flows, interruption of river and habitat continuity and disconnection of the water modified watercourse from the adjacent wetlands and flood plains and changes in erosion and sediment transport. These in turn produce ecological impacts which include loss of habitat diversity, disruption of migration and introduction of exotic species via the new water connections produced by the extended canal systems. Heavy abstraction of groundwater also has a negative impact on wetlands and their ecosystems by drawing down groundwater levels and reducing the discharges of water that often support these fragile ecosystems.

46. Flow regime is one of the major factors controlling ecosystem function and services in river and wetland ecosystems. The seasonal and daily flow regimes of many European rivers have been changed by the structural modifications described above. Irrigation reservoirs, for example, generally store water during the wet season, usually the winter, and release it during the summer dry season. The release of water from reservoirs used for hydropower generation depends on electricity demand, and may therefore fluctuate on a daily basis.

47. Alluvial aquifers in close connection to surface water bodies can either discharge into the surface water or receive water from it, depending on whether the local hydraulic gradient is towards or away from the river. In the latter case, cutting floodplain alluvial aquifers off from the adjacent river systems with which they previously had strong hydraulic connection can reduce groundwater recharge and restrict the opportunity for improvement of water quality when recharging surface water filters slowly through the aquifer. A number of cities and towns beside the major rivers draw some of their public supply from “bank storage” schemes in which lines of wells and boreholes close to the river abstract a mixture of groundwater and recently-infiltrated river water. These vulnerable supplies need protection, but in this respect the WFD is less concerned with this situation than the opposite, where polluted groundwater can impact on surface waters.

48. Changes in land use and the planning of development can have major impacts on major drainage basins. Rivers have been straightened and wetlands and floodplains drained to permit farming and urban expansion. These changes mean that rivers flow faster in narrower and deeper channels than in their natural state and floods can develop more rapidly, allowing less time for flood warnings and reducing the capacity of floodplains to provide space for the temporary retention of flood waters.

49. Causes of freshwater pollution are diverse and vary considerably in the subregion. Thus, while landfills, forestry, mining, aquaculture and unsewered sanitation can all cause local pollution, it is, not surprisingly, agricultural activities, industry and the urban environment which are the dominant pressures. All of the major river basin commissions cite diffuse pollution from agriculture as a major pressure and impact. In the Po basin, for example, 15% of the heavy organic pollution load can be attributed to municipal sources, 52% to industrial wastewaters and 33% to agriculture and animal husbandry. In the Elbe basin, nutrient loading and hydromorphological changes are each reported as providing about 45% of the problems for surface waters and point sources the remaining 10%. For groundwater, the pressures in the basin are provided dominantly by diffuse pollution from agriculture, point source pollution from old landfills and industrial sites, and abstraction for potable supply and lignite mining.

[10] EEA, 2010. The European Environment: State and Outlook 2010.

50. While there have been signs of improving water quality, the pressure from agriculture remains high and diffuse pollution by nutrients and pesticides remains a major cause of poor water quality in many parts of Europe. Source apportionment studies indicate that agriculture generally provides 50- 80% of the total nitrogen load with wastewater providing most of the remainder.[11] High applications of both mineral and organic fertiliser are used in the farming areas of Western Europe, particularly those in the Netherlands, France, Spain, Belgium, Denmark and Germany. Nitrogen application rates had increased dramatically over past decades such that a surplus in excess of that needed by crops or grassland was transported into freshwater systems. While application rates in the sub-region are now widely declining in response to the legal framework summarised above, the time taken for pollutants to move through the hydrological cycle means that in some areas concentrations in receiving waters may still be rising even when the source itself is diminishing. Where trend data exist, these suggest that nitrate concentrations declined between 1992 and 2008 in 30% of rivers.

51. Remarkable efforts have been carried out to reduce pollution from urban waster waters and municipal wastewater treatment has increasingly been implemented across Europe. The implementation of the UWWTD has not only led to a higher collection rate of waste waters but also driven improvements in the level of wastewater treatment over recent years. The majority of wastewater plants in northern and central Europe now apply tertiary treatment although elsewhere in the EU, particularly in the south-east, the proportion of primary and secondary treatment is higher. This has led to a reduction in the wastewater discharge of nutrients, biological oxygen demand — a measure of organic pollution — and of ammonia to receiving waters. The emission of some hazardous chemicals has also been reduced.

52. Urban environments generate a range of water pollutants, including, industrial and household chemicals, metals, pharmaceutical products, nutrients, pesticides and pathogens from domestic premises, industrial plants and transport networks. Transport pathways are complex and the ultimate fate of urban pollutants highly variable, depending among other things on the mode of waste disposal or collection and the level of treatment. As an example, in some cities the sewage system is also designed to collect storm runoff from streets, roofs and other impervious surfaces. These dual systems are often long-established and were generally designed and built for smaller populations. During extreme storm events the flow generated can exceed the capacity of these combined sewer systems, and the excess overflows into streets and backs up into buildings. This is sometimes prevented or lessened by temporary diversion into relied drains which by pass the treatment works and discharge directly into receiving watercourses. These discharges of untreated water containing a range of pollutants can quickly deplete oxygen levels for aquatic life and cause rapid deterioration of bathing water quality.

53. Excessive concentrations of phosphorus from agricultural activities and urban wastewaters are the most common causes of freshwater eutrophication. Whilst concentrations remain high, 42% of rivers with long-term time series data for phosphorus concentration show statistically significant declines between 1992 and 2008.[12] Phosphorus concentrations have also declined since the 1990s in many lakes in Western Europe. These improvements can be attributed to controls on the use of phosphorus in detergents and enhanced nutrient removal in wastewater treatment, but the rate of improvement in water quality appears to be slowing in some rivers and lakes. Further significant declines in concentrations will have to be achieved by reduction in pollution from agricultural sources.

[11] EEA, 2005. Source apportionment of nitrogen and phosphorus inputs into the aquatic environment.
[12] EEA, 2010, The European Environment: State and outlook, 2010.

