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Working Group on Monitoring and Assessment

Eighth meeting
Helsinki, Finland, 25–27 June 2007
Item 4 of the provisional agenda

ASSESSMENT OF THE STATUS OF TRANSBOUNDARY WATERS IN THE UNECE REGION[1]

PRELIMINARY ASSESSMENT OF TRANSBOUNDARY RIVERS DISCHARGING TO THE NORTH SEA AND THEIR MAJOR TRANSBOUNDARY TRIBUTARIES

Submitted by the Chairperson of the Working Group on Monitoring and Assessment

[1] At their fourth meeting (Bonn, Germany, 20–22 November 2006), the Parties to the Convention mandated its Working Group on Monitoring and Assessment with the assessment of transboundary rivers, lakes and groundwaters in the UNECE region. For details, please refer to documents ECE/MP.WAT/WG.2/2007/1 and ECE/MP.WAT/WG.2/2007/3.

GE.07-22558

I. ASSESSMENT OF THE STATUS OF THE GLAMA RIVER[2]

1. The Glama River, also known as the Glåma and the Glomma, is shared by Norway and Sweden.

Basin of the Glama River			
Area	Countries	Countries' share	
42,441 km^2	Norway	42,019 km^2	99%
	Sweden	422 km^2	1%
Source: Ministry of Environment, Norway, and Swedish Environmental Protection Agency.			

2. With a total length of some 604 km, the Glama runs from Lake Aursund near Røros in Sør-Trøndelag (Norway) and empties into the Oslofjord at Fredrikstad. Major tributaries include the Vorma and Lågen rivers. The Vorma River drains Lake Mjøsa and joins the Glama at Nes. The Lågen River drains into Lake Mjøsa, collecting water from the large Gudbrandsdal valley and significantly increasing the Glama's flow.

3. The Glama has experienced several major floods due to melting snow from Jotunheimen, Rondane and other mountain areas in Norway. A number of hydroelectric stations were built to provide electricity to the urban-industrial complex in the lower part of the river between Sarpsborg and Fredrikstad. Today, the hydropower stations on the rivers Glama and Lågen cover about 9% of Norway's electricity demand.[3]

4. The Glama, passing through a heavily forested region, is Norway's chief timber-floating river.[4] The total agricultural area in the basin, mainly located in the southern part, is about 1500 km^2.

5. The lower part of the river was industrialized in the beginning of the 20th century, the main activities being pulp and paper industries and a zinc smelter. Today, one of the main industrial activities is a chromium titanium plant situated close to the river mouth. There is also a big plant for waste incineration.

6. From 1986 to 1995, the Glama carried between 120,000 and 440,000 tons per year of suspended particulate matter. The yearly contribution of lead by the Glama is about 10-20 tons; it is a mixture of natural lead from minerals, atmospherically long-range transported lead and lead from local anthropogenic sources. Studies of the bottom sediments in the estuary show an increasing concentration of lead, with increasing distance from the river mouth. The estuary is affected by material transported by the river and autochthonous material due to the highly productive conditions in the estuary itself. Eutrophication is an also common phenomenon.

[2] Based on information submitted by Norway and Sweden as well as http://www.ife.no/departments/environmental_technology/projects/glomma/view?set_language=en&cl=en
[3] http://www.dams.org/docs/kbase/studies/csnomain.pdf
[4] http://www.bartleby.com/65/gl/Glama.html

II. ASSESSMENT OF THE STATUS OF THE KLARALVEN RIVER[5]

7. The Klaralven River, also known as the Klarälven, is shared by Norway (upstream country) and Sweden (downstream country).

Basin of the Klaralven River			
Area	Countries	Countries' share	
11,853 km^2	Norway	2,872 km^2	24.2%
	Sweden	8,981 km^2	75.8 %
Source: Swedish Environmental Protection Agency ("Statistics Sweden, 2000").			

8. The almost 460-km-long Klaralven ("clear river" in Swedish) runs for almost 300 km on Swedish territory. The river begins with a number of streams flowing into Lake Femunden on the Norwegian side of the border. Some of these watercourses also come from Sweden, mainly from Lake Rogen in Härjedalen. The river flowing south from Lake Femunden is first called the Femundselva and later the later Trysilelva. The river crosses the border and changes its name to the Klaralven. It flows through northern Värmland, where it follows a valley towards the south. The river empties into Lake Vänern in Sweden with a delta near Karlstad.

9. The river's average discharge is 165 m^3/s. The maximum measured discharge was 1,650 m^3/s.Spring floods are common, mainly caused by run-off from the snowy mountains in the northern areas of the basin.

10. The Klaralven has clean and fresh water, suitable for bathing. The river is internationally recognized as excellent sport fishing watercourse. Following Norwegian data for the period 1969-2002, the river carried some 48,000 tons TOC, 75 tons phosphorus and 2,600 tons nitrogen per year. However, these determinands were not analysed in Sweden.

