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PRELIMINARY ASSESSMENT OF THE STATUS OF TRANSBOUNDARY RIVERS DISCHARGING INTO THE CASPIAN SEA AND THEIR MAJOR TRANSBOUNDARY TRIBUTARIES

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

Addendum

1. This preliminary assessment is an intermediate product, which deals with major transboundary rivers discharging into the Caspian Sea and their major transboundary tributaries.

2. Based on countries' response to the datasheets[1] and on data available from other sources, this assessment focuses on major watercourses in the Caspian Sea basin as shown in the table below. The other watercourses will be included in the updated version to be submitted to the sixth Ministerial Conference "Environment for Europe" (Belgrade, October 2007) as explained in document ECE/MP.WAT/2006/16.

3. In the present document and the other addendums (ECE/MP.WAT/2006/16/Add.3-Add.6), the term "river basin" means the area of land from which all surface runoff flows through a sequence of streams, rivers and possibly lakes into the sea at a single river mouth,

[1] The cut-off date was 1 September 2006.

estuary or delta, or the area of land from which all surface runoff ends up in another final recipient of water, such as a lake or a desert. “Sub-basin” means the area of land from which all surface runoff flows through a sequence of streams, rivers and possibly lakes to a particular point in a river, normally a lake or a river confluence.[2]

Transboundary rivers discharging into the Caspian Sea and their major transboundary tributaries

Basin/sub-basins	**Riparian countries**	**Recipient**	**Status of assessment**			
			Hydrology	***Pressure***	***Impact***	***Trends***
Ural	KZ, RU	Caspian Sea	x	x	x	x
- Ilek	KZ, RU	Ural	…	(x)	(x)	…
Atrak	IR, TM	Caspian Sea/desert sink	…	…	…	…
Astara Chay	AZ, IR	Caspian Sea	(x)	(x)	…	…
Kura	AM, AZ, GE, IR, TR	Caspian Sea	x	x	x	x
- Iori	AZ, GE	Kura	x	x	x	x
- Alazani	AZ, GE	Kura	x	x	x	x
- Debet	AM, GE	Kura	x	x	x	x
- Agstev	AM, AZ	Kura	…	(x)	(x)	…
- Potskhovi	GE, TR	Kura	x	(x)	(x)	(x)
- Ktsia-Khrami	AM, GE	Kura	x	(x)	(x)	(x)
- Araks	AM, AZ, IR, TR	Kura	(x)	(x)	(x)	(x)
-- Achurjan	AM, TR	Araks	…	…	…	…
-- Arpa	AM, AZ	Araks	…	…	…	…
-- Vorotan (Bargushad)	AM, AZ	Araks	…	…	…	…
-- Voghji	AM, AZ	Araks	…	…	…	…
-- Kotur (Qotur)	IR, TR	Araks	…	…	…	…
Samur	AZ, RU	Caspian Sea	x	x	x	x
Sulak	AZ, GE, RU	Caspian Sea	…	…	…	…
Terek	GE, RU	Caspian Sea	x	x	x	x
Volga	KZ, RU	Caspian Sea	n.a.	n.a.	n.a.	n.a.
- Delta, eastern branches	KZ, RU	Caspian Sea	…	…	…	…
Malyi Uzen	KZ, RU	Kamysh-Samarks lakes system	…	…	…	…

[2] Synonyms commonly used for basins and sub-basins are “catchment” and “watershed”.

Bolshoy Uzen	KZ, RU	Kamysh-Samarks lakes system	…	…	…	…

The following abbreviations for country names are used: Afghanistan (AF), Armenia (AM), Azerbaijan (AZ), Georgia (GE), Iran (IR), Kazakhstan (KZ), Russian Federation (RU), Turkey (TR) and Turkmenistan (TM). The following abbreviations for the status of the assessment are used: x – draft assessment made; (x) – draft assessment partially made. Three dots (…) indicate that no data were submitted. The exclusion of a river basin from the assessment, given decisions by the Working Group on Monitoring and Assessment is marked with "n.a.".
EPR means the Environmental Performance Reviews carried out by UNECE for countries in Eastern Europe, the Caucasus and Central Asia (EECCA).

I. ASSESSMENT OF THE STATUS OF TRANSBOUNDARY RIVERS IN THE URAL BASIN

A. Ural River

4. The Ural River basin is shared by the Russian Federation (upstream country) and Kazakhstan (downstream country).

Basin of the Ural River			
Area	Countries	Countries' share	
231,000 km^2	Russian Federation	83,200 km^2	36%
	Kazakhstan	147,800 km^2	64%

Source: Ministry of Environment Protection of Kazakhstan [3]

Hydrology

5. The Ural River, which forms part of the traditional boundary between Europe and Asia, rises in the South-eastern slopes of the Ural Mountains (Bashkortostan Republic, Russian Federation). 72% of its total runoff is formed in the Russian part of the basin. There are remarkable water level and water discharge fluctuations throughout the year; the share of spring floods amounts to some 65-70%.