54. Nevertheless, the high population densities and long industrial history still have a profound impact on the waters of the large river basins of Western and Central Europe. In the Rhine basin, for example, 12% of the water bodies in the main stream are classified as of good chemical status and 88% as not good, mainly on the basis of poly-aromatic hydrocarbons (PAH) concentrations exceeding environmental quality standards. Most groundwater bodies in the basin have good chemical status and the causes for classification as bad status are nitrate from fertiliser applications and intensive livestock rearing and plant protection products. Although inventories of flora and fauna reflect the improvements in water quality, the present ecological status of the Rhine shows that 4% of water bodies are classified as good, 37% as moderate, 34% as poor and 14% as bad, although the situation is expected to improve considerably by 2015.

55. In the Oder basin, from an ecological viewpoint, only 8 surface water bodies (all of them lakes) have high status, 470 have good status, 171 are moderate, 214 poor and 787 are bad. In terms of chemical status, 1072 rivers and lakes (42%) are of good status and 1497 fail to reach good status. A similar assessment for the Scheldt indicates that no surface water bodies have high ecological status, 15 are classified as good, 83 as moderate, 81 as poor and 113 as bad. Much the same situations exists in the Moselle/Saar, Meuse and Elbe basins.

56. While groundwater monitoring is being augmented, knowledge of status and trends for both quantity and quality is generally less comprehensive than for surface water. In the Meuse basin, most groundwater bodies are affected by pollution from agricultural activities, and some have long been in poor status for both quantity and quality caused by lignite mining in the German part of the basin.

57. Within the Oder basin, the Hradec and Zitava and the Inter sudeten groundwater basins shared by the Czech Republic and Poland have been mapped, monitored and modelled and the results suggest that current abstraction of groundwater does not significantly influence groundwater flow in the border area. Of the seven transboundary groundwater bodies shared by Slovakia with its neighbours, all are defined as being in good quantitative status from the Slovak side and only the shallow alluvial aquifer along the Ipel River being at poor chemical status. In the Elbe basin, two groundwater bodies shared between the Czech Republic and Germany and with substantial groundwater abstraction have been extensively monitored, indicating declining groundwater levels and transboundary Protected Areas have been proposed. In the north of the sub-region, in Sweden, Norway and Finland transboundary groundwaters are not significant as water supply sources, but may support important ecological services.

58. Although reporting of RBMP by Member States is incomplete, some 40% of surface waters and 30% of groundwaters are at risk of not achieving good status by 2015, with agricultural emissions and wastewater discharges confirmed as the most significant pressures with respect to ecological and chemical status.

59. Forestry, tree felling and other associated land use changes resulting in soil erosion and greater sediment loads provide pressures in some parts of the sub-region, as does mining, either from current activities or as a legacy of closed and decommissioned mines. In the Torne basin, for example, forestry and mining are joined as pressures by peat production and land drainage for agriculture, and the consequent increases in nitrogen and phosphorus loading have made eutrophication in the basin more severe.

60. The legacy of past coal an iron mining remains a major pressure on surface water and groundwater in the Moselle/Saar basin, together with calcium chloride-rich discharges from the Lothringian salt industry in the lower reaches of the Meurthe tributary of the Moselle, past mining in the Ruhr and current open-cast lignite mining on the left bank of the Lower Rhine.

VI. Climate change and its impacts on water resources

61. Climate change is projected to lead to significant changes in yearly and seasonal water availability. Water availability is predicted to increase generally in the north, whereas southern areas which already suffer most from water stress are likely to be at risk of further reductions in water availability, with increasing frequency and intensity of drought.[13] Thus, for a northern basin such as the Torne, over the next 50 years annual precipitation is projected to rise by 4-12%, and by around 20% in western and northern Norway.

62. Seasonal changes in river flows are also predicted. Higher temperatures would push the snow limit in northern and mountain regions upwards and reduce the proportion of precipitation which falls as snow. This would decrease winter retention of water and increase winter flows in rivers such as the Rhine, Rhône and Danube. The reduced snow reservoir and earlier snow-melt would reduce spring meltwater flows. There are some suggestions that more intense precipitation events might occur in spring and autumn, with fewer in the summer. Together with an expected overall decline in summer precipitation, these changes could lengthen the periods of low flow in summer, although elsewhere there are expectations of higher summer rainfall. For the Torne basin, projected seasonal hydrological changes range from -5 to +10% and the frequency of spring floods may increase which could cause overflow at treatment plants.

63. In relation to management of the Genevese transboundary aquifer, the extreme heat wave of 2003 and heavy storms of 2007 both produced high turbidity in the Arve river water. This rendered the water unsuitable for artificial recharge of groundwater, and the plant had to be closed. Thus, opposite meteorological extremes had the same practical impact, highlighting the potential implications of climate change for the control and management of artificial groundwater recharge with river water.

64. Both direct and indirect consequences of climate change can be anticipated. Where intensive rainfall events are expected to become stronger and more frequent, greater flushing of diffuse agricultural pollutants to both surface water and groundwater could result and the frequency and severity of polluted urban stormflows could increase. Overall increases in annual rainfall could have the effect of diluting diffuse pollutants. Hotter and drier summers would enhance mineralisation reactions in the soil and thereby potentially increase nitrate concentrations in water. Rising water temperatures will increase the likelihood of cyanobacterial blooms and hotter and drier summers would deplete river flows, reduce dilution capacity and lead to higher pollutant concentrations.

65. Climatic changes may also produce changes in land use, agricultural activities and cropping patterns. Rising temperatures may result in the northward extension of cultivation of a whole range of crops. Hotter and drier summers are likely to increase the demand for seasonal supplementary irrigation both within and beyond existing irrigated lands. Modelling studies in the Guadalquivir river basin suggested and increase in seasonal irrigation requirements of 15-20% by the 2050s and even in the United Kingdom irrigation demand is likely to increase.[14] These substantial demands may be difficult to predict and plan for.

66. Overall, whilst the potential climate change impacts will vary, with the mountain areas particularly affected, this subregion may have the greatest capacity for adaptation to climate change. Policy choices to mitigate impacts are important and some promising efforts are already being made in several of the major transboundary basins – the Danube,

[13] EEA-JRC-WHO, 2008. Impacts of Europe's changing climate — 2008 indicator-based assessment. Joint EEA-JRC-WHO report.

[14] EEA, 2010. The European Environment: State and Outlook 2010.

Rhine and Meuse. In the Meuse, an EC Interreg project is currently working with the support of the International Meuse Commission to define a common strategy for adapting to the consequences of climate change in the river basin and measures for addressing the higher discharges, less rapid drainage and consequent increased flood risk that are likely to occur. This work will also contribute to the implementation of the EU Flood Directive.