III. ASSESSMENT OF THE STATUS OF THE WIEDAU RIVER[6]

11. The Wiedau River, also known as the Vidå, is shared by Denmark and Germany.

[5] Based on information submitted by Norway and Sweden as well as http://www.nature.kau.se/klaralven/om_alven.htm and http://www.vattenportalen.se/docs/Rapport%20fallstudie%20skogsind.pdf

[6] Based on information submitted by Germany and http://www.snaebel.dk/English/Areas/River_Vidaa/ and http://www.hydro-web.org/EGW/Platform/SystemDescription.htm

Basin of the Wiedau River			
Area	Countries	Countries' share	
1,341 km^2	Denmark	1,080 km^2	81%
	Germany	261 km^2	19%
Sources: Ministry for the Environment, Nature Protection and Nuclear Safety (Germany) and http://www.snaebel.dk/English/Areas/River_Vidaa/			

12. The Wiedau is a typical lowland and tidal river. It starts east of Tønder (Denmark) and flows to the west, ending in the Wadden Sea at the German-Danish North Sea coast.

13. The mean water flow at the outflow into the Wadden Sea is approximately 15,000 l/s (minimum 4,000 l/s, maximum 95,000 l/s). The Wiedau is highly controlled by weirs and gates to protect it from tides and surges, and yet does discharge its water into the North Sea. The sluice at Højer town regulates the water exchange with the Wadden Sea.

14. The river's important uses are fishing and canoeing. 90% of the catchment area is arable land.

15. In the past, the main parts of the watercourses in the basin were heavily modified through drainage, dredging and physical alterations. During the last decade, Denmark has completed a number of nature restoration projects, including the reconstruction of 27 smaller weirs to make them passable for migrating fish. Other projects brought 37 km of straightened, modified water stretches back to original meandering.

16. Nowadays, the river system is inhabited by 24 different fish species, which is considered high in Danish terms. However, the sizes of a number of the populations are quite small and they only occur in limited parts of the river system.

IV. ASSESSMENT OF THE STATUS OF THE ELBE RIVER[7]

17. Four countries (Austria, Czech Republic, Germany and Poland) share the basin of the Elbe River.

[7] Based on contributions by the International Commission for the Protection of the Elbe River and the Ministry of Environment (Czech Republic).

Basin of the Elbe River			
Area	Countries	Countries' share	
148,268 km^2	Austria	920.7 km^2	0.62%
	Czech Republic	49,933 km^2	33.68%
	Germany	97,175 km^2	65.54%
	Poland	239.3 km^2	0.16%
Source: International Commission for the Protection of the Elbe River			

Hydrology

18. The Elbe River, with a total length of 1,094.3 km, originates in the Giant Mountains in the northern Czech Republic. Its main tributary is the Vltava River in Southern Bohemia (Czech Republic). Other tributaries of the Elbe River include the Ohre River in the Czech Republic as well as the Schwarze Elster, Mulde, Saale and Havel rivers in Germany.

19. The mean annual discharge at the border between the Czech Republic and Germany (catchment area – 51,394 km^2) is 311 m^3/s. At Cuxhaven (Germany), the Elbe discharges into the North Sea. The mean annual discharge at the mouth is 861 m^3/s.

20. In the Czech Republic, except some small ones, there are almost no natural lakes. . In German part of the Elbe River basin, specifically the Middle and Northern German lowlands, there are a number of natural lakes, such as the the Mueritz See, Schweriner See, Plauer See, Koelpinsee and Schaalsee.

21. The largest hydraulic structures include the Lipno, Orlik, Slapy, Svihov and Nechranice reservoirs in the Czech Republic and the Bleiloch, Hohenwarte, Bautzen and Eibenstock reservoirs in Germany.

22. Water-quantity problems are linked to floods (e.g. in August 2002) and droughts (e.g. in the summer of 2003).

Pressure factors

23. In the Czech part of the Elbe basin, the principal pressure factors are similar to those in Germany (see below). The main problems are related to point sources, which cause pressures on the oxygen balance, emit specific pollutants, partially also nutrients, and lead to salinization, acidification and thermal pollution. As for non-point sources, agriculture and forestry with nutrient inputs are of utmost concern. One of the main problems is eutrophication, particularly of some reservoirs.

24. In the German part of the Elbe basin, the principal pressure factors include pressures on the oxygen balance, nutrient pressures, pressures by specific pollutants, thermal pollution, salinization, acidification, water abstractions, flow regulation and morphological alterations. These pressure factors have sometimes led to situations in the Elbe and its tributaries, which

were assessed as “slightly polluted by non-point and point sources of pollution”. Eutrophication of reservoirs is also a problem in the German part of the basin.

25. In the 1990s, a comprehensive monitoring network was established to provide insight into over 100 physico-chemical and biological determinands of the Elbe and its major tributaries based on identical or comparable analytical methods.

Transboundary impact

26. In the 1980s, the Elbe was still one of the most polluted transboundary rivers in Europe.

27. Water pollution has substantially decreased from the 1990s onwards. Oxygen concentrations have been improved almost in the whole Elbe River; at present, the oxygen status is “mostly satisfactory”. Likewise, the nutrient load has progressively decreased. The phosphorus load in Germany has also diminished, especially from point sources. In the Czech Republic, substantive progress was achieved, above all due to the operation of efficient wastewater treatment plants with phosphates’ reduction.

28. The reduction of the pollution of the Elbe with heavy metals, organic hazardous substances and nutrients was mostly due to decreasing or ceasing industrial production, as well as to the construction of new municipal and industrial wastewater treatment plants. This is shown in the following table, which provides calculated load values (based on measured concentrations and river discharges) for two years (1989 and 2004) with almost equal river discharges.