6. The total length of the river is 2,428 km, from which 1,082 km are in Kazakhstan. In the basin, there are some 240 lakes and one man-made multipurpose reservoir, the Iriklin reservoir, with a total storage capacity of 3,260 km^3 and a surface of 260 km^2.

[3] Other sources report a size of the basin ranging from 231,000 km^2 to 311,000 km^2.

Discharge characteristics of the Ural River downstream of the border with the Russian Federation		
Q_{av}	2.82 km^3/a	Average for …
Q_{max}	7.82 km^3/a	…
Q_{min}	1.0 km^3/a	…

Pressure factors

7. On the territory of the Russian Federation, major pollution sources are the industrial enterprises in Magnitogorsk and the Orenburg oblasts. In Kazakhstan, the cities of Uralsk and Atyrau discharge municipal wastewaters with nutrients and organic substances into the Ural River. Other pollution sources include surface water runoff, particularly during flood periods, carrying away pollutants from sewage infiltration fields, as well as seepage from sewage ponds. Surface runoff from the oil extraction sites on the Caspian coast (Tengiz, Prorva, Martyshi, Kalamkas, Karazhmbas) introduces oil products into the Ural river.

Transboundary impact

8. Phenols, heavy metals and oil products are the principal pollutants in the Ural basin.[4] Data from 1990 to 1999 show that on the Russian-Kazakhstan border (village of Yanvartsevo) the concentration of copper and phenol in the Ural River exceeded the maximum permitted concentration (MPC) [5]by a factor of 10 to12, whereas the concentrations for hexachlorane and lindan were 1 to 18 times higher than the permissible concentrations. For the same period of time, inputs of phosphorus and lindan from sources in Kazakhstan increased the pollution load by 13% and 30%, respectively, compared to the measurement at the Russian/Kazakhstan border.

Water pollution at the Russian-Kazakhstan border (village of Yanvartsevo): Mean annual concentrations in mg/l								
Determinands and the corresponding MPC in mg/l		1990	1995	1999	2001	2002	2003	2004
Copper	0.001	0.012	0.0006	0.00	…	…	…	…
Zinc	0.01	0.037	0.004	…	0.021	…	…	…
Chromium	0.001	0.0016	0.002	0.00	…	…	…	…
Manganese	0.01	0.009	0.016	0.00	…	…	…	…
Oil products	0.05	0.039	0.071	0.0031	…	…	…	…
Phenols	0.001	0.001	0.001	0.00	0.001	0.002	0.002	0.001

9. Despite the negative impact of floods (see above), the diluting effects of huge spring floods temporarily decrease water pollution in the river itself and allow for some self-purification of the river system. These effects are particularly visible in the lower parts of the basin and in the

[4] EPR Kazakhstan, 2000.
[5] MPC means the maximum permitted concentration. MPC values are comparable to, but not identical with, water-quality criteria used in Northern America and Western Europe to designate the maximum concentration of a substance above which a designated water use (e.g. drinking-water use; water use by aquatic life) will be adversely affected.

delta (see the table below). Nevertheless, data from the second half of the 1990s show a general increase in the content of nitrogen compounds (by 3 times) and boron (by 7 times).

Water pollution index[6] at two stations in Kazakhstan								
Measuring station	1994	1995	1996	…	2001	2002	2003	2004
Uralsk (KZ)	1.55	1.68	3.03	…	2.78	1.18	1.21	1.42
Atyrau (KZ)	0.96	1.04	1.01	…	…	…	…	…

Trends[7]

10. As indicated by the water pollution index, an increase of the overall pollution in the 1990s seems to be followed by a slight decrease of pollution from 2000 onwards and the upgrading from water quality class 4 (polluted) to class 3 (moderately polluted). For individual substance, a trend cannot be detected, as the factor by which the maximum allowable concentration is exceeded considerably changes from year to year.

B. Ilek River

11. The river Ilek, also shared by Kazakhstan and the Russian Federation, is a transboundary tributary to the Ural River. The Ilek carries boron and chromium into the Ural River, originating from the tailing ponds of former chemical plants via groundwater. The water-quality class of Ilek River varies between 4 (polluted water) to 6 (very polluted water).[8]

II. ASSESSMENT OF THE STATUS OF TRANSBOUNDARY RIVERS IN THE ATRAK BASIN

12. The Atrak River basin (27, 300 km^2) is shared by Iran (7,300 km^2) and Turkmenistan (20,000 km^2).[9] Its assessment will be made at a later stage.