67. Policy with respect to climate change adaptation is also being developed at national level. In Slovakia, for example, a national climate programme was established in 1993 to establish relevant monitoring and interpret the results in relation to possible climate change impacts on hydrological variability, agricultural production and forest ecosystems. The programme also considers and proposes adaptation measures to reduce the negative impacts of climate change on the management of land and water resources.

VII. Responses

68. Until recently, water management has largely been directed towards increasing supply from wells, reservoirs, water diversions and desalination. Recognising that this could not continue indefinitely, attention has turned to the management of water demand by measures such as water pricing mechanisms, reduction of water losses, water reuse and recycling, increasing the efficiency of domestic, agricultural and industrial water uses and water saving campaigns supported by public education. Reducing water demand can bring additional benefits in decreased pollution discharges and lower energy consumption.

69. The EU sixth Environment Action Programme and EU water legislation, including the WFD, aim to ensure that water abstraction is sustainable over the long term and to promote the protection of water resources. Moreover, in 2007 the European Commission adopted a Communication "Towards Sustainable Water Management in the European Union" related to water scarcity and droughts.[15] This set out the measures needed for a water-efficient, water-saving economy, with full implementation of the WFD to include water pricing policies, and sustainable land-use planning.

70. The WFD requires Member States to implement water pricing policies which provide adequate incentives to use water efficiently. In practice, this usually means a combination of pricing and metering, which has been highly effective in changing consumer behaviour in many countries. Increased water prices have been a major factor in reducing public water demand in Eastern Europe and have contributed to a desire for water saving in Western Europe.[16] To encourage efficient water use, pricing must be related to the volume of water consumed. Metering therefore plays a key role, and should be implemented for all sectors of water users, although not all countries meter the majority of water users.

71. The potential for water saving is considerable, with estimates that water efficiency could be improved by 40% through technological improvements alone[17] with changes in behaviour or production processes producing additional savings. At the household level, this is largely a matter of combining water-efficient installations with raising awareness through educational and publicity campaigns. Industrial users have reduced water use by recycling, reuse, changing production processes and using more efficient technologies and reducing leakage.

[15] Commission of the European Communities, COM(2007) 128 final. Communication from the Commission to the European Parliament and the Council "Towards sustainable water management in the European Union - First stage in the implementation of the Water Framework Directive 2000/60/EC".

[16] EEA, 2010 The European Environment: State and Outlook 2010.

[17] EEA, 2010 The European Environment: State and Outlook 2010.

72. In the southern part of the sub-region, agriculture is by far the dominant water use by volume abstracted from rivers and aquifers. Farmers have often changed to more water-intensive crops because of the high yields obtained and the high prices commanded, but agricultural users generally pay much less for water than other users. In Greece and Spain, for example, water for agriculture costs about €0.05/m^3 compared with €0.85 to 1.25/m^3 for household and industrial water[18]. If water for agriculture were paid for by volume and with the price reflecting full resource and environmental costs, then farmers would respond by improving the timing of irrigation, adopting more efficient techniques such as sprinkler and drip irrigation, and changing to less water-demanding crops. In Spain, for example, the total irrigated area has remained stable at 3.4 million hectares from 2002 to 2008, while the area under gravity flood irrigation has decreased from 1.4 million to just over 1 million hectares and the area watered by drip irrigation increased from 1.1 to 1.6 million hectares. In 2006 water use for drip irrigation was 3800 m^3/ha compared to 6200 m^3/ha for gravity irrigation. In some cases the savings in water achieved by more efficient irrigation have been used by farmers to irrigate larger areas of land.

73. Leakage of water from supply systems in parts of the sub-region remains substantial and countries face major challenges to reduce these losses. Investment in detecting and repairing leaks is important, and improvements to the construction and maintenance of water supply systems have reduced leakage losses throughout the sub-region. In the past 10 to 15 years, 30-50% reductions in leakage have been achieved in the Czech Republic, Denmark, England and Wales, Germany, Malta, the Netherlands and Spain so that in the Czech Republic, Spain and the United Kingdom they are now down to 20% or below[19]. In a few countries, such as Germany and Denmark, losses are down to 10% or even lower, which is probably close to the limit of what is technically and economically feasible. Such conservation measures have significant economic and environmental benefits, delaying or avoiding additional water supply abstraction and reducing sewage generation and the investment in treatment capacity required to deal with the wastewater and reducing energy requirements for abstracting, treating, and transporting both clean water and wastewater. Continuing investment will still be required to update or replace aging water supply and sewerage infrastructure.

74. There have been visible benefits for the protection of water resources in the last two decades thanks to investments in wastewater treatment. These have produced measureable improvements in water quality, particularly with respect to nutrients, biochemical oxygen demand, ammonia and hazardous chemicals. Much of the early concern focussed on pollution from both active and closed industrial sources, and between 1987 and 2000 measures under the Rhine Action Programme led to improvements in river water quality, recovery of the fauna and a significant reduction in the number and severity of accidental pollution.

75. This process has been given further impetus by the implementation of the Urban Wastewater Treatment Directive. Countries in the north and centre of the sub-region were already well provided with tertiary wastewater treatment for their urban populations. More than 96% of the 58 million inhabitants in the Rhine basin are connected to wastewater treatment plants and many industrial sites now have modern and comprehensive wastewater treatment facilities. In the northern countries, tertiary treatment has been provided for 70-80% of their populations for over twenty years, and the remaining 20% or so live in small scattered rural communities with small-scale sewage treatment systems or septic tanks which are nowadays quite strictly regulated.

[18] EEA, 2010 The European Environment: State and Outlook 2010, Country Assessment — Greece.
[19] EEA, 2010. The European Environment: State and Outlook 2010.

76. Amongst those countries in the south and centre of the sub-region, the proportion of national populations connected to water-borne sewerage systems has increased within the last two decades and the proportions connected to plants with secondary or tertiary treatment have also increased substantially over the same period. In the Oder basin, for example, some 500,000 and 150,000 additional people in the Polish and Czech parts respectively are expected to have been connected to sewage systems between 2005 and 2015. Investment in environmental measures does, therefore, pay but continuing efforts are required, and it can become disproportionately costly to serve the last communities in basins where most of the population are already connected to sewerage systems.

