UNITED
NATIONS

E

Economic and Social Council

Distr.
GENERAL

ECE/MP.WAT/WG.2/2007/6
16 April 2007

Original: ENGLISH
ENGLISH AND RUSSIAN
ONLY

ECONOMIC COMMISSION FOR EUROPE

MEETING OF THE PARTIES TO THE CONVENTION ON THE PROTECTION AND USE OF TRANSBOUNDARY WATERCOURSES AND INTERNATIONAL LAKES

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 WATERS IN THE BALTIC SEA BASIN
Transboundary rivers and/or lakes in Finland, Norway, Sweden and the Russian Federation

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.07-22245

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

1. Norway, Sweden and Finland share the basin of the Torne River, also known as the Tornionjoki and the Tornio.

Basin of the Torne River

Area	Countries	Countries' share	
40,157 km^2	Finland	14,480 km^2	36.0%
	Norway	284 km^2	0.7%
	Sweden	25,393 km^2	63.3%

Source: Finnish Environment Institute (SYKE).

Hydrology

2. The river runs from the Norwegian mountains through northern Sweden and the north-western parts of Finnish Lapland down to the coast of the Gulf of Bothnia. It begins at Lake Torneträsk (Norway), which is the largest lake in the river basin. The length of the river is about 470 km. There are two dams on the Torne's tributaries: one on the Tengeliönjoki River (Finland) and the second on the Puostijoki River (Sweden).

3. At the Karunki site, the discharge in the period 1961–1990 was 387 m^3/s (12.2 km^3/a), with the following minimum and maximum values:[3] MNQ = 81 m^3/s and MHQ = 2,197m^3/s. Spring floods may occasionally cause damage in the downstream part of the river basin

Pressure factors

4. Most of the point sources are urban wastewater treatment plants. In the years 1993–1997, their average discharge was 7,500 kg/a phosphorus, 260,000 kg/a nitrogen and 272,000 kg/a BOD_7.

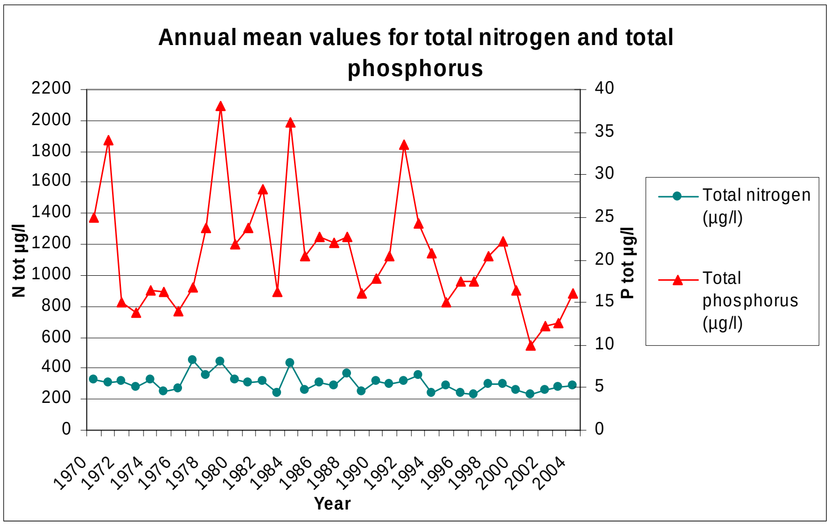
5. There is also non-point loading from the scattered settlements and summerhouses, which amounted to approximately 8,900 kg/a of phosphorus and 61,700 kg/a of nitrogen in 1995. 60% of this discharge stems from the lower part of the Torne River basin, where the share of scattered settlement is the largest.

6. Some small peat production areas as well as a couple of fish farms add to the nutrient loading. In addition, felling trees, tilling the land and draining caused phosphorus and nitrogen discharges of approximately 4,400 kg/a (phosphorus) and 41,000 kg/a (nitrogen) in 1997. 72%–76% of these discharges stems from the lower part of the Torne River basin.

[2] Based on information provided by the Finnish Environment Institute (SYKE).
[3] HQ: Maximum water discharge; MHQ: Average maximum water discharge; MNQ: Average minimum water discharge; NQ: Minimum water discharge.