Pollution load of the Elbe River for two years with approximately the same river discharge

Determinands	Unit	Year	Year	Reduction (in %)
		1989	2004	
Mean annual discharge	m^3/s	520	511	…
Mercury	t/a	12	1.0	92
Lead	t/a	110	59	46
Cadmium	t/a	6.4	5.2	19
Zinc	t/a	2,400	700	71
Chromium	t/a	190	26	86
Nickel	t/a	200	54	73
Arsen	t/a	52	45	13
Hexachlorobenzen	kg/a	150	19	87
Hexachlorobutadien	kg/a	96	<1	>99
Trichloromethane	kg/a	13,000	160	99
Trichloroethene	kg/a	7,300	<16	>99
Tetrachloroethene	kg/a	8,300	120	99
1,2,4-Trichlorobenzene	kg/a	570	<9.7	>98
Total nitrogen	t/a N	140,000	75,000	46
Total phosphorus	t/a P	9,100	3,100	66
AOX (Cl)	kg/a	1,600,000	350,000	78
BOD_{21}	t/a O_2	430,000	210,000	51
COD	t/a O_2	760,000	440,000	42

Source: International Commission for the Protection of the Elbe River

29. Despite these positive developments, diffuse pollution sources and “old pollution sites” are still of concern and have to be dealt with more intensively.

30. According to an analysis of the Elbe River basin characteristics in 2004[8], the status of surface water bodies was estimated as follows: 11% of water bodies “not at risk”, 26% of water bodies “needing further assessment to determine risk”, and 63 % “at risk of failing the environmental objectives”. This analysis provides the grounds for further measures to achieve the objectives of the European Union Water Framework Directive (EU WFD).[9]

Trends

31. The transboundary impact from the Czech Republic on German territory is decreasing. Eutrophication will remain one of the main problems.

[8] Prepared for the 2005 reporting under the Water Framework Directive.
[9] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000, establishing a framework for European Community action in the field of water policy.

32. A higher number of wastewater treatment plants and their improved efficiency as well as the implementation of River Basin Management Plan will substantially improve the status of water bodies.

V. ASSESSMENT OF THE STATUS OF THE EMS RIVER[10]

33. Germany and the Netherlands share the Ems River basin. As the management unit, the Ems River Basin District[11] was created, which includes the Ems-Dollart estuary.

Ems River Basin District			
Total area	Countries/areas	Countries/areas' share	
17,879 km^2	Germany	15,008 km^2	84%
	Netherlands	2,389 km^2	13%
	Ems-Dollard estuary	482 km^2	3%
Sources: http://www.ems-eems.de/EMS-EEMS/de/documents/mainColumnParagraphs/04/document/A_Bericht_Ems_DE_NL.pdf and http://www.ems-eems.nl/EMS-EEMS/de/documents/mainColumnParagraphs/04/document/A_Bericht_Ems_DE_NL.pdf			

34. The Ems, also known as the Eems, is a river in north-western Germany and north-eastern Netherlands. It runs through the German States of North Rhine-Westphalia and Lower Saxony The Ems' tributaries in the Netherlands (Provinces of Groningen and Drenthe) discharge directly into the Ems-Dollart tidal system.

35. The source of the river is at the southwest edge of the Teutoburg Forest in North Rhine-Westphalia. At Meppen, the Ems is joined by its largest tributary, the Hase. Near the city of Emden, the Ems flows into Dollart bay and then continues as a tidal river towards the Dutch city of Delfzijl. The total length of the Ems is 371 km.

36. At the Rheine gauging station (Germany) the discharge values are as follows: HHQ – 332 m^3/s; MQ – 37 m^3/s and MNQ – 5.8 m^3/s. At this gauging station, the discharge during the 1946 flood event with a recurrence interval of 100 years amounted to 1,030 m^3/s.

37. Hydromorphological changes have a high or very high influence on the ecological quality of the water bodies. The water bodies in the river basin are loaded by nutrients, especially nitrates.

[10] See www.ems-eems.de and www.ems-eems.nl/.

[11] According to the EU WFD, a River Basin District is an area of land and sea, made up of one or more neighbouring river basins together with their associated groundwaters and coastal waters, which is identified under Article 3 (1) as the main unit for management of river basins.

VI. ASSESSMENT OF THE STATUS OF THE RHINE RIVER, ITS MAJOR TRANSBOUNDARY TRIBUTARIES AND LAKE CONSTANCE[12]

38. The International River Basin District Rhine, established as the management unit under the EU WFD, has a size of approximately 200,000 km^2 and is shared by nine countries.

Basic figures for the International River Basin District Rhine

Indicator	RBD	IT	CH	LI	AT	DE	FR	LU	BE	NL
Countries' area in km^2	197,100	<100	27,930	<200	2,370	105,670	23,830	2,530	<800	33,800
Countries' areas share in km^2	100	<1	14	<1	1	54	12	1	<1	17
Countries' population share in %	100	…	9	<1	1	64	6	1	<1	20
Urban areas in km^2	14,800	…	950	…	70	9,750	1,490	160	40	2,340
Agricultural land in km^2	99,310	…	9,620	…	990	56,000	13,000	1,410	430	17,860
Forests in km^2	69,040	…	16,290	…	1,270	38,990	9,040	940	290	2,220
Wetlands in km^2	370	…	<20	…	<5	100	<20	0	<5	230
Water bodies in km^2	13,350	…	1,200	…	40	790	150	10	0	11,160

Source: Internationale Flussgebietseinheit Rhein: Merkmale, Überprüfung der Umweltauswirkungen menschlicher Tätigkeiten und wirtschaftliche Analyse der Wassernutzung (International River Basin District Rhine: features, assessment of the impact of human activities on the environment and economic analysis of water uses). International Commission for the Protection of the Rhine, 18 March 2005.

