



**SIXTH MINISTERIAL CONFERENCE**  
**“ENVIRONMENT FOR EUROPE”**

BELGRADE, SERBIA  
10-12 October 2007

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**ASSESSMENT OF TRANSBOUNDARY WATERS  
IN THE UNECE REGION**

submitted by

Finland on behalf of the Bureau of the Meeting of the Parties to the Convention on  
the Protection and Use of Transboundary Watercourses and International Lakes

through the Ad Hoc Working Group of Senior Officials

BACKGROUND DOCUMENT



UNITED NATIONS





**Economic and Social  
Council**

Distr.  
GENERAL

ECE/BELGRADE.CONF/2007/INF/1  
ECE/MP.WAT/23  
23 July 2007

Original: ENGLISH

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**ECONOMIC COMMISSION FOR EUROPE**

Sixth Ministerial Conference  
“Environment for Europe”  
Belgrade, 10-12 October 2007  
Item 2(a) of the provisional agenda

Meeting of the Parties to the Convention  
on the Protection and Use of Transboundary  
Watercourses and International Lakes

ASSESSMENT AND IMPLEMENTATION

STATE OF THE ENVIRONMENT AND MONITORING AND ASSESSMENT

**ASSESSMENT OF TRANSBOUNDARY WATERS IN THE UNECE REGION**

The Assessment of Transboundary Rivers, Lakes and Groundwaters – presented under separate cover (ECE/MP.WAT/25) – has been carried out under the auspices of the Meeting of the Parties to the UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention), under the overall leadership of Finland. It highlights the achievements of over 10 years’ work under the Water Convention to prevent, control and reduce transboundary impact.

This document conveys the key messages derived from the assessment. It describes the background and scope of the assessment and outlines its main findings. Priority action to be taken by riparian countries and conclusions drawn from the assessment are also reflected.

## CONTENTS

	<i>Paragraphs</i>	<i>Page</i>
I. KEY MESSAGES FROM THE ASSESSMENT.....	1-12	3
II. BACKGROUND .....	13-22	4
III. MAIN FINDINGS OF THE ASSESSMENT .....	23-34	5
A. General water-quantity and water-quality problems .....	23-29	5
B. Status of transboundary waters .....	30-34	6
IV. PRIORITY ACTION BY RIPARIAN COUNTRIES .....	35-49	7
A. Transboundary rivers and lakes .....	39-48	7
B. Transboundary aquifers .....	49	10
V. CONCLUSION.....	50-62	11
A. Transboundary level .....	51-54	11
B. National policies and legislation.....	55-56	12
C. Monitoring, data management and early warning .....	57-59	12
D. River basin management plans .....	60-61	12
E. Platform for multi-stakeholder dialogues .....	62	13

## I. KEY MESSAGES FROM THE ASSESSMENT

1. Transboundary waters play a significant role in the UNECE region. From the 56 countries in the region, all but the three island states (Cyprus, Iceland and Malta) share water resources with one or more other countries. Sometimes, the transboundary river basins include parts of Afghanistan, China, the Islamic Republic of Iran, Mongolia and other countries outside the UNECE region.
2. The assessment is the first ever produced comprehensive analysis of transboundary rivers, lakes and groundwaters in the UNECE region. Special attention was given to countries in Eastern Europe, Caucasus and Central Asia (EECCA) and South Eastern Europe (SEE) as these countries face the biggest challenge to reduce transboundary impact.
3. The basins of transboundary rivers and lakes and the recharge areas of transboundary aquifers are widely heterogeneous from the economic and environmental points of view, and display very specific problems, calling for tailor-made solutions.
4. The effects of climate change became visible in almost all of the analysed river basins.
5. In transboundary river basins, water sharing among countries in the same basins is often a major water-quantity issue, and continues to cause upstream-downstream conflicts.
6. In transboundary aquifers, increasing abstraction for agricultural purposes and drinking water supply is often a major water-quantity issue, and in some cases leads to overuse.
7. Organic pollution, nutrient pollution, pollution by hazardous substances and – in the case of rivers – hydromorphological alterations are the most important issues for further action to improve the chemical and ecological status of transboundary waters.
8. The contamination of drinking water supplies is significant in EECCA and SEE, and causes such water-related diseases as cholera, dysentery, coliform infections, viral hepatitis A and typhoid.
9. Action to decrease water pollution from point sources (municipal sewage treatment; old industrial installations) is of primary importance in basins in EECCA and SEE.
10. Pollution from diffuse sources (e.g. agriculture, urban areas) is of high importance for action in basins in Western and Central Europe.
11. Plans for integrated water resources management still need to be developed for almost all basins; proper attention should be devoted to land-use planning and the joint management of surface waters and groundwaters.
12. In EECCA and SEE countries, the political will to overcome problems of past development is as essential as the ability of environmental agencies to enforce existing water legislation vis-à-vis other sectors of national economy and the general public.