77. While agriculture remains the dominant land use in most of the large transboundary river basins, nitrogen fertiliser applications to crops have been decreasing in recent years. This is largely driven by stricter environmental legislation such as the Nitrate Directive referred to below, but increasing demand for organic produce, the high cost of fertilisers and scientific advances in improved crop strains and modern application techniques have also played their part. In the Rhine basin, a reduction of up to 15% in the nitrogen load from agricultural sources is targeted by 2015.

78. Implementation of the Nitrate Directive is likely to result in further improvements in the quality of both surfaces waters and groundwater. Ten EU Member States have designated their whole territory as Nitrate Vulnerable Zones (NVZ) and in the remainder substantial areas of agricultural land have been designated. Overall, almost 40% of the area of the EU has been designated. All Member States have established action programmes of measures, almost all of which incorporate the manure nitrogen application threshold of 170 kg/ha/year. Other measures described in Annex III of the directive include the development of comprehensive codes of good agricultural practice, restrictions on the timing of fertiliser applications and on the types of vulnerable land to which fertilisers can be applied. However, even where full compliance is assured, sufficient improvement in water quality may not be achieved by this threshold and the beneficial impacts of the measures will take years or decades to become apparent, especially in many of the sub-regions deeper groundwater systems.

79. For the larger river basins in the sub-region, restoring river hydromorphology remains a major challenge. The hydrological regimes of many wetland systems have been heavily altered in the past by the river engineering activities mentioned above and, as a result, many of the major European rivers have been separated from their floodplains. Realising that rivers cannot be properly managed in isolation from their floodplains and without a better balance between user needs — transport, irrigation, flood protection, agriculture and hydropower — numerous restoration projects are underway. These measures can provide greatly improved ecosystem services, encourage habitat restoration and restore biodiversity, all of which are beneficial to leisure activities and the tourism industry.

80. This is illustrated particularly by the efforts to restore continuity of the Rhine to allow improved fish migration under the “Master Plan Migratory Fish Rhine” which are already showing progress. This programme will eventually re-establish spawning habitats and improve fish passage close to the coast and at dams further up the Rhine and its major tributaries. To build up self-sustaining stocks of salmon and of lake trout in Lake Constance, access to a maximum number of identified spawning and juvenile habitats in the Rhine catchment must be restored and greater facility for upstream migration must be allowed. Activities to support this include, work on two dams in the Upper Rhine at Strasbourg and Gerstheim by 2015 to allow access to the Elz-Dreisam system in the Black Forest, improve existing fish passages at four dams on the High Rhine and at several barriers on the navigable tributaries the Moselle, Main, Lahn and Neckar. Such measures are also a feature of responses in the Moselle/Saar and the Scheldt.

81. Efforts to restore the ecosystems of the Upper Rhine have resulted in the transboundary French-German Upper Rhine Ramsar Site. Designation of this strip of forests and floodplains stretching 190 km from Basel to Karlsruhe in 2008 took 16 years to achieve. Management of these transboundary wetland ecosystems is led by a tripartite intergovernmental council — the Upper Rhine Council — and facilitated by the establishment of a trans-border Rhine Park, supported by NGOs targeting sustainable tourism, the salmon restoration mentioned above and waterfowl.

82. Almost all of the pressures outlined above are present in the Raab/Rába basin shared by Austria and Hungary, such that only two of its 30 surface water bodies are presently of good status. Specific measures to be taken include reducing the regulation of the rivers, modifying the operation of barrages and constructing fish channels, providing buffer protection strips along the river, reducing nutrient loading from arable and livestock farms and supplying additional water to the oxbow ecosystems in the flood plain close to the river. These are likely to be required through three RBMP cycles until 2027 in order to reach good status for surface water and groundwater.

83. Restoration measures are also important in heavily modified lowland river basins. The Wiedau River, shared between Denmark and Germany and discharging into the Wadden Sea has been highly controlled by weirs and gates to protect it from tides and surges. During the last decade, a number of projects have been completed to make the weirs passable for migrating fish and to return straightened and modified stretches of the river to its original meandering course.

84. Large alpine lakes are a particular characteristic of the Po basin. The transboundary Lake Lugano, shared by Switzerland and Italy, has seen considerable recovery with respect to water quality. In the 1960s the lake was heavily polluted and had become eutrophic with high phosphorus concentrations and oxygen deficiency at depth. Since the 1970s, eight wastewater treatment plants have gradually come into operation and the lake water quality improved substantially. In 1986, Italy and Switzerland started to eliminate phosphorus from detergents and cleaning products and since 1995 the larger sewage treatment plants have improved their capacity to remove nitrogen and phosphorus, to the extent that the phosphorus load to Lake Lugano has been reduced to one third in the last twenty years.

85. With regard to responses, it is even more important that the implementation of programmes of measures within RBMPs is coordinated at the basin level. This requires political commitment to enforcement, transboundary agreement on the measures and sustained cooperation to monitor their effectiveness. Thus, for the Scheldt basin, a transboundary Catalogue of Measures directed at a range of pressure factors has been developed in which the countries will provide details of their measures in comparable formats. Measures are classified according to sector of human activity, the subject or source of pollution to which the measures are addressed, the environmental compartment they are directed at and the groups of pollutants they are intended to control or reduce. At a more local level, joint lists of restoration measures are compiled under the common management strategy developed for the Morava-Dyje-Danube floodplain.

86. For many intensively-farmed areas, the programmes of measures developed under the Nitrate Directive will not, by themselves, necessarily be enough to restore water quality. In some countries, local, more intensively targeted measures have been developed. In Baden-Wurttemberg, the local AgroEnvironmental Programme (MEKA) uses a point scoring system for a range of farming actions designed to minimise nutrient pollution, and then provides payments of 10 euros per hectare for each credit point.

87. Considerable advances have been made in providing early warning of accidental pollution. The International Warning and Alarm Plan for the Elbe was established in 1991 with five warning centres, one in the Czech Republic and four in Germany. The plan is upgraded and revised from the experience of any accidents which occur and is regularly

tested, and considered a major defence against transboundary impacts of accidental pollution.

88. While implementation of the UWWTD has resulted in more of the sub-region's population being provided with sewerage systems and treatment works, there remains considerable scope for increased control of pollutants at source.