A. Rhine River

Hydrology

39. The Rhine River, with a total length of 1,320 km, is one of the most important transboundary watercourses in western Europe. Its source is in the Swiss Alps. The Rhine passes through Lake Constance (see separate assessment below). Important transboundary tributaries include the Moselle, Ijssel and Vechte rivers, which are separately assessed below.

[12] Internationale Flussgebietseinheit Rhein: Merkmale, Überprüfung der Umweltauswirkungen menschlicher Tätigkeiten und wirtschaftliche Analyse der Wassernutzung (International River Basin District Rhine: features, assessment of the impact of human activities on the environment and economic analysis of water uses). International Commission for the Protection of the Rhine, 18 March 2005, at http://www.iksr.de/fileadmin/user_upload/Dokumente/Rheinkarten/cc_02-05d_rev._18.03.05_online.pdf

40. The long-term mean annual discharge (MQ) at the Konstanz gauging station (Germany) is 338 m³/s; at Karlsruhe-Maxau (Germany), 1,260 m³/s; and at Rees, upstream of the German-Dutch border, 2,270 m³/s.

Pressure factors and transboundary impact

41. The Rhine is one of the most intensively used water bodies in Europe. Some 58 million people live in the Rhine basin and some 20 million people depend on the Rhine as their main source of drinking water supply, either through direct abstraction (Lake Constance), bank filtration or abstraction of groundwaters, which are artificially recharged by Rhine water infiltration through dunes.

42. 96% of the population in the Rhine basin is connected to some 3,200 municipal wastewater treatment plants, which also treat wastewater from small industries and run-off water from sealed surfaces.

43. Currently, over 950 of major industrial point pollution sources have been identified. These big and medium-sized enterprises operate their own treatment plants. In 2000, eight industrial enterprises were responsible for more than 1% of the total emission of at least one of the following substances: Hg, Cr, Cu, Ni, Pb, N-total and P-total. The share of single enterprises varied between 1% (N-total) and 18% (Cr). There were no single enterprises that discharged more than 1% of the total emission of Zn, Cd or Lindan.

44. Nitrogen, phosphorus and pesticides originate from diffuse pollution sources in agriculture or run-off in rural areas. Run-off water, including water from sealed surfaces and streets is also responsible for heavy metal inputs into the watercourses of the basin. The table below shows the significant share of pollution from diffuse sources.

45. Mining activities, although decreasing, have an impact on the sub-basins of the Moselle and Saar rivers, the Ruhr area in Germany and the western side of the Lower Rhine area. Adverse effects, sometimes visible over the whole length of the Rhine downstream of the confluence with the Moselle, include hydraulic changes, thermal pollution and pollution by chlorides and heavy metals. Mining of hard coal has significantly changed groundwater flow (see assessment of the Moselle sub-basin), and opencast mining of brown coal is lowering the groundwater level in parts of the Lower Rhine area, with adverse impacts on aquatic and terrestrial ecosystems.

46. The Rhine is an important shipping route. Apart from hydromorphological changes, required for shipping purposes, ship transport adversely affects riverbanks and their ecology and leads to higher turbidity (raising of sediments). Other pressure factors include water abstraction for cooling purposes, hydropower production and agriculture.

Emissions in the International River Basin District Rhine

Emissions upstream of Lake Constance (average for 1996–1997)

Determinands	Municipal and industrial sources	Diffuse pollution	Total
N-total (in kg)	3,630,000	13,000,000	16,630,000
P-total (in kg)	140,000	370,000	510,000

Emissions downstream of Lake Constance

Determinands	Municipal sources	Industrial sources	Diffuse pollution	Total
N-total (in kg)	107,120,000	22,853,000	289,881,000	419,854,000
P-total (in kg)	9,719,000	2,424,000	14,032,000	25,175,000
Cr (in kg)	11,467	34,971	88,205	134,643
Cu (in kg)	56,820	48,139	213,627	318,586
Zn (in kg)	357,689	107,071	1,223,103	1,687,863
Cd (in kg)	863	809	6,350	8,022
Hg (in kg)	353	306	1,222	1,881
Ni (in kg)	31,979	30,993	105,036	168,008
Pb (in kg)	23,827	19,265	148,882	191,974
Lindan (in kg)	0	1	219	220

Source: Internationale Flussgebietseinheit Rhein: Merkmale, Überprüfung der Umweltauswirkungen menschlicher Tätigkeiten und wirtschaftliche Analyse der Wassernutzung (International River Basin District Rhine: features, assessment of the impact of human activities on the environment and economic analysis of water uses). International Commission for the Protection of the Rhine, 18 March 2005.

Share of nitrogen and phosphorus emission in various transboundary sub-basins

Sub-basins	N-total (in %)			P-total (in %)		
	Municipal sources	Industrial sources	Diffuse sources	Municipal sources	Industrial sources	Diffuse sources
Alpine Rhine and Lake Constance	22		78	27		73
Upper Rhine	12	4	85	21	4	75
Moselle and Saar	9	1	90	58	2	40
Delta Rhine (Netherlands)	13	4	83	35	7	58

Source: Internationale Flussgebietseinheit Rhein: Merkmale, Überprüfung der Umweltauswirkungen menschlicher Tätigkeiten und wirtschaftliche Analyse der Wassernutzung (International River Basin District Rhine: features, assessment of the impact of human activities on the environment and economic analysis of water uses). International Commission for the Protection of the Rhine, 18 March 2005.