7. The discharge from cultivated fields was about 9,700 kg/a of phosphorus (1995) and 193,000 kg/a of nitrogen (1990). In 1998, these figures were approximately 1,800 kg/a (phosphorus) and 38,000 kg/a (nitrogen).

8. More recent data on the total phosphorus and nitrogen content are given in the figure below:



Annual mean values for total nitrogen and total phosphorus in the Torne River (Tornionjoki-Pello site)

Transboundary impact

9. Currently, the transboundary impact is insignificant. Most of the nutrients transported to the river originate from background and non-point loading. For instance, 77% of the phosphorus transport is from natural background sources and only 13% from anthropogenic sources, 10% originates from wet deposits.

Trends

10. Currently the Torne is in a high/good ecological and chemical status. The ongoing slow eutrophication process may cause changes in the future, especially in the biota of the river.

II. ASSESSMENT OF THE STATUS OF THE KEMIJOKI RIVER[4]

11. The major part of the river basin is in Finland; only very small parts of headwater areas have sources in the Russian Federation and in Norway.

[4] Based on information provided by the Finnish Environment Institute (SYKE).

Basin of the Kemijoki River			
Area	Countries	Countries' share	
51,127 km^2	Finland	49,467 km^2	96.8%
	Russia	1,633 km^2	3.2%
	Norway	27 km^2	0.05%
Source: Lapland regional environment centre, Finland.			

Hydrology

12. The Kemijoki is Finland's longest river. It originates near the Russian border and flows generally southwest for about 483 km to the Gulf of Bothnia at Kemi. The river system is harnessed for hydroelectric power production and is important for salmon fishing and for transporting logs.

13. For 1971–2000, the mean annual discharge at the Isohaara site was 566 m^3/s with a minimum discharge of 67 m^3/s and a maximum discharge of 4,824 m^3/s. Spring floods cause erosion damage on the bank of the Kemijoki.

14. The river has been regulated since the 1940s for hydroelectric power generation and flood protection. Before damming, the river was an important nursery area for migratory salmon and trout.

Pressure factors

15. The waters in the transboundary section of the river are in a natural state. There are no anthropogenic pressures.

16. In the main course of the river, the water quality is affected by non-point loading (humus) of the big reservoirs Lokka and Porttipahta. Wastewater discharges occur from some settlements, such as Rovaniemi (biological/chemical sewage treatment plant), Sodankylä and Kemijärvi. Industrial wastewater of a pulp and paper mill is discharged to the river just above Lake Kemijärvi. Other human activities in the basin include forestry, farming, husbandry and fish farming.

Transboundary impact

17. There is no transboundary impact on the borders with Norway and the Russian Federation. These transboundary areas of the river are in high status.

Trends

18. Currently, the main course of the river and Lake Kemijärvi as well as the two big reservoirs (Lokka and Porttipahta) are in good/moderate status. With more effective wastewater

treatment at the Finnish pulp mill in Kemijärvi, the status of the river is expected to further improve.

III. ASSESSMENT OF THE STATUS OF THE OULUJOKI RIVER[5]

19. The major part of the river basin is on Finnish territory; only very small parts of the headwater areas have sources in the Russian Federation.

Basin of the Oulujoki River

Area	Countries	Countries' share	
22,841 km2	Finland	22,509 km^2	98.5%
	Russian Federation	332 km^2	1.5%

Source: Finnish Environment Institute (SYKE).

Hydrology

20. The Oulujoki basin is diverse, having both heavily modified water bodies and natural waters. The coastal area of the Oulujoki basin represents unique brackish waters.

21. At the Merikoski monitoring site (Finland), the mean annual discharge for the period 1970–2006 was 259 m^3/s (8.2 km^3/a).

Pressure factors

22. In the transboundary section, there are no significant pressure factors.

23. On Finnish territory, pressures are caused by point and non-point sources as follows:

- Agriculture is concentrated on the lower reaches of the basin, where it has a major impact on water quality. Forestry including clear-cutting, drainage and tillage do have a significant impact on the ecology in small upstream lakes and rivers. Locally, also peat production may deteriorate water quality and ecology;

- A large pulp and paper mill is located on the shore of the major lake (Lake Oulujärvi) within the basin. The mill has an impact on water quality and ecology in its vicinity; however, the area of the affected parts of the lake became much smaller due to pollution control measures in the 1980s and 1990s.