89. Where it is particularly difficult to achieve good status by 2015, Article 4 of the WFD allows extensions to this deadline for reasons of technical unfeasibility or disproportionate costs of response measures, or because the local natural environment and flow regimes mean that the beneficial impacts of the measures will be very slow to appear. The first two often apply to engineering works to improve the hydromorphological conditions, and the last to nitrate pollution of groundwater. Thus, in the Meuse for example, only about 280 out of 777 surface water and 42 out of 82 groundwater bodies are expected to reach the WFD targets by 2015, and 492 surface water and 29 groundwater bodies will require deadline extensions for one or more of the reasons mentioned above.

90. EU Member States are now beginning to establish activities related to the implementation of the Flood Directive. The lower reaches of the Klarälven is included in a pilot programme within the directive. In the Moselle/Saar, the ICMPS Flood Action Plan which was adopted in 1998 and outlines activities up to 2020 will be incorporated into the flood risk planning required by the Flood Directive.

VIII. The way ahead

91. A comprehensive range of EU legislation has been established to protect freshwater from pollution. Full compliance with this legislation would result in substantial improvements in water quality, but the extent to which these can be achieved could be constrained by several factors, not least of which is the economic costs that will need to be borne by society to achieve good status under the WFD.

92. Although the legislative framework is well established, long-term political and institutional commitment will be needed to achieve the desired environmental benefits. In the Elbe basin, for example, the expected reduction in nutrient loading in the first RBMP period to 2015 is 6% for nitrogen and 9% for phosphorus. These are expected to result from measures to control nitrogen applications which are in excess of crop requirements, improve cultivation practices to help reduce nitrogen losses from the soil and establish riparian buffer zones without fertiliser applications and which will encourage denitrification. Even with these measures, the basin management plan is anticipating the need for slow reductions in loading right up to 2027 because of the issues of technical feasibility and natural conditions referred to above.

93. Along with the requirement for long-term commitment will come a need for regular review and updating of monitoring programmes to take account of, for example, new substances and hazards, and evaluation of the effectiveness of programmes of measures and other responses. It will be important in this process to review the lessons learned from implementation. In the Rhine basin, for example, experience so far confirms the need for a clear organisational structure in the basin. Key lessons suggest it is important to establish priorities and tackle the important tasks first, allow for adequate public and stakeholder participation at the local level, keep things simple and concentrate on measures that are well understood. Ecological restoration is a complex process, but finding a symbol, in this case fish life, that both politicians and the public understand has been of considerable benefit.

94. Other current and future driving forces could instead have negative impacts on water quantity and quality in the coming years. These include the climate change impacts as well as changes in land use. Most studies predict a continuing decline in grassland cover in the countries of the EU, with the area of permanent crops remaining stable or decreasing.

95. However, European legislation does not always move completely in the same direction, and implementation of the Renewable Energy Directive is likely to result in an increase in the cultivation of biofuel crops. As it is unlikely that less food will be produced, formerly natural grassland or woodland might start to be cultivated resulting in the release of additional carbon and nitrogen into the environment and increased use of agrochemicals. Implementation of this Directive is also likely increase demand for hydro-electric power generation, with consequent pressures and impacts on surface water systems.

96. The political changes in Europe from 1989-90 resulted in less pronounced decreases in water abstraction and consumption in Western and Central Europe than in other subregions. Nevertheless, within the Oder basin water consumption declined by 25-30% and, although demand has begun to recover, present water sources should meet demand at least until 2015. These economic and social changes also led to sharp declines in industrial activity and reductions in agrochemical usage, and hence pollution loading, but these are now beginning to recover and this is likely to continue.

97. Illegal abstraction, particularly from groundwater for agricultural use is widespread in some countries. Addressing illegal water use presents major political challenges and requires surveillance and fines to detect and control such activities. From 2010 the Good Agricultural and Environmental Condition (GAEC) framework developed as part of the EU cross-compliance mechanisms includes requirements for improved authorisation of water for irrigation. This should help in water management by providing a means by which Member States can control illegal abstraction of groundwater by unauthorised wells.

98. There remains a need to strengthen the integration of European policy so that improvements in water management are not compromised by policies in other sectors such as the EU Common Agricultural Policy (CAP) and the proposed trans-European waterway network. Recent reforms of the CAP and Swiss agricultural policy have resulted in a decoupling of agricultural subsidies from production and the introduction of cross-compliance mechanisms to help address environmental concerns. Further reform of agricultural policies is, however, required to improve water use efficiency and irrigation practices.

Annex I

Brief description of the water resources management frameworks in countries in Western and Central Europe

1. The EU Water Framework Directive (WFD) provides the framework for the management of water resources for all of the countries of the subregion, both those who are EU Member States and those such as Norway and Switzerland who are not.

Austria

2. The main responsibility for water management is allocated to the Federal Ministry of Agriculture, Forestry, Environment and Water Management. Its core tasks are to prepare and implement water legislation (with some minor exemptions, see below); to develop a National Water Management Plan following the provisions of the WFD; to assess and manage floods risks; to provide appropriate budgets and financial incentives; to collect and assess representative and comparable data on the water cycle and water quality and to represent Austria's water interests in all international fora. This ministry is supported by the Federal Environmental Agency and the Federal Agency for Water. Some water responsibilities are traditionally allocated to other ministries such as drinking water and bathing waters (Federal Ministry for Health) and navigation and waterways (Federal Ministry for Traffic, Innovation and Technology).

3. Core legislation and general direction of activities at the national level, e.g. by national plans and action programmes, and by providing financial incentives, are undertaken by the Federal State. Implementation of legislation such as the issuing of licences and authorisations and the taking of concrete action (e.g. setting in place regional action plans within the framework of the National Water Management Plan) are undertaken by Austria's nine Länder. Authorisations of routine projects, abstractions and discharges are allocated to the 100 district authorities, which is the lowest level of administration. Some responsibilities are shared between Federal State and Länder, for example, the national monitoring of water quality and water quantity. The federal ministry provides general directives, operates a nation-wide database of the monitoring results and directs the process by covering 66% of the cost of monitoring and 100% of the costs of the monitoring sites, while the daily routine efforts are entrusted to the Länder administrations and to private companies.