III. ASSESSMENT OF THE STATUS OF TRANSBOUNDARY RIVERS IN THE ASTARA CHAY BASIN

13. The Astara Chay River basin is shared by Iran and Azerbaijan. Following data from the Ministry of Environment of Azerbaijan, from the total catchment area of 242 km^2, 51% (or 124 km^2) are located in Azerbaijan.[10] The mean annual flow is 0.22 km^3. In Azerbaijan, 1,007 ha are

[6] The water pollution index is defined on the basis of the ratios of measured values and the maximum permitted concentration of the water-quality determinands.
[7] As assessed by the consultant
[8] Water Resources of Kazakhstan in the New Millennium, Water Resources Committee of the Republic of Kazakhstan, 2002.
[9] Following information submitted by Turkmenistan to the UNECE secretariat. Other sources report a size of 34,200 km^2.
[10] Other data sources report an area of the basin of 600 km^2.

under irrigated agriculture. Consequently, the main pollution stems from agriculture, including fertilizers and pesticides. A more detailed assessment will be made at a later stage.

IV. ASSESSMENT OF THE STATUS OF TRANSBOUNDARY RIVERS IN THE KURA BASIN

A. Kura River

14. Armenia, Azerbaijan, Georgia, Iran and Turkey share the Kura basin, which has a total area of 188.000 km^2. The Russian Federation is usually not considered as a basin country, as its territory in the basin is far below 1% of the total basin area.

Basin of the Kura River[11]			
Area	Countries	Countries' share	
188,000 km^2	Armenia	29,743 km^2	15.8%
	Azerbaijan	57,831 km^2	30.7%
	Georgia	29,741 km^2	15.8%
	Iran	…	…
	Turkey	…	…
Source: UNECE Environmental Performance Review (EPR) programme; Ministries of Environment of Armenia, Azerbaijan and Georgia			

Hydrology

15. The Kura, takes off in Turkey on the east slope of the mount Kyzil-Gyadik at the height of 2742 m. The total length of the river is 1364 km (185 km in Turkey, 390 km in Georgia and 789 km in Azerbaijan). The basin includes the whole territory of Armenia, the eastern part of Georgia, some 80% of Azerbaijan as well as parts of Turkey and Iran. In previous times, the Kura was even navigable up to Tbilisi (Georgia); after the construction of dams for hydropower generation, the river became much shallower.

16. Among the Kura tributaries, there are a number of major transboundary tributaries, including the rivers Araks, Iori, Alazani, Debet, Agstev, Potskhovi and Ktsia-Khrami. Major transboundary tributaries to the Araks River include the rivers Achurjan, Agstev, Arpa, Kotur, Voghji and Vorotan.

[11] There are some differences regarding the total area of the basin (ranging from 188,000 km^2 to 193,200 km^2) and the countries' shares. For example, the 2004 GIWA Regional Assessment 23 "Caspian Sea" gives the following figures: Total basin area 193,200 km^2 from which 18% in AM, 29% in AZ, 18% in GE, 21% in IR, 14% in TR and << 1% in RU). The figures used here are those reported by the countries under the UNECE Environmental Performance Review programme, supplemented by data from the Water Convention's pilot project on monitoring and assessment of transboundary waters, i.e. the TACIS Project "Joint River Management Programme", 2003. Data on Turkey and Iran were not gathered under these activity and are therefore not included in the table.

17. Flash floods are frequent (see also the assessment of the first and second order tributaries below). Reservoir and dam construction also served flood regulation. On the Kura, the Mingechevir reservoir has improved the situation in this respect in the Kura lowlands. Downstream of the confluence of the Arak River, however, floods frequently occur due to a combination of increased water level in the Caspian Sea and sedimentation in the riverbed. Emergency work on the Kura dykes in 2003 mitigated the impact of flooding in the Salyan and Nefchala areas.

Discharge characteristics of the Kura at gauging stations in Georgia and Azerbaijan		
Khertvisi (Georgia, downstream of the border with Turkey): latitude: $41^0\,29'$; longitude: $43^0 17'$		
Q_{av}	33.0 m^3/s	1936-1990
Q_{max}	56.0 m^3/s	1936-1990
Q_{min}	18.0 m^3/s	1936-1990
$Q_{absolute\ max}$	742 m^3/s	18 April 1968
$Q_{absolute\ min}$	5.5 m^3/s	16 January 1941
Tbilisi city (Georgia): latitude: $41^0\,44'$; longitude: $44^0\,47'$		
Q_{av}	204.0 m^3/s	1936-1990
Q_{max}	325.0 m^3/s	1936-1990
Q_{min}	133.0 m^3/s	1936-1990
$Q_{absolute\ max}$	2450 m^3/s	19 April 1968
$Q_{absolute\ min}$	12 m^3/s	12 February 1961
Kyragkesaman (Azerbaijan, on the border with Georgia) : latitude: $41^0\,00'$; longitude: $46^0 10'$		
Q_{av}	270.0 m^3/s	1953-1958, 1986-2006
Q_{max}	4,460 m^3/s	1953-1958, 1986-2006
Q_{min}	188.0 m^3/s	1953-1958, 1986-2006
$Q_{absolute\ max}$	2,720.0 m^3/s	May 1968
$Q_{absolute\ min}$	47.0 m^3/s	August 2000
Saljany (Azerbaijan): latitude: $48^0\,59'$; longitude: $39^0\,36'$		
Q_{av}	446.0 m^3/s	1953-2006
Q_{max}	6,570 m^3/s	1953-2006
Q_{min}	269.0 m^3/s	1953-2006
$Q_{absolute\ max}$	2,350 m^3/s	11 May 1969
$Q_{absolute\ min}$	82 m^3/s	4 July 1971