Trends

47. Owing to heavy investments into wastewater treatment and industrial safety technology over a long period of time, the pollution of the Rhine River has been significantly reduced. The salmon, one of the indicator species for demonstrating the success of pollution abatement measures, recently returned to the river. The remaining pollution stems mainly from diffuse sources. Therefore, agriculture is one of the target areas for further improving the status of watercourses in the International River Basin District Rhine.

48. In order to achieve the targets of the EU WFD related to the status of surface waters, further measure have been identified as to nutrients, chromium, copper, zinc and PCB-153 as the relevant pollutants; further "target" substances include nickel and its compounds, HCB and tributyl-tin. As to groundwaters, there is hardly a quantity problem, however, nitrates and some pesticides have been identified as target substances to improve groundwater quality.

B. Alpine Rhine and Lake Constance

49. For technical reasons, the assessment of the Alpine Rhine and Lake Constance sub-basin, shared by Austria, Germany, Italy, Liechtenstein and Switzerland, is part of document ECE/MP.WAT/WG.2/2007/15.

C. Moselle River[13]

50. Belgium, France, Germany and Luxembourg share the sub-basin of the Moselle River, which includes the transboundary Saar River.

Sub-basin of the Moselle River			
Area	Countries	Countries share	
28,286 km^2	France	15,360 km^2	54.3%
	Luxembourg	2,521 km^2	8.9%
	Belgium	767 km^2	2.7%
	Germany	9,637 km^2	34.1%
Source: International Commission for the Protection of the Moselle and Saar (http://213.139.159.34/servlet/is/1604/)			

51. The Moselle, also known as the Mosel, Musel and Moezel, is one of the largest tributaries of the Rhine. The source of the Moselle is at the western slope of the Ballon d'Alsace in the Vosges mountains (France). Its total length from source to mouth at the confluence with

[13] Richtlinie 2000/60/EG - Internationale Flussgebietseinheit Rhein, Internationales Bearbeitungsgebiet „Mosel-Saar": Bestandsaufnahme (Directive 2000/60/EG – International River Basin District Rhine, International area Moselle-Saar: Inventory). International Commission for the Protection of the Moselle and Saar, June 2005. See http://www.iksms-cipms.org/servlet/is/411/Bestandsaufnahme%20MS__Textteil.pdf?command=downloadContent&filename=Bestandsaufnahme%20MS__Textteil.pdf

the Rhine at the city of Koblenz (Germany) is approximately 545 km. Based on measurements at the gauging station Cochem, the calculated average discharge at the mouth is 328 m³/s.

52. The Saar River is the largest transboundary tributary of the Moselle. The 227-km-long Saar joins the Moselle next to the city of Trier. The Saar catchment area of 7,431 km² is almost equally shared by France and Germany. Its discharge at the confluence with the Moselle is 80m^3/s.

53. The Moselle has been made navigable for large cargo ships from the Rhine at Koblenz up to Neuves-Maisons, south of Nancy. For smaller ships, it is connected to other French rivers through the Canal de l'Est and the Canal de la Marne au Rhin.

54. The Moselle valley between Nancy, Metz and Thionville is an industrial area, with coal mining and steel manufacturing. Hard coal mining in the Moselle and Saar region also causes significant transboundary impacts on groundwaters.

55. At Cattenom (France), one of the most powerful European nuclear power stations uses the Moselle for cooling purposes. Water transfer from the Vieux-Pré reservoir in the Vosges usually compensates its thermal pollution[14]; and pollution by radioactive substance, with the exception of tritium, is below measurement level. The relatively high chloride level is both of natural origin and due to emissions from French sodium industry. In 2003, the chloride concentration in the upper reaches of the Moselle was still around 330 mg/l and at Koblenz 200 mg/l.

56. Transboundary impact from Luxembourg is mainly related to nitrogen (from animal husbandry and from some municipal wastewater treatment plants, which are not yet eliminating nitrogen). The impact from Belgium is similar to that from Luxembourg. The German impact, mostly related to ongoing and ceased mining activities, is decreasing although some hazardous substances and chlorides are still entering the Saar.

D. Vechte River

57. Germany (upstream country) and the Netherlands (downstream country) share the sub-basin of the Vechte River.

Sub-basin of the Vechte River			
Area	Countries	Countries' share	
2,400 km^2	Germany	1,536 km^2	64%
	Netherlands	864 km^2	36%
Source: Netherlands Institute for Inland Water Management and Waste Water Treatment (RIZA).			

[14] Law regulates the possible increase of water temperature; thus, under extreme weather events, the power station may experience operational difficulties.

58. The Vechte, also known as the Overijsselse Vecht, has a length of 167 km.107 km of the river is on German side and 60 km in the Netherlands. The mean discharge at the mouth of the Vechte[15] is 50 m^3/s, at low water 5 m^3/s, and under conditions of high water, about 300 m^3/s.

59. The Vechte originates in the Baumberge hills in the German State of North Rhine-Westphalia near the city of Münster and flows across the border into the Dutch province of Overijssel. There, it confluences with the River Zwarte Water near the town of Hasselt.