Belgium

4. No information provided.

Czech Republic

5. No information provided.

Denmark

6. In Denmark the local authorities (municipalities) are responsible for the management and the protection of water resources, i.e. rivers, lakes, coastal waters and groundwaters. The Nature Agency (a national Agency under the Danish Ministry of the Environment) is responsible for overall water planning including the preparation of River Basin Management Plans and Programmes of Measures according to the EU WFD. In addition,

each municipality will make a local Action Plan that transposes into practice the Programme of Measures covering its territory. Water monitoring is the responsibility of the Ministry of the Environment.

7. As for bilateral agreements concerning transboundary waters, in 2005 Denmark and Germany made a Joint Declaration on the management of transboundary waters in the International River Basin District according to the WFD. The Joint Declaration was signed in 2005 by the Danish Minister of the Environment and the Federal Minister for the Environment, Nature Conservation and Nuclear Safety of the Federal Republic of Germany. The Declaration concerns the four transboundary rivers Vidå/Wiedau, Kruså/Krusau, Meden Å/Meynau and Jardelund Grøft/Jardelunder Graben (names in Danish and German respectively).

8. The scope of the Declaration is the coordination of river basin management in the International River Basin District according to the Water Framework Directive, in particular analyses and reviews (Article 5), Programmes of Measures (Article 11), River Basin Management Plans (Article 13), timetables and work programmes, interim overviews of significant water management issues, measures for consulting and informing the public (Article 14), and reporting to the European Commission (Article 15).

Finland

9. For a description of the water resources management framework in Finland, see document ECE/MP.WAT/WG.2/2011/6–ECE/MP.WAT/WG1/2011/6.

France

10. No information provided.

Hungary

11. For a description of the water resources management framework in Hungary, see document ECE/MP.WAT/WG.2/2011/6–ECE/MP.WAT/WG1/2011/6.

Germany

12. No information provided.

Ireland

13. The Department of the Environment, Community and Local Government's mission is "to pursue sustainable development". This includes protecting and improving water resources and the quality of drinking water, consistent with the EU WFD. A total of eight River Basin Districts (RBDs) form the administrative areas for coordinated implementation of the Directive on the island of Ireland. Three of these are international RBDs, in which waters are shared with Northern Ireland. The Department is also responsible for developing and implementing policy and legislation in the fields of water and wastewater services.

14. Investment by the State in water services infrastructure is channelled through two Programmes – the Water Services Investment Programme (WSIP) and the Rural Water Programme (RWP). The WSIP accounts for the greatest share of the investment and is the instrument through which all major public water and wastewater infrastructure schemes are delivered. The Rural Water Programme (RWP) relates to smaller public schemes, group

water schemes and private supplies and responsibility for these schemes is devolved to the relevant local authorities.

15. The Environmental Protection Agency (EPA) is a statutory body responsible for protecting the environment in Ireland. It regulates and polices activities that have the potential to cause pollution. The agency issues licences to local authorities for wastewater discharges, conducts environmental audits and inspections of EPA licensed facilities, oversees the environmental responsibilities of the local authorities, prosecutes those found to be in breach of environmental legislation, monitors the quality of waters and water levels and flows and produces independent reports to inform decision making by national and local government.

16. There are five city councils and twenty nine county councils designated as water services authorities (WSAs) under the Water Services Act 2007 to provide water and wastewater services within their functional areas. In addition, the WSAs are responsible for water service infrastructure such as treatment plants and pumping stations, water supply networks and wastewater collection systems. They are also required to implement Departmental policies, comply with legislation and follow directions issued by the Minister, the EPA and the Health Services Executive. There may, however, be a new structure as plans are currently underway to establish a new State company, Irish Water, which will take over responsibility for water service infrastructure from the 34 existing water services authorities.

Italy

17. In Italy, the Ministry of Environment, Land and Sea has the overall responsibility for water resources management. Other concerned ministries include the Ministry for Agriculture, Food and Forest Policies, and the Ministry for Infrastructure and Transport.

18. In 1989, Law 183 established the river basin as the basic unit within which all regulatory actions concerning water resource management, water pollution control and soil protection are to be coordinated. The law also established Major Basin Authorities and entrusted them with planning responsibilities. Major Basin authorities are cooperative bodies at an intermediate level between the national and regional where representatives of both levels are represented in the decision-making structure.

19. Municipal utilities are aggregated into Optimal Territorial Areas (OTAs), which are responsible for the management and supply of water services such as wastewater treatment, sanitation and drinking water provision. OTAs also have to draft Optimal Territory Plans (OTP), which analyse the availability of water resources and plan for their current and future use. Basin authorities have the responsibility of verifying that the OTP is coherent with basin plans and objectives.

20. By approval of the legislative text on environmental protection in 2006 (Decree 152), which has a part concerning water resource protection and management, the contents of the EU WFD were formally adopted. This involved the establishment of River District Authorities and assigning them the task of producing river basin management plans. Other competences related to the implementation of the WFD are shared between national authorities, local authorities and River District Authorities.

Luxembourg

21. In Luxembourg the Water Management Administration was created in 2004. It reports to the Ministry of Home Affairs and the Greater Region and is responsible for water protection and management. The main duties of the Water Management Administration cover in particular sewerage, drinking water, surface water and groundwater protection,

hydrology, fisheries, river restoration and flood risk management as well as the transposition into national law and regulation and the implementation of European legislation on water.

22. Luxembourg collaborates in the following transboundary Water Management Organizations; the International Commissions for the Protection of the Moselle and the Saar (ICPMS), the International Commission for the Protection of the Rhine (ICPR) and the International Meuse Commission (IMC), more details of which are given in Annex II. During 2011, Luxembourg chairs both the ICPMS and the ICPR.

Netherlands

23. At State level; the Ministry of Infrastructure and Environment is responsible for formulating water policy and legislation in general, holds supervision over the implementation of water management by the other bodies, and is responsible for the management of 'national' water bodies, i.e. the larger rivers, lakes and sea, and some weirs, dams and dikes. The twelve provinces are responsible for developing water policy at provincial level, within the national framework. They are also responsible for supervision over the water boards and have a broader task in spatial planning.

24. The 25 water boards, which are the oldest democratic institutions in the Netherlands, have as their core task the operational management of the water system. This includes drainage of urban and rural areas, water quantity and water quality including wastewater treatment and management of dikes and dams. Occasionally, water boards are given responsibilities related to road and waterway management. The administrations of the water boards are elected every four years, the same period as at state, provincial and municipal level. The 418 municipalities in the Netherlands are responsible for operational water management, which comprises the collection of wastewater and the construction and maintenance of sewerage systems and drainage in urban areas. Sometimes, for example in Amsterdam, the municipal water services and the water board are merged into one organization. Drinking water is provided for by ten drinking water companies which are semi-independent from the state. They are responsible for the production and distribution of the water. Quality standards are defined in national legislation and differentiated for drinking water/water for consumption and water for industrial use.