Pressure factors

18. The Kura river system is organically and bacteriologically polluted by the discharge of poorly treated or untreated wastewater from the 11 million people[12] living in the catchment area. Wastewater discharges from households, not connected to sewage systems, into surface waters

[12] EPR Azerbaijan, 2004

and groundwaters (particularly on the countryside) is another issue, which also increases the potential of water-related diseases.

19. Due to the collapse of many industries in the early 1990s, industrial pollution has decreased considerably. A number of polluting activities, however, still exist, notably mining, metallurgical and chemical industries. The major pollutants are heavy metals (Cu, Zn, Cd) from mining and the leather industry, and ammonia and nitrates from the fertilizer industry. Up to now, concentrations of heavy metals exceed norms up to nine times, phenols up to six times and mineral oil, two to three times. The point source discharges from industries are very irregular (often during night-time) and difficult to detect due to the high speed in most of the rivers. In Georgia, pollution load estimates are therefore based on production figures, rather than measurements.

20. Irrigated agriculture is another source of pollution. In Azerbaijan alone, some 745,000 ha are used for this purpose, including 300,000 ha in the Azerbaijan part of the Araks sub-basin.

21. Manure and pesticides (including leakages from old stock of DDT or use of illegally produced or imported products) and viniculture are additional pollution sources. As roads are often close to the riverbanks, there is also a fair impact from oil products, residues and lead, mostly from badly functioning cars.

22. Deforestation in the upper part of the basin has led to poor soil protection with damaging mud slides as a result. Moreover, deforestation and overgrazing have led to erosion causing high turbidity of river water. The Araks River is claimed to be one of the most turbid in the world, and its high turbidity and pollution load increases the cost of drinking-water production in Azerbaijan.

Transboundary impact

23. On the territory of Georgia, industrial enterprises discharged in 2004: $9.945 \cdot 10^6$ kg surface active synthetic substances, $2 \cdot 10^3$ kg sulfate, $72 \cdot 10^3$ kg chloride, $46.839 \cdot 10^6$ kg ammonium-nitrogen, $23 \cdot 10^3$ kg nitrate, $159 \cdot 10^3$ kg iron, $37.005 \cdot 10^3$ kg total inorganic nitrogen, $600 \cdot 10^3$ kg BOD and 4,958 t suspended solids.[13]

24. Following measurements by Azerbaijan, the maximum permitted concentration (MPC) for a number of substances are exceeded at the Georgian-Azerbaijan border (station Shikhli-2), for example, 8-12 times for phenols, 2-3 times for oil products, 8-14 times for metals, and 1-2 times for sulphates.

25. There are no significant pollution sorces in the section from the Georgian-Azerbaijan border to the Mengechevir reservoir (Azerbaijan); due to self-purification capacity of the Kura, the concentration of polluting substances decreases in this section by 30-55%.

[13] These data are estimates, based on production figures and not on monitoring.

Trends

26. The Ministry of Environment of Georgia assesses the Kura river's ecological and chemical status (from its source in Turkey until the border between Georgia and Azerbaijan) as moderate. There are no major improvements in water quality to be expected over the next years. Spring floods will continue causing damage in parts of the basin.

B. Iori River

27. Georgia (upstream country) and Azerbaijan (downstream country) share the catchment area of the River Iori, a left-hand side (northern) tributary to the Kura, as follows:

Sub-basin of the Iori River[14]			
Area	Countries	Countries' share	
...	Georgia	4,645 km^2	...
	Azerbaijan	610 km^2	...
Source: Ministry of Environment of Georgia for the area in Georgia; Ministry of Environment of Azerbaijan for the area in Azerbaijan.			

Hydrology

28. The River Iori takes off on the southern slope of the Main Caucasian Range at the height of 2600 m, flows from Georgia to Azerbaijan and falls into the Mingechevir reservoir. The river has a length of 320 km (313 km in Georgia and 7 km in Azerbaijan). In Georgia, the river system is made up of 509 smaller rivers with an overall length of 1,777 km. The density of river network is 0.38 km/km^2.