60. The total population in the catchment is about 800,000 people. The Dutch part of the basin is more intensively used than the German part. The human pressure on the aquatic environment is high, both from cities and from intensive agriculture. Discharges from many sewage treatment plants end up in relatively small tributaries. Most of the watercourses in the sub-basin have been strongly regulated by river straitening and dams. In large parts of the area, water inlet from outside the basin plays an important role for agriculture in the summer.

E. Ijssel River[16]

61. At the date of submission of the present document, the Government of the Netherlands was still working on the pre-assessment of the river. The Netherlands will draw up relevant text passages until the eighth meeting of the Working Group.

VII. ASSESSMENT OF THE STATUS OF THE MEUSE RIVER AND ITS MAJOR TRANSBOUNDARY TRIBUTARIES[17]

62. Belgium, France, Germany, Luxembourg and the Netherlands share the Meuse River basin. The International River Basin District Meuse is the management unit under the EU WFD.

International River Basin District Meuse

Area	Countries	Countries' share	
34,548 km^2	France	8,919 km^2	25.8%
	Luxemburg	65 km^2	0.2%
	Belgium	13,896 km^2	40.2%
	Netherlands	7,700 km^2	22.3%
	Germany	3,968 km^2	11.5%

Source: Roof report under the EU WFD for the International River Basin District Meuse (available at http://www.meuse-maas.be/tempFiles/176060382_0.3953058/Rapport%20final%20MEUSE_angl_def_4Mb.pdf)

[15] http://www.euroharp.org/toolbox/example.php?n=Vechte&d=1&r=
[16] The German part of the sub-basin is analysed in http://www.ijssel.nrw.de
[17] Based on information from http://www.meuse-maas.be/tempFiles/176060382_0.3953058/Rapport%20final%20MEUSE_angl_def_4Mb.pdf as well as http://www.meuse-maas.be/tempFiles/604443658_0.9999506/1922_CIM_RAPPORT_EN_V5.pdf

Hydrology

63. The Meuse River takes its source at an altitude of 384 m above sea level at Pouilly-en-Bassingy in France. Having a total length of 906 km, it flows through France, Belgium and the Netherlands before entering the North Sea. The average discharge at the mouth is 230m^3/s.

64. The peak run-off usually occurs in winter and spring. A maximum flow of 3,100 m^3/s was measured in 1993 at Eijsden (border station between Belgium and the Netherlands). Summer and autumn are mainly characterized by longer periods of low flows, for example, 10 m^3/s to 40 m^3/s at Eijsden.

65. A number of locks and dams were built in the river for navigation purposes or protection against floods, leading to significant modifications of the natural character of the river in most of its sections.

66. Majors tributaries of the Meuse, some of them transboundary, include the Chiers, Semois, Lesse, Samber, Ourthe, Rur, Schwalm, Niers and Dommel rivers.

Pressure factors

67. Some 8.8 million people live in the International River Basin District Meuse and use water for drinking and domestic purposes, agriculture and industry, hydropower generation, navigation and recreation. The water of the Meuse also supports surrounding ecosystems, and is exported by pipelines and canals to provide drinking water to people living outside the basin.

68. The basin of the river Meuse can be divided into three sections, with differing geomorphological and physical features and human impacts.

69. The first section, from the source to the city of Charleville-Mézières (France), is characterized by low-flow velocity and low pressure from industry and municipalities.

70. The second section, where the Semois, Lesse, Sambre and Ourthe rivers join the Meuse, stretches from Charleville-Mézières to Liège (Belgium). During periods of heavy precipitation, these tributaries contribute substantially to the flow of the Meuse and may cause rapid water level rises. The sub-basins of these tributaries make up the principal natural values of this river section and are especially important as spawning grounds and growth areas for rheophile fish. A few small islands in the river and parts of the banks have remained in their natural condition, offering habitats for a variety of species of plant and animal life. The section has also many heavily urbanized and industrial sites, both along the main watercourse as well as along the Sambre, one of the tributaries. In the upper part of this section of the river, there are a few small islands in the river and parts of the banks that remained natural and offer habitats for a variety of plant and animal life. There was major development of the principal Meuse watercourse to make it navigable.

71. The third section, a flood plain area, stretches from Liège to the mouth. This section is navigable, which limits the possibilities for a natural low-water channel and severely reduces the fluvial dynamics. This region is also characterized by dense population, intensive agriculture and

many industries. Areas of great ecological value exist (e.g. woods, heather fields and marshlands), but their area has been reduced and they are widely dispersed. The north-western part offers an attractive and relatively open area that is surrounded by urban harbour areas.

72. Further urban development and increasing transport, as well as industrial and agricultural activities, are significant pressures for the water systems. Safety and flood control measures (e.g. delta works and the closure of the Haringvliet in the Netherlands) in the 1970s were essential social measures, but deprived the area of tidal dynamics, resulting in a decreased ecological potential. Recently, the Dutch Government decided to introduce, by 2008, a different modus operandi for the floodgates of the Haringvliet, with the aim of reintroducing the tidal influence.

Transboundary impact

73. Human impact has altered the natural hydromorphological and ecological conditions. The main driving forces for these alterations are urbanization, industrialization, agriculture, shipping and flood protection – which have a transboundary impact and drinking-water supply.

74. For the French part of the river basin, agriculture is the main driving force. In the Walloon region (Belgium), the more densely populated and industrialized sub-basins of the Vesdre and Sambre rivers experience urbanization as major driving force. For the Semois and Lesse rivers, only smaller longitudinal obstacles are present, with no strong driving forces restricting restoration potentials.