Norway

25. For a description of the water resources management framework in Norway, see document ECE/MP.WAT/WG.2/2011/6–ECE/MP.WAT/WG1/2011/6.

Poland

26. No information provided.

Slovakia

27. For a description of the water resources management framework in Slovakia, see document ECE/MP.WAT/WG.2/2011/6–ECE/MP.WAT/WG1/2011/6.

Slovenia

28. For a description of the water resources management framework in Slovenia, see document ECE/MP.WAT/WG.2/2011/6–ECE/MP.WAT/WG1/2011/6.

Spain

29. No information provided.

Sweden

30. No information provided.

Switzerland

31. No information provided.

United Kingdom

32. No information provided.

Annex II

Existing agreements related to the management of transboundary water bodies in Western and Central Europe

Countries[aa]	*Water body basin concerned*	*Title key provisions*	*Signed (S); Entry into force (E)*
AU, BA, BG, HR, CZ, DE, HU, MD, ME, RO, RS, SK, SI, UA, EC		The Convention on Co-operation for the Protection and Sustainable Use of the River Danube (Danube River Protection Convention) forms the overall legal instrument for cooperation and transboundary water management in the Danube River Basin. The main objective of the Danube River Protection Convention (DRPC) is to ensure that surface waters and groundwater within the Danube River Basin are managed and used sustainably and equitably. This involves: the conservation, improvement and rational use of surface waters and groundwater; preventive measures to control hazards originating from accidents involving floods, ice or hazardous substances; AND measures to reduce the pollution loads entering the Black Sea from sources in the Danube River Basin. The Convention is the basis for the work of the International Commission for the Protection of the Danube River (ICPDR).	1994 (S) 1198 (E)
CZ, PL		Convention between the Czechoslovak Republic and the Peoples Republic of Poland on Water Management on Transboundary Waters	1958
DE, NL	Ems Dollart estuary	Arrangement for collaboration in the Ems Dollart estuary	1960
SK, AU		Treaty between the Czechoslovak Socialist Republic and the Republic of Austria on the Arrangement of Water Management Issues for Transboundary Waters	1970 E
CH, FR	Genevese aquifer	An arrangement for 30 years between the State of Geneva and Haute-Savoie was signed in 1978. A new agreement relating to the use, recharge and monitoring of Franco-Swiss Genevese groundwater was signed between, on the one hand, the communes of the greater Annemasse region, the Genevese communes and the commune of Viry and, on the other hand, the State Council of the Republic and the canton of Geneva, in December 2007. This new agreement succeeded that of 1978 and entered into force on 1 January 2008 for 30 years. The agreement is a rare example of a transboundary aquifer management agreement between a Swiss canton and European Union communities.	1978 2007 S 2008 E

Countries[aa]	*Water body basin concerned*	*Title key provisions*	*Signed (S); Entry into force (E)*
CZ, DE		Treaty between the Czech Republic and the Federal Republic of Germany on Cooperation on Transboundary Waters	1997 E
DE, PL		Treaty between the Polish Republic and the Federal Republic of Germany on Cooperation on Transboundary Waters	
DE, AU		So called "Regensburg Treaty". i.e. a bilateral treaty between Germany and Austria on transboundary waters	
CZ, SK		Agreement between the Government of the Czech Republic and the Government of the Slovak Republic on Co-operation on Transboundary Waters	1999 E
AU, HU	Raab/ Raba,	The intergovernmental Raab/Rába Action Group was formed in 2004 and was terminated in 2007 when the Raab/Rába ad Hoc Working Group was formed under the framework of Hungarian-Austrian Transboundary Water Committee to implement the action programme and its monitoring.	2007
AU, HU	Lake Neusiedl, Lech, Inn/Salzach	Agreements on the joint management of transboundary waters (Austrian-Hungarian Transboundary Water Commission).	1959 (1956?)
DE, DK	Wiedau	German-Dutch Transboundary Water Commission (Deutsch-Dänische Grenzgewässerkommission)	
DE, CZ	Elbe	The International Commission for the Protection of the Elbe	1990 S
DE, NL	Ems	German-Dutch transboundary cooperation. There is no commission. Transboundary cooperation with regard to implementation of the WFD and the new EU flood directive is based on an exchange of ministerial letters.	
DE, NL		German-Dutch Transboundary Water Commission	
CH, DE, FR, LU, NL, EC	Rhine	Convention on the Protection of the Rhine is the basis for international cooperation for the protection of the Rhine and of the International Commission for the Protection of the Rhine (ICPR). Among other objectives, the preservation, improvement and sustainable development of the Rhine ecosystem are central elements of the convention. This target was fixed against the background that the Rhine is an important European navigation lane and is supposed to continue to serve different uses. The Convention signed in 1999 replaces the Treaty of Bern signed in 1963 as well as the Chemical Convention of 1976 and is being completed by the Financial regulations and rules of procedure of the ICPR.	1999

Countries[aa]	*Water body basin concerned*	*Title key provisions*	*Signed (S); Entry into force (E)*
NO,	Glama/ Glomma	Sweden-Norway Water Convention	1929
SE		Memorandum of Understanding for implementation of the WFD	2008
Mosel: FR, DE, LU. Saar: FR, DE	Mosel and Saar	The Protocol between the Governments of the Federal Republic of Germany and the French Republic on the constitution of the International Commission for the Protection of the Saar against pollution and the Protocol between the Governments of the Federal Republic of Germany, the French Republic and the Grand Duchy of Luxembourg on the constitution of the International Commission for the Protection of the Mosel against pollution are at the basis of the International Commissions for the Protection of Mosel and Saar Against Pollution (ICPMS).	1961
FR, NL, BE, DE, LU	Meuse	International Agreement on the Meuse is the basis for the International Meuse Commission	2002 S 2006 E
BE, FR, NL	Scheldt	The Treaty on the Protection of the Scheldt of 1994 sets up the International Commission for the Protection of the Scheldt (ICPR). In 2002, a the new Scheldt Treaty was signed in Ghent to meet the effective obligation to multilaterally coordinate, as stipulated by the European Water Framework Directive. The new Scheldt treaty also provides a new name for the commission: International Scheldt Commission (ISC).	1994 S 2002
BE, NL	Scheldt estuary	Vlaams Nederlandse Schelde Commissie (VNSC) Within the Scheldt basin, there is a separate set of memoranda and agreements between the Flemish Region and the Netherlands for policy and management related to the deepening, shipping, safety and nature of the Scheldt estuary. These are covered by the VNSC, and this cooperation was formalised in the Treaty of December 2005 on cooperation and management in the Scheldt estuary.	2005
SP, FR	Bidasoa	Administrative Agreement between Spain and France on Water Management. The Coordination Committee operating on this basis is chaired by the ministries responsible for environment in France and Spain and co-chaired by the Directorates of French and Spanish Water.	2006