## II. BACKGROUND AND SCOPE OF THE ASSESSMENT

13. Under the 1992 UNECE Convention on the Protection and Use of Transboundary Watercourses and International lakes (Water Convention), the Parties shall take all appropriate measures to prevent, control and reduce the pollution of waters causing or likely to cause transboundary impact.
14. The assessment of transboundary rivers, lakes and groundwaters, which is presented under separate cover (ECE/MP.WAT/25) has been carried out under the auspices of the Meeting of the Parties to the Water Convention, under the overall leadership of Finland. It highlights the achievements of over 10 years' work under the Water Convention to prevent, control and reduce transboundary impact.
15. The assessment serves as a point of reference for such measures by Governments, international river basin organizations (joint bodies), other international organizations and relevant non-governmental organizations (NGOs) to improve the status of transboundary waters and agree on joint measures related to integrated water resources management.
16. The assessment also underlines the challenges that countries face in implementing further measures to counteract still existing pressures and improve the ecological and chemical status of transboundary waters.
17. In the UNECE region, about 160 major transboundary rivers that form or cross the boundary between two or more States have been identified so far.<sup>1</sup> Approximately 100 of them drain directly into regional seas, lakes or desert sinks. About 40 major transboundary lakes shared by two or three countries, and around 150 important transboundary aquifers<sup>2</sup>, are located in these basins.
18. Some of the 100 first-order transboundary basins are very small (60 to several hundred km<sup>2</sup>), as it is the case with several water bodies shared by Ireland and the United Kingdom, Italy and San Marino, Finland and the Russian Federation, and Turkey and Bulgaria. Other basins extend over 2,000,000 km<sup>2</sup>, as is the case with the basins of the Ob, Yenisey and Amur rivers.
19. The assessment covers 145 transboundary rivers (with a basin area over 1,000 km<sup>2</sup>) and 26 transboundary lakes in the European and Asian parts of the UNECE region, as well as 70 transboundary aquifers, located in SEE, the Caucasus and Central Asia.
20. In many cases, a country that is upstream of another country in one basin is downstream of that (or a third) country in another basin. This shows the close hydrological interdependency of countries in transboundary basins. The reasonable and equitable use of transboundary waters, and water sharing between countries and among different sectors within the countries, are therefore particular challenges.

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<sup>1</sup> Following communications by countries. This figure does not include transboundary rivers in Northern America and Israel.

<sup>2</sup> The actual number of aquifers is much higher; countries only reported aquifers that have essential water management functions.

21. The assessment has been a joint undertaking of international and national organizations; more than 150 experts have been involved by providing information and peer-reviewing texts.

22. Following a step-by-step approach, the present assessment deals with the impact of human activities on the chemical status of transboundary waters more comprehensively than the impact of hydromorphological alterations on the ecological status of watercourses. The assessment also examines and describes transboundary waters in EECCA and SEE countries more comprehensively than transboundary waters in Western and Central Europe, as EECCA and SEE countries face the biggest challenge to reduce transboundary impact. More comprehensive assessments will be made in the next future.

### **III. MAIN FINDINGS OF THE ASSESSMENT**

#### **A. General water-quantity and water-quality problems**

23. The basins of transboundary rivers and lakes and the recharge areas of transboundary aquifers are widely heterogeneous from the economic and environmental points of view and display specific problems related to both water quantity and water quality. Nevertheless, some issues are common to most of the basins and recharge areas.