75. In the German, Flemish and Dutch lowlands, urbanization and agriculture are the major cause to alterations in hydromorphological characteristics. In the Dutch part of the Meuse River, most pressures derive from flood defence and shipping. For the smaller tributaries, especially in the Netherlands, agriculture remains a major driving force. In addition to the strongest estimated impact of longitudinal obstacles and changes in river discharge over the basin, local pressures affecting the habitat quality can seriously affect the ecological integrity of the river's water.

76. Based on the results of the internationally coordinated bio-monitoring of the Meuse, the artificial alterations of the riverbanks and a lack of natural substrates, together with poor water quality, were identified as major threats to the river's benthic macro-invertebrate communities. Changed flow conditions and bed characteristics are among the major causes for the absence of natural rheophilic fish communities. Some weirs represent a considerable obstacle for organisms to move upstream, especially for migration of fish.

Trends

77. The riparian countries (including the Belgian regions) are implementing the decisions of their own Governments as well as recommendations of the International Meuse Commission (IMC). The IMC has been established under the Agreement on the River Meuse (Ghent, 2002) and acts as the platform for international coordination to implement obligations under the EU WFD for the International River Basin District Meuse.

78. The measures taken in the past have led to an improvement of the water quality. Further improvements are expected in the future due to more stringent policies at the national and EU levels.

VIII. ASSESSMENT OF THE STATUS OF THE SCHELDT RIVER, THE YSER RIVER AND MAJOR TRANSBOUNDARY TRIBUTARIES[18]

79. Belgium, France and the Netherlands share the Scheldt River basin (22,116 km^2). The Scheldt has the Lys (Leie), Zenne and Dender rivers as major transboundary tributaries.

80. The basin of the Yser (IJser), shared by Belgium and France, has an area of 1,750 km^2.

81. As management unit, the Scheldt International River Basin District was established (36,416 km^2). Apart from the Scheldt and Yser basins, the International River Basin District Scheldt also includes basins of national rivers, most notably the basins of the Somme, Authie and Canche rivers, which are located entirely in France, as well as transitional and coastal waters.

Scheldt International River Basin District		
Area	Countries/regions	Countries' or regions' share (in %)
36,416 km^2	Belgium (Flemish region)	33
	Belgium (Walloon region)	10
	Belgium (Brussels capital region)	0.44*
	France	50
	Netherlands	6
* 10% of the population of Belgium *Source:* Scheldt International River Basin District, Roof report, February 2005. Internationale Scheldecommissie (ISC) – Commission Internationale de l'Escaut (CIPE).		

Hydrology (rivers Scheldt and Yser)

82. The 350-km-long Scheldt River has its source on the Saint-Quentin plateau, near the village of Gouy-Le-Catelet in France in the Artois hills. The river courses through Northern France, Belgium (Flemish and Walloon regions) and the Netherlands before it discharges into the North Sea via a long estuary. The estimated average discharge at Lillo is 130 m^3/s. The wide and flat valleys in the Scheldt basin suffer from numerous floods, especially in winter, when the groundwater level and water flow is highest. The water of the Scheldt estuary is by nature very nutritious. Therefore, it is an important place for fish and other animals to reproduce. In the Scheldt, fishery mainly fishes for cockles, eels and soles.

[18] *Source:* Scheldt International River Basin District. Roof report. February 2005. Internationale Scheldecommissie (ISC) – Commission Internationale de l'Escaut (CIPE). http://www.isc-cie.com/members/docs/documents/13625.pdf)

83. The Yser River is approximately 80 km long, rising in northern France and flowing generally northeast through north-western Belgium and into the North Sea at Nieuwpoort. It connects a network of canals.

Pressure factors having adverse effects on water quality

84. The Scheldt International River Basin District is a highly urbanized, densely populated, and heavily built-up area. As in some areas the European Waste Water Treatment Directive has not yet fully implemented but is scheduled for the near future, the impact of the urban pollution will decrease.

85. There are a number of major industrial areas (e.g., around the towns of Kortrijk and Ostend; in the ports of Zeebrugge, Ghent, Antwerp, Vlissingen and Terneuzen, Calais, and Dunkerque; along the Antwerp-Brussels-Charleroi axis (in particular the petrochemical site of Feluy-Seneffe-Manage in the Walloon Region); along the Albert Canal; near the agglomeration Lille-Roubaix-Tourcoing; in the Valenciennes area; and around the towns of Mons, Saint-Ghislain, La Louvière, Tournai and Mouscron).

86. There is also a dense transport infrastructure including railways, waterways and motorways. The shipping trade uses the Scheldt intensively. The river provides the connection between the North Sea and the harbours of Antwerp, Ghent, Terneuzen and Vlissingen. Thanks to this accessibility, many industrial activities take place on the banks of the Scheldt. These industries pollute the Scheldt with wastewater containing chemicals, nutrients and heavy metals.

87. Agriculture covers 61% of the total area of the International River Basin District Scheldt. In the northern part, the main agricultural activity is live-stock farming, whereas crop farming is the main agricultural activity in the southern part.

88. The relative importance of the pressure factors in transboundary sub-basins of the International River Basin District Scheldt are summarized in the table below.