29. The hydrological regime of the river is characterized by spring floods, summer/autumn high waters and steady low-water levels in winter. The increase of water levels in the period of spring floods caused by melting of snow and rainfalls usually starts in March (in the second half of February in the lower reaches of the river) and reaches its maximum in May-June. The dropping of water levels continues till the end of July. The summer/autumn season floods, caused by intensive rainfalls, reoccur every year for 3-6 times a season with a duration of 2 to 10 days. By height, water levels often reach the maximums of spring floods. In winter, variations of low-water levels do not exceed 0.1 m, and in some years the water level even stays on the same mark for 10-30 days.

30. In Georgia, there are three large irrigation reservoirs on the River Iori, the Sioni reservoir (325 million m^3) used for irrigation, hydropower generation and water supply; the Tbilisi reservoir (308 million m^3) used for irrigation and water supply; and the Dalimta reservoir (180 million m^3) used for irrigation. The construction of the Sioni reservoir in the 1950's also served flow regulation.

[14] Both countries gave a different size for the total area.

Pressure factors

31. Diffuse pollution from agriculture (94,006 hectares are used for irrigated agriculture) and municipal wastewaters are the main anthropogenic pollution sources in Georgia. In Azerbaijan, 1,522 ha are used for irrigated agriculture.

Transboundary impact

32. On the territory of Georgia, the following substances were discharged in 2004 into the Iori River: surface active substances $5.85 \cdot 10^6$ kg, oil products 1,000 kg, BOD $111 \cdot 10^3$ kg and suspended solids 176 t. These data are calculated values, based on production figures and not on river monitoring.

33. The Ministry of Environment of Georgia assesses the river's ecological and chemical status as good.

34. Azerbaijan confirms that there is little human impact on the river. Downstream of the Georgian-Azerbaijan border, the maximum permitted concentration (MPC) for phenols and metals are exceeded by a factor of 2-3, the MPC values for oil products and sulphates are exceeded by a factor of two.

Trends

35. Georgia assesses that the river system's ecological and chemical status will remain in a good status.

C. Alazani River

36. Georgia (upstream country) and Azerbaijan (downstream country) share the catchment area of the River Alazani. The total length of the river is 391 km (104 km in Georgia, 282 km common border between Georgia and Azerbaijan, 5 km in Azerbaijan).

Sub-basin of the Alazani River[15]

Area	Countries	Countries' share	
…	Georgia	6,700 km^2	…
	Azerbaijan	4,755 km^2	…

Source: Ministry of Environment of Georgia for the area in Georgia; Ministry of Environment of Azerbaijan for the area in Azerbaijan.

[15] Both countries gave a different size for the total area.

Hydrology

37. The River Alazani, the second largest river in Eastern Georgia, is formed at the junction of two mountain rivers, which flow from the southern slopes of the Main Caucasus Mountain Range. The river crosses an inter-mountainous depression, streams along the Georgian-Azerbaijan border and flows into Mingachevir reservoir in Azerbaijan. In Georgia, the river system is made up of 1803 smaller rivers with an overall length of 6851 km (1701 rivers with a length below 10 km).

38. Spring floods caused by melting of seasonal snows and rainfalls usually starts in March in the upper reaches, and end of February in the lower reaches of the river. Typically, the maximum is achieved in May-June. Caused by rainfalls (from the beginning or middle of April), some sharp but usually low peaks are observed with a duration of 2 to 15 days. The dropping of floods continues till the end of July. At this time, usually 2-3 short rain peaks take place. The rainy days in summer/autumn reoccur typically 2-6 times per season with the duration of 2 to 20 days. They are especially intensive and prolonged in the lower reaches of the river. There, water levels often reach the maximum of spring floods, and in some years even surpass them.

39. The winter low-water level is nearly steady, the daily range of level fluctuations does not exceed 0.2 m, and in some winters, the same water level persists during 25-30 days. In several winter seasons, sudden increase of level has occurred caused by rains and thaws.

Discharge characteristics at the gauging station "Chiauri" (10 km upstream of the Georgian/Azerbaijan border): latitude: $41^0 40'$; longitude: $46^0\ 05'$		
Q_{av}	62.1 m^3/s	1925-1990
Q_{av}	43.1 m^3/s	In 95% of the year
Q_{av}	32.5 m^3/s	In 99% of the year
Q_{max}	105 m^3/s	1925-1990
Q_{min}	33.4 m^3/s	…
$Q_{absolute\ max}$	685 m^3/s	21 May 1936
$Q_{absolute\ min}$	5.33 m^3/s	4-6 February 1953

The Chiauri station was open in 1925 and closed in 2004. Now, the gauging station "Shakriani" (latitude: 41^0 59'; longitude: 45^0 35') is in operation. At the mouth, the annual discharge of the Alazani River is 112 m^3/s.