24. The effects of climate change became visible in almost all of the analysed river basins. Most basins experience an impact of climate change on water quantity (e.g. decreasing water resources availability and extreme hydrological events, including severe floods and long-lasting droughts). The effects of climate change on the ecological regime of rivers became also visible in transboundary basins in Central Asia, where the rise in air temperatures leads to significant melting of glaciers, resulting in noteworthy changes of the rivers' hydrological and ecological regimes.

25. Water sharing among countries in the same basins to satisfy demands of national economic activities (irrigation, manufacturing, energy production), continues to cause upstream-downstream conflicts, including adverse effects on the environment (e.g. the destruction of water-related ecosystems). Most affected are the basins in Central Asia (e.g. Amu Darya, Syr Darya, Ili) and the Samur basin.

26. In many basins/sub-basins, the ecological and chemical status of transboundary rivers, lakes and groundwaters is under threat from a range of human activities leading to organic pollution (mostly from sewage), nutrient pollution (mostly from agriculture and sewage), pollution by hazardous substances (mostly from manufacturing and mining), and – in the case of rivers – hydromorphological alterations, mostly due to water construction works for hydropower production and navigation.

27. Although the relative importance of chemical and microbiological pollution varies greatly within the region, the contamination of drinking-water supplies is significant in EECCA and SEE, and water-related diseases such as cholera, dysentery, coliform infections, viral hepatitis A and typhoid are often reported.

28. Geochemical processes have been repeatedly seen as an issue of concern in some river basins in the entire region due to high natural background concentration of heavy metals (mountain areas) or high turbidity (areas with peat extraction). Geochemical processes also cause high arsenic concentrations in some aquifers in SEE countries.

29. Deforestation, soil erosion and degradation of pastures (particularly in EECCA) are additional issues of concern. They will continue to be a problem for the proper functioning of water-related ecosystems and lead to higher risks of natural disasters as the implementation of response measures (e.g. afforestation) will take some time.

### **B. Status of transboundary waters**

30. The assessment showed that almost 20 per cent of transboundary rivers in Caucasus and Central Asia are in a “high or good chemical status”; this also applies to some transboundary tributaries to first-order rivers in SEE. Some of these water bodies, however, show signs of increasing pollution due to the ongoing revival of industry and agricultural production or are potentially threatened by mining and ore processing. The majority of the transboundary rivers included in the assessment fall into the category of “water bodies with moderate pollution”. “Polluted water bodies” in EECCA and SEE basins are transboundary rivers which: (a) take up their pollution load in lowland areas due to intensive agriculture; (b) are in the vicinity of big cities and industrial centres; (c) have small water discharges; and (d) which take up their pollution load in foothills with intensive industrial (including mining) or agricultural water use. Cadmium, lead, mercury, phenols and oil products, as well as pesticides, are among the most serious pollutants.

31. Similarly, a number of transboundary rivers in Western Europe as well as Central Europe are in “high and good status”. Most rivers still belong to the category of “moderately polluted” water bodies or have a “fair water quality”. There are also transboundary rivers or stretches of these rivers, for example in the Danube basin, that have been assessed as “polluted”. Cadmium, lead, mercury, nickel and its compounds, tributyl-tin, hexachlorobenzene (HCB), dichloro-diphenyl-trichloroethane (DDT), lindane and atrazine are among the most serious pollutants.

32. Overall, the quality status of transboundary groundwaters in SEE countries, the Caucasus and Central Asia is good, with the exception of few potential hot spots. The major water-quantity issue of concern is the increasing abstraction of groundwaters leading to overuse.

33. Eutrophication is the worst phenomenon affecting transboundary lakes. It is increasing constantly except in areas where wastewater treatment has been effectively implemented and where small improvements are visible. In nearly all areas, increasing non-point loading from agricultural and forestry areas has spurred incipient eutrophication even in some lakes which were earlier in good condition.

34. High nitrate-nitrogen concentrations, particularly from fertilizers, are also a problem in groundwater, and insufficiently treated wastewaters from municipal treatment plants cause eutrophication in rivers (phosphorus compounds) and the sea (nitrogen compounds, sometimes phosphorus).