Pressure factors for transboundary sub-basins in the Scheldt International River Basin District				
Sub-basin	**Main pressures**			
	Population	Industry	Agriculture	Transport
Scheldt, upper course	++++	+++	++++	**
Scheldt, middle course	+++	++	++	***
Scheldt, lower course	++++	++++	++++	***
Zenne	++++	++	++	***
Dender	++	++	++	**
Lys/Leie	++++	+++	++++	**
Yser (IJser)	++	+	++++	**
For population, industry and agriculture: Very high pressure: ++++ High pressure: +++ Moderate pressure: ++ Low pressure: +		*For transport:* Indicator values higher than RBD averages: *** Some indicator values higher than RBD averages: **		
Source: Scheldt International River Basin District. Roof report. February 2005.				

89. It should be noted that indicators to characterize the pressure from the population included the discharged nitrogen load, the discharged phosphorus load and the discharged load of suspended solids. Indicators for pressures from industry covered metal micro-pollutants, organic micro-pollutants, macro-pollutants (nitrogen, phosphorus, total organic carbon), and salts (chlorides, cyanides, fluorides). For agriculture, the share of cultivated area in the total area of the sub-basin; the share of commercial crops in the total cultivated area of the sub-basin; the percentage of the total cattle, pig and poultry livestock present in the area of the sub-basin; and the livestock density for cattle, pigs and poultry were taken into account. The pressure of transport on the aquatic environment was difficult to estimate as accurate data were lacking; but it is important to mention transport regarding the impact of polycyclic aromatic hydrocarbons on the aquatic environment.

Pressure factors affecting hydromorphology

90. The probable impact of the envisaged deepening of the Scheldt waterway to 14.70 meters below mean sea level (13.10 meter tide-independent accessibility) to keep the harbour of Antwerp accessible to larger vessels – as part of the Scheldt Estuary Development Outline 2010[19] – was thoroughly evaluated. Several studies were carried out during recent years,

[19] The Dutch-Flemish bilateral Technical Scheldt Commission developed a long-term vision for the Scheldt estuary with three objectives:

- Safety maximum protection against flooding in the region
- Accessibility optimum accessibility to the harbours on the Scheldt estuary
- Natural environment – a dynamic, healthy natural environment

http://www.ontwikkelingsschets.nl/www/fileLib/userFiles/File/Pb%20UK%202005w.pdf
http://www.ontwikkelingsschets.nl/www/scripts/content.php?pageID=1000&cBlockID=47

including: (a) a strategic environmental impact report; (b) social cost/benefit analysis, (c) studies on the development of the natural environment; and (d) birds and habitat criteria. Comprehensive consultations with all stakeholders were held and communications were widely issued.

91. The deepening will cause minor effects due to (a) a new flexible dumping strategy and (b) a nature restoration programme including de-poldering along the river. Specific monitoring programmes are established to continuously follow-up the changes of the estuary and its ecological quality.

92. The Wild Birds and Habitat Directives[20] prohibit interventions that cause damage to protected natural environments unless the intervention serves a major social interest and no alternatives are available. The EU WFD also stresses restricting adverse effects of man-induced morphological changes, such as deepening waterways or building dikes. Study results show that the overall package of measures in the Development Outline would not cause any damage to protected natural environments. In fact, these measures would increase the robustness of the natural environment of the Scheldt estuary. In the coming years, part of this package will be carried out in a nature restoring programme that includes 600 ha and 1,100 ha of de-poldering along the Dutch and Flemish (Belgian) parts, respectively, of the Scheldt. The major adverse effects on protected natural habitats of deepening the waterway and more than 150 years of poldering are not completely restored, but sufficiently counteracted to ensure compliance with the targets of the Birds and Habitat Directive as well as the EU WFD. For the upcoming deepening of the waterway and the implementation of a flexible strategy of dumping adverse effects are estimated as minor. In this way, the positive effects of the nature restoration programme will be maintained.

Transboundary impact

93. It was not yet possible for the International Scheldt Commission to carry out a transnational comparison of the current chemical status because joint standards have not yet been established for the Scheldt International River Basin District and the countries/regions still use different monitoring and assessment methods. A general and complete transnational comparison of the ecological status is also lacking. Preliminary assessments were made on the basis of available data and expert judgment.

94. The roof report of the International Scheldt Commission[21] concluded that very few waterbodies in the Scheldt International River Basin District are currently “in good ecological status”.

95. On the basis of the collected data, the International Scheldt Commission concluded in 2005 that none of the examined transboundary watercourses (Scheldt, Yser, Lys/Leie, Zenne and Dender) were in good physico-chemical status. Most of the watercourses also showed bad oxygen balances. Nutrients were a problem everywhere, and national/local metal standards had been exceeded for copper, zinc, lead and cadmium at a number of monitoring sites.

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[20] Council Directive 79/409/EEC on the conservation of wild birds and Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora.
[21] Scheldt International River Basin District. Roof report. February 2005.

96. In the coastal waters of the International River Basin District, the overall quality of macrofauna is “good”, but the quality of phytoplancton is “generally insufficient”, and PCBs, PAH, lindane, organotin compounds and nutrients are a problem.

Trends

97. The three riparian countries are implementing the decisions of their own Governments as well as recommendations of the International Scheldt Commission. The Commission has been established by the signatories under the Agreement on the River Scheldt (Ghent, 2002) and acts as the platform for international coordination to implement obligations under the EU WFD for the International River Basin District Scheldt.

98. This has lead to an improvement of the water quality in France, Belgium and the Netherlands.

99. Further improvements are expected in the future due to more stringent policies, i.e. better implementation and enforcement, as well as new or improved policies, at the national and EU levels.