Countries[aa]	*Water body basin concerned*	*Title key provisions*	*Signed (S); Entry into force (E)*
SP, PT	Limia, Mino, Duero, Tagus, Guadiana	The Convention of Albufeira for cooperation for the protection and the sustainable use of the waters of the Spanish-Portuguese river basins aims to improve the cooperation between the Governments of Portugal and Spain, to encourage the sustainable use of shared of surface and groundwater, maintain and improve the ecological status of shared water bodies. Key provisions are information exchange, public information and consultation, assessment of transboundary impacts and warning and emergency systems. The Agreement and its Additional Protocol define for each main shared river, the minimum discharge to the downstream country. The Convention has two bilateral government bodies: The Conference of the Parties with a high political level, and The Commission for the Development and Application of the Convention.	1998 S Revised 2008
FI, SE	Torne	The Finnish-Swedish Border River Agreement	2010
FR, CH	Lake Geneva (Rhone)	The Convention between the Swiss Federal Council and the Government of the French Republic on the protection of Geneva Lake Against Pollution sets up the International Commission for the Protection of the Waters in Geneva Lake (CIPEL)	1962
FR, CH	Lake Geneva (Rhone)	French-Swiss Agreement on the intervention of bodies to prevent accidental pollution of waters by hydrocarbons or other substances that can affect the water.	1977
CH, IT	Po	The Italian Swiss Convention on the protection of Italian-Siwss Waters against pollution set up the International Commission for the Protection of Italian-Swiss Waters (CIPAIS). The catchment areas of Lakes Maggiore and Lugano are managed in an integrated way by CIPAIS with a focus on water quality issues, particularly eutrophication. Regulation of the outflow of Lake of Lugano in the River Tresa is ensured by a transboundary agreement between Italy and Switzerland which is an independent commission, separate from CIPAIS.	1972 (S)
CZ, DE, PL	Oder	The Convention on the International Commission for the Protection of the Oder sets up the International Commission for the Protection of the Oder against Pollution (ICPO).	1996 S, 1999 E

[a] Country names have been abbreviated as follows: Austria (AT); Bosnia and Herzegovina (BA); Belgium (BE); Bulgaria (BG); Croatia (HR); Czech Republic (CZ); Denmark (DK); Finland (FI); France (FR); Germany (DE); Ireland (IE); Italy (IT); Luxembourg (LU); Montenegro (ME); Netherlands (NL); Norway (NO); Poland (PL); Portugal (PT); Republic of Moldova (MD); Romania (RO); Serbia (RS); Slovakia (SK); Slovenia (SI); Spain (ES); Sweden (SE); Switzerland (CH); Ukraine (UA); United Kingdom (GB); European Community (EC)..

Annex III

Status of ratification of selected international agreements relevant to transboundary water management by countries in Western and Central Europe

Treaty	*Countries*																				
	AT	BE	CZ	DK	FI	FR	DE	HU	IE	IT	LU	NL	NO	PL	PT	SK	SI	ES	SE	CH	GB
Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Water Convention - Helsinki, 1992)	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	S
Protocol on Water and Health (London, 1999, in the framework of the UNECE Water Convention)		●	●	S	●	●	●	●		S	●	●	●	S	●	●	S	●	S	●	S
Protocol on Civil Liability (Kyiv, 2003, in the framework of the UNECE Water Convention and Industrial Accidents Convention)	S	S		S	S			R			S		S	S	S				S		S
Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention, 1991)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Protocol on Strategic Environmental Assessment (SEA Protocol, Kyiv, 2003, to the Espoo Convention)	●	S	●	S	●	S	●	●	S	S	●	●	●	S	S	●	●	●	●		S
Convention on the Transboundary Effects of Industrial Accidents (Industrial Accidents Convention, Helsinki, 1992)	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●
Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention, 1998)	●	●	●	●	●	●	●	●	S	●	●		●	●	●	●	●	●	●	S	●

Treaty	*Countries*																				
	AT	BE	CZ	DK	FI	FR	DE	HU	IE	IT	LU	NL	NO	PL	PT	SK	SI	ES	SE	CH	GB
Danube River Protection Convention (Sofia, 1994)	●	n/a	●	n/a	n/a	n/a	●	●	n/a	n/a	n/a	n/a	n/a	n/a	n/a	●	●	n/a	n/a	n/a	n/a
Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention 1976, amended in 1995)	n/a	n/a	n/a	n/a	n/a	●	n/a	n/a	n/a	●	n/a	n/a	n/a	n/a	n/a	n/a	●	●	n/a	n/a	n/a
Convention on Wetlands of International Importance Especially as Waterflow Habitat (Ramsar Convention, 1971)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	S	●	●
Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based Sources and Activities (Athens 1980, amended in Syracuse 1996)	n/a	n/a	n/a	n/a	n/a	●	n/a	n/a	n/a	●	n/a	n/a	n/a	n/a	n/a	n/a	●	●	n/a	n/a	n/a

Notes: S = signatory only, R = Ratified, ● = Party. Country names have been abbreviated as follows: Austria (AT); Belgium (BE); Czech Republic (CZ); Denmark (DK); Finland (FI); France (FR); Germany (DE); Hungary (HU, Ireland (IE); Italy (IT); Luxembourg (LU); Netherlands (NL); Norway (NO); Poland (PL); Portugal (PT); Slovakia (SK); Slovenia (SI); Spain (ES); Sweden (SE); Switzerland (CH); United Kingdom (GB).