#### **IV. PRIORITY ACTION BY RIPARIAN COUNTRIES**

35. The assessment provides an in-depth analysis of the various uses and functions in river basins and aquifers recharge areas that cause pressure on water resources and their availability over time and space. The assessment points to four challenge areas of further action to decrease pressures on transboundary waters: organic pollution, nutrient pollution, pollution by hazardous substances, and – in the case of rivers – hydromorphological alterations.

36. The relative importance of pollution (organic pollution, nutrient pollution, pollution by hazardous substances) and pressures due to hydromorphological alterations varies from basin to basin. This relative importance notably depends on past achievements in environmental protection and is strongly related to the effectiveness of implementing existing legislation and other measures related to integrated water resources management.

37. In many basins, tailor-made investments in the water sector are still needed, such as investments in municipal wastewater treatment plants and wastewater treatment in rural areas; these are often postponed in EECCA due to lack of financing or the preference given to investments in other sectors.

38. There is a remarkable difference in action undertaken/action needed to be undertaken to improve the status of transboundary waters in EECCA and SEE as compared to basins in Western and Central Europe.

##### **A. Transboundary rivers and lakes**

39. A general comparison of the scale and severity of water management problems between various basins in the region is given in the table below, which shows that:

- (a) Action to decrease water pollution from point sources (e.g. municipal sewage treatment, old industrial installations) is of primary importance in basins in EECCA and SEE;
- (b) The fight against pollution from diffuse sources (e.g. agriculture, urban areas) is of much importance for action in basins in Western and Central Europe (the European Union (EU) countries, Switzerland and Norway).

40. The reason for such a clear distinction in further action needed is quite obvious:

- (a) Over a period of some 15 years, countries in transition have suffered a decline in their economies, which came hand in hand with a breakdown of essential systems of water supply and wastewater treatment. These countries can substantially improve the status of their transboundary waters, if point pressures from municipal sewage treatment plants and discharges from old industrial installations were dealt with as priority tasks. This requires proper allocation of funds.

- (b) In many countries with market economies, huge investments in point-source pollution control measures were made over two and more decades. This led to a substantial decrease of the pollution load from these sources hand in hand with an increase of the relative importance of the pollution load from non-point sources. Dealing with diffuse pressures (e.g. agriculture, urban land use) is therefore seen a priority task.

Relative importance of pressures in transboundary river basins		
Scale and severity of problem *	Basins in EECCA and SEE	Basins in Western and Central Europe
Widespread and severe	<b>Point pressures:</b> municipal sewage treatment, old industrial installations, illegal wastewater discharges, illegal disposal of household and industrial wastes in river basins, tailing dams and dangerous landfills	<b>Diffuse pressures:</b> agriculture, urban land use
	<b>Abstraction pressures:</b> agricultural water use / water sharing between countries	<b>Abstraction pressures:</b> agricultural water use (Southern Europe)
	<b>Morphological pressures:</b> hydroelectric dams, irrigation channels	<b>Morphological pressures:</b> hydroelectric dams, river alterations
Widespread but moderate	<b>Diffuse pressures:</b> agriculture (except in some basins in Central Asia, where the impact is severe)	<b>Other (point) pressures:</b> industries discharging hazardous substances
Limited but severe	<b>Other (diffuse, point) pressures:</b> non-sewered population, mining and quarrying	<b>Other (point) pressures:</b> mining and quarrying
Limited and moderate	<b>Other (point) pressures:</b> new industrial installations	<b>Other (diffuse, point) pressures:</b> non-sewered population, municipal sewage treatment
* In this generalization of river basins in the region, “widespread” means that the problem appears in many river basins, whereas “limited” indicates that only some basins are affected.		

## **1. Diffuse pressures from agriculture**

41. In Western and Central Europe, the legal framework to cut down pollution has been established many years ago (e.g. European Commission Directives; national legislation in the EU countries, Norway and Switzerland) and technical guidance to control water pollution by fertilizers and pesticides in agriculture is broadly available. However, given reports by EU countries located in the drainage basins of the Mediterranean Sea, the East Atlantic Ocean and the Black Sea, the impact of agriculture on the quality of water resources is most striking, also because the implementation of these pieces of legislation and recommendations seems to take more time than expected. Experience has also shown that command-and-control approaches need to be supplemented by voluntary measures and innovative financing schemes.