24. The Oulujoki River discharges 3,025 tons/a of nitrogen (1995–2000) and 161 tons/a of phosphorus (1995–2000) into the Gulf of Bothnia.

[5] Based on information provided by the Finnish Environment Institute (SYKE).

Transboundary impact and trends

25. There is no transboundary impact on the Russian/Finnish border.

IV. ASSESSMENT OF THE STATUS OF THE JÄNISJOKI RIVER[6]

26. Finland (upstream country) and the Russian Federation (downstream country) share the basin of the Jänisjoki River.

Basin of the Jänisjoki River

Area	Countries	Countries' share	
3,861 km^2	Finland	1,988 km^2	51.5%
	Russian Federation	1,873 km^2	48.5%

Source: Finnish Environment Institute (SYKE).

Hydrology

27. The river rises in Finland; its final recipient in the Baltic Sea basin is Lake Ladoga (Russian Federation). At the Ruskeakoski discharge station, the mean annual discharge is nowadays 17.0 m^3/s (about 0.50 km^3/a). The discharge of the river fluctuates considerably. It is greatest during spring floods whereas in low precipitation seasons, the water levels can be very low.

28. At the Ruskeakoski station, the mean and extreme discharges for the period 1961–1990 are as follows: MQ = 15.5 m^3/s, HQ = 119 m^3/s, MHQ = 72.5 m^3/s, MNQ = 4.11 m^3/s, NQ = 0 m^3/s. For the last recorded decade, 1991–2000, the figures indicate an increase in the water flow as follows: MQ = 17.0 m^3/s, HQ = 125 m^3/s, MHQ = 80.6 m^3/s, MNQ = 1.84 m^3/s, NQ = 0 m^3/s.

Pressure factors

29. On Finnish territory, anthropogenic pressure factors include wastewater discharges from villages, which apply biological/chemical treatment, and the peat industry. Additionally, there is non-point loading mainly caused by agriculture, forestry and settlements. The river water is very rich in humus; the brownish color of the water originates from humus from peat lands.

Transboundary impact

30. On the Finnish side, the water quality in 2004 was assessed as "satisfactory", mainly due to the high humus content of the river waters. The transboundary impact on the Finnish-Russian border is insignificant.

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[6] Based on information provided by the Finnish Environment Institute (SYKE) and North Karelia Regional Environment Centre.

Trends

31. Over many years, the status of the river has been stable; it is to be expected that the river will keep its status.

V. ASSESSMENT OF THE STATUS OF THE KITEENJOKI-TOHMAJOKI RIVERS[7]

32. Finland (upstream country) and the Russian Federation (downstream country) share the basin of the Kiteenjoki-Tohmajoki rivers.

Basin of the Kiteenjoki-Tohmajoki rivers

Area	Countries	Countries' share	
1,594.6 km^2	Finland	759.8 km^2	47.6%
	Russian Federation	834.8 km^2	52.4%

Source: Finnish Environment Institute (SYKE).

Hydrology

33. The Kiteenjoki discharges from Lake Kiteenjärvi; 40 km of its total length (80 km) is on Finnish territory.

34. The Kiteenjoki flows via Hyypii and Lautakko (Finland) into the transboundary Lake Kangasjärvi (shared by Finland and the Russian Federation), and then in the Russian Federation though several lakes (Lake Hympölänjärvi, Lake Karmalanjärvi) into the Tohmajoki River just a few kilometres before the Tohmajoki runs into Lake Ladoga.

35. The river Tohmajoki discharges from Lake Tohmajärvi and runs through Lake Rämeenjärvi (a small lake shared by Finland and the Russian Federation) and the small Russian Pälkjärvi and Ruokojärvi lakes) to Lake Ladoga (Russian Federation) next to the city of Sortavala.

36. For the Kiteenjoki (Kontturi station), the discharge characteristics are as follows: mean annual discharge 3.7 m^3/s, HQ = 14.7 m^3/s, MHQ = 9.54 m^3/s, MNQ = 1.36 m^3/s and NQ = 0.90 m^3/s. These data refer to the period 1991–2000.