Pressure factors

40. Diffuse pollution from agriculture and viniculture as well as municipal wastewaters are the main anthropogenic pollution sources in Georgia.

Transboundary impact

41. On the territory of Georgia, the following substances were discharged from industries in 2004: oil products 2,000 kg, BOD $66 \cdot 10^3$ kg and suspended solids 216 t. These data are

calculated values based on production figures and not on water monitoring. There are no data for agricultural and municipal pollution.

42. The Ministry of Environment of Georgia assesses the river's ecological and chemical status as good.

43. Following measurements by Azerbaijan, the MPC values for phenols are exceeded 5-7 times, for metals 6-8 times, and for oil products 2-3 times.

Trends

44. Georgia assesses that the river system's ecological and chemical status will remain in a good status.

D. Debet River

45. Armenia (upstream country) and Georgia (downstream country) share the catchment area of the River Debet, a right-hand side (southern) tributary to the Kura, as follows:

Sub-basin of the Debet River			
Area	Countries	Countries' share	
4,100 km^2	Armenia	3,790 km^2	92.4%
	Georgia	310 km^2	7.6%
Source: Ministry of Environment of Georgia.			

Hydrology

46. The Debet river rises at 2100 m above sea level and flows through a deep valley. From its total length of 176 km, 154 km are in Armenia. There are two reservoirs in the Armenian part of the catchment area, one on the river Dzoraget (0.27 million km^3), which is a (non-transboundary) tributary to the Debet, and the other on the river Tashir (5.4 million km^3), a non-transboundary tributary to the river Dzoraget. The lake percentage is 0.01%.

Discharge characteristics at gauging stations on the Debet River		
Discharge characteristics at the gauging station Sadaxlo at the Georgian/Armenian border		
Q_{av}	29.2 m^3/s	1936-1990
Q_{max}	48.5 m^3/s	1936-1990
Q_{min}	13.0 m^3/s	…
$Q_{absolute\ max}$	479 m^3/s	19 May1959
$Q_{absolute\ min}$	1.56 m^3/s	12 July 1961
Discharge characteristics at the gauging station Airum (Armenia) upstream of the border with Georgia		
Q_{av}	38.1 m^3/s	…
Q_{max}	242 m^3/s	…
$Q_{absolute\ max}$	759 m^3/s	19 May 1959
Q_{min}	10.6 m^3/s	For 95% of time

Pressure factors

47. Hydrochemical processes in the many ore deposits in the Armenian part of catchment area cause a considerable natural background pollution with heavy metals, which already exceeds the maximum permitted concentration.

48. Wastewater from the ore enrichment and processing industry, wastewater from municipal sources (some 110 human settlements in the Armenian part), and diffuse pollution from agriculture (51% of the Armenian part of the catchment area is used by agriculture) are the main anthropogenic pollution sources.

Transboundary impact

49. On the border with Georgia (station Airum, Armenia), the concentration of heavy metals (Zn, Fe, Cu), due to both natural and anthropogenic sources, exceeds the maximum permitted concentration for aquaculture.

Trends

50. Currently, the river system's ecological and chemical status is "poor".

51. In Armenia, the closure of the Vanadzorsk chemical factory (1998), the installation of closed water systems in the Alaverdinsk copper melting factory (2005) and the installation of closed water systems in the Achtalinsk ore processing factory (2006) will, over a period of time, lead to pollution reduction and improve water quality.

52. However, natural background pollution, leakages from a tailing dam that stores wastes from the Achtalinsk factory, and water pollution from agriculture will remain as pollution problems. Spring floods will continue causing damage in the lower part of the basin.

E. Agstev River

53. Armenia (upstream country) and Azerbaijan (downstream country) share the catchment area of the River Agstev (2,500 km^2), a right-hand side tributary to the Kura.

54. Azerbaijan reports that at the border section the maximum permitted concentration of phenols is exceeded by a factor of 9, metals by a factor of 5-8, oil products by a factor of 3-4, and sulphates by a factor of 2. Pollution is caused by economic activities in Armenia.

55. This assessment will be further elaborated at a later stage.

F. Potskhovi River

56. Turkey (upstream country) and Georgia (downstream country) share the catchment area of the River Potskhovi, a left-hand side tributary to the Kura.

Sub-basin of the Potskhovi River			
Area	Countries	Countries' share	
1,840 km^2	Turkey	509 km^2	27.7%
	Georgia	1,331 km^2	72.3%
Source: Ministry of Environment of Georgia.			