42. Although currently classified as “widespread but moderate”, diffuse pressures from agriculture in EECCA and SEE basins will increase in the future alongside the revival of economy; thus, the use of fertilizers and pesticides will be much higher than in the last decade, causing negative effects on transboundary waters. Apart from legal and regulatory measures, it is important to focus on education, training and advice to promote understanding of good agricultural practice and respect for existing legislation by various economic entities and the public at large.

## **2. Abstraction pressures**

43. Abstraction pressures within the national parts of the basins (in particular, water use by irrigated agriculture in EECCA, SEE and South-Western Europe) are among the most important water-quantity issues. In some basins, particularly in Central Asia, the predominant water use for agriculture has also led to such water-quality problems as salinization of soils and high mineral salt contents in water bodies.

44. In many basins in the EECCA region, water allocation among riparian countries continues to be an issue, because disagreement still exists over use quotas for the upstream and downstream users belonging to different States. Ecological requirements of the water bodies are rarely considered and win-win solutions to mitigate existing – and avoid future – conflicts over water resources are not yet drawn up.

## **3. Hydromorphological pressures**

45. One often overlooked problem in basins in EECCA and SEE (with the exception of reports from Central Asian countries and the Russian Federation) is linked to pressure arising from hydroelectric dams, river alterations, irrigation channels and other hydromorphological changes in river basins. The assessment of water resources in such river basins as the Danube, Elbe, Rhine, Meuse and Scheldt has clearly pointed to the severity of these pressures and has stimulated action (e.g. under the Water Framework Directive) to counteract them.

#### **4. Other pressures**

46. Other pressures in EECCA basins mostly refer to big industrial enterprises which recently became operational; these seem to cause fewer problems, as they were equipped with adequate wastewater treatment technologies. However, given economic development, it should be expected that, the relative importance of this type of pressure will increase in the future.

47. As concerns other pressures in basins in Western Europe, a particular challenge area still to be addressed by proper response measures is the control and reduction of pollution by new substances produced by the chemical industry, including new pharmaceuticals that cannot be eliminated in wastewater treatment processes, as well as the control of pollution by priority substances given provisions of the Water Framework Directive and other applicable directives. In some other basins shared by countries with market economies, untreated or insufficiently treated industrial wastewater is still of concern and breakdowns of municipal wastewater treatment systems are the reason for significant discharges of polluted waters into rivers. The legal framework exists with the relevant directives, and compliance with these directives is needed to achieve a good status of water bodies. In some new EU countries, inappropriate wastewater treatment is still a problem, and the national sewerage and wastewater treatment plans are targeted to fulfil the requirements of the relevant directives by 2010 and 2015, respectively.

48. Other point pressures also refer to mining. In some basins, the mining industry (e.g. copper, zinc, lead, uranium mining) is one of the most significant (past or new) pollution sources, and a number of storage facilities (including tailing dams for mining and industrial wastes) exert significant (or at least potentially significant) pressures. In parts of the region, mining of hard coal has also significantly changed the groundwater flow. Opencast mining of brown coal, particularly in parts of Central Europe, is also lowering the groundwater level. Thus appropriate measures need to be implemented in many cases to control the adverse impact on water quality and quantity. After the termination of mining activities, rehabilitation measures need to be implemented to avoid further adverse impacts on aquatic and terrestrial ecosystems and/or to restore damaged landscapes and ecosystems, as is done in basins such as the Elbe, Oder and Rhine.

#### **5. Transboundary aquifers**

49. Water use by agriculture and drinking water supply are the major water-quantity related pressure factors in transboundary aquifers. Demographic growth, more intensive agriculture and growing tourism are likely to increase pressure on both groundwater quantity and quality. There is evidence of the impact of climate change on groundwater water resources in SEE, the Caucasus and Central Asia; however, the effects of changing rainfall patterns on groundwater recharge, as well as of floods and droughts on interactions between surface water and groundwater, still remains unpredictable.

## V. CONCLUSIONS

50. Although the policy, legislative, institutional and managerial framework for transboundary cooperation has been developed over the last decade, the assessment revealed a number of deficiencies that call for further action.

### A. Transboundary level

51. Bilateral and multilateral agreements are the basis for determined and reliable cooperation. Some river basins are still not covered by agreements and some of the existing agreements need to be revised particularly with regard to such issues as joint monitoring (see below), warning for hydrological extreme events and industrial accidents, sustainable flood management, and sharing/allocation of water resources. Major gaps also relate to the incorporation of groundwater management issues, which should be overcome most urgently.

52. Joint bodies are a prerequisite for effective cooperation and the joint monitoring and management of transboundary waters as is demonstrated by the well functioning joint bodies for the rivers Elbe, Danube, Meuse, Moselle/Saar, Rhine, Oder, Scheldt and Sava as well as the Finnish-Russian waters and the Kazakh-Russian waters. For such other basins as the Chu and Talas and Albanian-Greek waters, joint bodies have also been set up but are still in their infancy. Most other basins lack dedicated joint management; lack of political will for joint action and cumbersome national procedures (coordination between national authorities/sectors) often hamper negotiations over joint measures and delay agreements on the mandates and tasks of joint bodies.

53. In a number of basins shared by EU countries with non-EU countries, there is still a conflict in applicable legislation leading to different requirements in such fields as monitoring and classification of water bodies and performance parameters of treatment technology. With the reform of the Water Law in countries bordering the EU, an approximation to EU legislation may be accomplished soon, allowing upstream and downstream countries to rely on almost the same standards.

54. Other EECCA countries face additional challenges. Pollution control legislation based on very similar “maximum allowed concentration levels” allows straightforward comparisons between water quality in upstream and downstream countries, but the legislation seems to be unrealistic to be complied with by existing wastewater treatment technology. Rather than amending legislation, a straightforward way may consist of setting “realistic” target values for water quality that can be achieved over the medium term, and making these target values intermediate goals in the joint river basin management plans.

## **B. National policies and legislation**

55. National policies and legislation should be further developed to regulate economic activities so that they do not adversely affect water and water-related ecosystems. A particular issue is agriculture, where perverse incentives that subsidize the overuse of natural resources and the decline of ecosystem health should be removed.

56. Legislation should be drawn up and applied to reduce fragmentation between, and improve coordination among, government departments and institutions. This requires a clear definition of the responsibilities and duties of ministries for the environment, agriculture and forestry, transport, energy, economy and finance. Legislation should also provide for coordination with stakeholders, e.g. farmers' associations and water users' groups.

## **C. Monitoring, data management and early warning**

57. Further issues for cooperation include joint monitoring and data management. Data upstream and downstream of the borders between countries are often not comparable due to uncoordinated sampling, measurement and analytical (laboratory) methods in riparian countries. Joint programmes on monitoring, data management and assessment are therefore the key to integrated water resources management. This also applies to transboundary groundwaters as the current low level of transboundary cooperation and deficient technical guidance hamper systematic monitoring and assessment of their status.

58. There is a need to secure national funding, as for many basins in EECCA, the availability of data too often depends on the lifetime of international assistance projects.

59. Early warning (quality and quantity) is another issue of concern. Although industrial accidents and severe floods were often an important catalyst for joint measures in transboundary basins, joint action should be taken on time to prevent disasters or reduce their consequences. In many basins, this requires the establishment of early warning systems for floods, droughts and accidental pollution.

## **D. River basin management plans**

60. Plans for integrated water resources management in a transboundary context still need to be developed for almost all basins in the region and the countries' analysis has pointed to the essential elements to be included in these plans, river-basin-by-river-basin. Proper attention should be devoted to land-use planning and management given the potential positive and adverse effects of land use on the hydrological and chemical regimes of transboundary waters. Management plans should cover both surface water and groundwater bodies, although the responsibility for protection and management may rest with different governmental authorities.

61. For river basin management plans, the identification and development of adaptive strategies towards effects of climate change on water management, including floods and droughts, on different levels of time and scale, and the identification of information needs in

support of these strategies is also important. Such adaptive strategies should include the safe operation of water supply and sanitation facilities in urban and rural areas.

### **E. Platform for multi-stakeholder dialogues**

62. There is a need for establishing a platform for a national interdepartmental and multi-stakeholder (e.g. Governments, NGOs, the private sector, water users' associations) dialogue on integrated water resources management. Early experience from the National Policy Dialogue under the EU Water Initiative that started in Armenia and Moldova may serve as guidance for similar dialogues in other countries.

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