Hydrology

57. The River Potskhovi originates in Turkey on the southern slope of the Arsiani range 1.2 km east of the mountain Arsian-dag at a height of 2720 m. The length of the river is 64 km, from which 35 km are in Georgia. In the Georgian part of the catchment area, there are 521 rivers with the total length of 1,198 km. Floods mostly occur in the middle or end of March and reach their maximum in April, sometimes in May; the average increase of water levels is in the order of 0.8-1.2 m. There are altogether 11 lakes with the total area of 0.14 km^2.

Discharge characteristics at the gauging station "Skhvilisi" in Georgia (10 km upstream of the river mouth): latitude: $41^0 38'$; longitude: $42^0 56'$		
Q_{av}	21.3 m^3/s	1936-1990
Q_{av}	13.6 m^3/s	During 97% of the year
Q_{max}	31.7 m^3/s	1936-1990
Q_{min}	11.7 m^3/s	1936-1990
$Q_{absolute\ max}$	581 m^3/s	18 April 1968
$Q_{absolute\ min}$	1.0 m^3/s	13 August 1955

Pressure factors, transboundary impact and trends

58. Above 2000 m, there are alpine meadows utilized as pastures and hayfields. Below, there are mixed forests. Further downhill, the land is used by agriculture. Georgia assesses that the river system's chemical status is moderate. Georgia assesses that the river system's chemical status will remain in a moderate status.

G. Ktsia-Khrami River

59. Armenia (upstream country), Georgia (downstream country) and Azerbaijan share the catchment area of the river, a right-hand side tributary to the Kura.

Sub-basin of the Ktsia-Khrami River			
Area	Countries	Countries' share	
8,340 km^2	Armenia	3,790 km^2	45.4%
	Georgia	4,470 km^2	53.5%
	Azerbaijan	80 km^2	1.1%
Source: Ministry of Environment of Georgia			

Hydrology

60. The River Ktsia-Khrami takes off from a spring on the southern slope of the Trialeti range 2.4 km eastwards from the mountain Karakaya at the height of 2,422 m, falls into the river Kura from the right bank at 820 km above the riverhead. The length of the river is 201km. There are 2,234 rivers in the catchment area with the total length of 6471 km.

61. The hydrological regime is characterized by one significant spring flood. In other periods of the year, the water level is mostly low occasionally disrupted by summer/autumn high waters.

Discharge characteristics at the transboundary gauging station "Red bridge": latitude: $41^0\ 20'$; longitude: $45^0\ 06'$		
Q_{av}	51.7 m^3/s	1928-1990
Q_{av}	32.5 m^3/s	During 99% of the year
Q_{max}	90.1 m^3/s	1928-1990
Q_{min}	29.3 m^3/s	1928-1990
$Q_{absolute\ max}$	1,260 m^3/s	16 May 1966
$Q_{absolute\ min}$	3.95 m^3/s	26 February 1961

Pressure factors, transboundary impact and trends

62. Pastures, meadows, forests and agriculture are the main form of land use. Given data from 1980-1993, NH_4, Cu and Zn exceeded the MPC. Georgia assesses that the river system's chemical status will remain in a moderate status.

H. Araks River

63. Armenia, Azerbaijan (15,700 km^2, 15.4%)[16], Iran and Turkey share the sub-basin of the Araks River, having with a total area of 102,000 km^2.

64. Over many decades, the Araks has been polluted by its left-hand side tributaries, carrying wastewater from the mining industry, chemical industry and other industries in Armenia. There is also an impact from natural sources, for example hydrochemical processes in areas with ore deposits. The impact of both natural and human pollution sources is felt on the territory of Azerbaijan until the point of confluence of the Araks with the Kura and beyond. At the rivers' confluence, Azerbaijan reports that the MPC values are exceeded as follows: 13 times for phenols, 9 times for metals, 6 times for sulphates and 4 times for oil products. The mineral content (1130 mg/l) exceeds the norms by 25-35%. A more detailed assessment will be made at a later stage.

I. Achurjan River

65. Armenia and Turkey share the sub-basin of the Achurjan River, a tributary to the Araks, having a catchment area of 9,670 km^2. An assessment will be made at a later stage.

J. Arpa River

66. Armenia and Azerbaijan share the sub-basin of the Arpa River, a tributary to the Araks. An assessment will be made at a later stage.

K. Vorotan (Bargushad) River

67. Armenia and Azerbaijan share the sub-basin of the Vorotan River, a tributary to the Araks, having a catchment area of 5,540 km^2. An assessment will be made at a later stage.

L. Voghji River

68. Armenia and Azerbaijan share the sub-basin of the Voghji River, a tributary to the Araks, having a catchment area of 1,175 km^2. An assessment will be made at a later stage.

M. Kotur (Qotur) River

69. Iran and Turkey share the sub-basin of the Kotur River, a tributary to the Araks. An assessment will be made at a later stage.

[16] Figures for the total area and share of Azerbaijan by the Ministry of Environment of Azerbaijan.

V. ASSESSMENT OF THE STATUS OF TRANSBOUNDARY RIVERS IN THE SAMUR BASIN

70. The basin of the Samur River is shared by the Russian Federation and Azerbaijan as indicated in the following table.

Basin of the Samur River			
Area	Countries	Countries' share	
4,430 km^2	Russian Federation	3,900 km^2	88 %
	Azerbaijan	530 km^2	12 %
Source: Ministry of Environment of Azerbaijan			

Hydrology

71. The river rises in Dagestan (Russian Federation). The common border on the river between the Russian Federation and Azerbaijan is 38 km long. Before flowing into the Caspian Sea, the river divides into several branches, located both in Azerbaijan and the Russian Federation.

Pressure factors

72. Irrigational water use (some 90,000 ha in Azerbaijan) and water abstraction for drinking-water supply of the city of Baku (Azerbaijan) via the Samur-Apscheronsk Canal and drinking-water supply to settlements in Dagestan (Russian Federation) are the principal pressure factors. There are also fish breeding farms on the river.

Transboundary impact

73. Given assessments by Azerbaijan, the River Samur discharges 1.5 tons/a of chemicals to the Caspian Sea, including 0.1 million tons/a oil, 0.01 million tons/a phenols, 0.01 million tons/a detergents, 0.01 million tons/a copper and 0.01 million tons/a zinc. Although there is some capacity for self-cleaning in the Jerianbatan reservoir, drinking-water supply even from sources downstream the reservoir requires deep water purification. Still, Russian and Azerbaijan experts report on adverse health effects.[17]

74. The reduction in flow in the River Samur to a level below that which is ecologically required has caused a drop in the groundwater table, which also has ecological and other consequences for the relic forest in the Samur Valley and nature conservation areas in the delta.

[17] Water Convention's workshop on sustainable water management and health, ECWATECH-2004, Moscow.

Trends [18]

75. Over a period of time, pollution problems will remain. The adverse impact of water abstraction for irrigation will increase in the future, particularly because attempts to draw up a bilateral agreement on water sharing failed between the two countries.

VI. ASSESSMENT OF THE STATUS OF TRANSBOUNDARY RIVERS IN THE SULAK BASIN

76. The Sulak River basin, shared by Azerbaijan, Georgia and the Russian Federation, covers an area of 15,100 km^2. Its assessment will be made at a later stage.

VII. ASSESSMENT OF THE STATUS OF TRANSBOUNDARY RIVERS IN THE TEREK BASIN

77. Georgia (upstream country) and the Russian Federation (downstream country), as indicated in the following table, share the basin of the Terek River. The river is a key natural asset in the Caucasus region.

Basin of the Terek River			
Area	Countries	Countries' share	
43,710 km^2	Georgia	805 km^2	1.8%
	Russian Federation	42,905 km^2	98.2%
Source: Ministry of Environment of Georgia			

Hydrology

78. The River Terek rises in Georgia on the slopes of Mount Kazbek. After some 61 km, the river crosses the Georgian-Russian border and flows through North Ossetia, Vladikavkaz, Chechnya and Dagestan (Russian Federation), and divides into two branches, which empty into the Caspian Sea. Below the city of Kizlyar (Russian Federation), it forms a swampy river delta, around 100 km wide.

79. Spring floods cause damage, particularly in the Russian part of the basin.

Discharge characteristics at the gauging station Kazbeki (Georgia): latitude: 44°38'24''; longitude: 42°39'32''		
Q_{av}	25 m^3/s	1928-1990
Q_{max}	…	…
Q_{min}	…	…

[18] As assessed by the consultant.

Pressure factors

80. Irrigational water use and human settlements are the main pressure factors in the Georgian part of the basin.

Transboundary impact

81 Based on estimates, $17 \cdot 10^3$ kg BOD and 41 t suspended solids were discharged in 2004 into the Georgian part of the basin.

Trends

82. In the Georgian part of the basin, the river is in a good ecological and chemical status. There are no real threats, which would decrease the status of the river in the near future.

VIII. ASSESSMENT OF THE STATUS OF TRANSBOUNDARY RIVERS IN THE VOLGA BASIN

83. In the Volda delta, some of the eastern branches cross the border between Kazakhstan and the Russian Federation. The Working Group on Monitoring and Assessment decided not to undertake an assessment of this part of the Volga basin due to its size far below 0.1% of the total area.

IX. ASSESSMENT OF THE STATUS OF OTHER TRANSBOUNDARY RIVERS

84. The Malyi Uzen (638 km length, catchment area 18,200 km^2) and the Bolshoy Uzen (650 km length, 15,600 km^2) are shared by Kazakhstan and the Russian Federation.[19] Their assessment will be made at a later stage.

[19] ECE/MP.WAT/16