[7] Based on information provided by the Finnish Environment Institute (SYKE) and North Karelia Regional Environment Centre.

Pressure factors

37. Lake Tohmajärvi, the outflow of the Tohmajoki River, receives wastewater from the sewage treatment plant of the Tohmajärvi municipality. In the sub-basin of the Kiteenjoki River, the wastewater treatment plant of Kitee discharges its waters into Lake Kiteenjärvi. A small dairy is situated near Lake Hyypii, but its wastewaters are used as sprinkler irrigation for agricultural fields during growing seasons. A small fish farming plant in Paasu was closed down in 2001.

Transboundary impact

38. On the Finnish side, the water quality is assessed as “good” for the Kiteenjoki and due to the humus-rich water “satisfactory” for the Tohmajärvi. The transboundary impact on the Finnish-Russian border is insignificant.

Trends

39. The status of the river has been stable for many years and is expected to remain so.

VI. ASSESSMENT OF THE STATUS OF THE HIITOLANJOKI RIVER[8]

40. Finland (upstream country) and the Russian Federation (downstream country) share the basin of the Hiitolanjoki River, also known as the Kokkolanjoki.

41. On the Russian side, the Hiitolanjoki serves as a natural environment for spawning and reproduction of Lake Ladoga’s unique population of Atlantic salmon.

Basin of the Hiitolanjoki River

Area	Countries	Countries’ share	
1,415 km^2	Finland	1,029 km^2	73%
	Russian Federation	386 km^2	27%

Source: Finnish Environment Institute (SYKE).

Hydrology

42. The Hiitolanjoki has a length of 53 km, of which 8 km are on Finnish territory. Its final recipient is Lake Ladoga (Russian Federation). At the Kangaskoski station (Finland), the mean daily discharges have been varied between 2.2 m^3/s (3 October 1999 and 12 December 2000) and 26.4 m^3/s (23 April 1983 and 22 to 26 May 2005). The mean annual discharge during the recorded period 1982–2005 was 11.3 m^3/s (0.36 km^3/a).

[8] Based on information provided by the Finnish Environment Institute (SYKE).

43. On the Finnish side, there are five sets of rapids of which four have hydropower stations. In the Russian part of the basin there are no power stations.

Pressure factors

44. Urban wastewater, originating in the Finnish municipalities, is being treated at three wastewater treatment plants. Another pressure factor is the M-real Simpele Mill (pulp and paper mill), which is equipped with a biological effluent treatment plant.

45. The amount of wastewater discharged into the Finnish part of the river basin of the Hiitolanjoki River is presented below.

Wastewater discharged to the Hiitolanjoki River basin in Finland

Year	Amount of wastewater (m^3/d)	BOD_7 (t/d)	Suspended solids (t/d)	Nitrogen (kg/d)	Phosphorus (kg/d)
1990–1994	15,880	540	560	85	11.3
1995–1999	13,920	205	243	71	7.0
2000	14,000	181	170	61	4,7
2001	13,900	180	270	62	5.7
2002	14,900	102	141	65	5.4
2003	13,200	84	109	62	5.3
2004	12,000	77	74	63	5.2

46. Felling of trees too close to the river was the reason for the silting of the river bed and disturbs the spawn of the Ladoga salmon on Finnish territory.

47. The relative high mercury content, originating from previously used fungicides, is still a problem for the ecosystem. The mercury content of fish was at its highest at 1970, but it has decreased since then.

Transboundary impact

48. In Finland, the total amounts of wastewater, BOD, suspended solids and phosphorus have been substantially reduced; only the nitrogen discharges remained at the same level. Thus, the water quality is constantly improving and the transboundary impact decreasing.

49. However, eutrophication is still a matter of concern due to the nutrients in the wastewaters and the non-point pollution from agriculture and forestry.

Trends

50. On Finnish territory, water quality in the Hiitolanjoki is assessed as good/moderate. With further planned measures related to wastewater treatment, the quality is expected to increase.

VII. ASSESSMENT OF THE STATUS OF TRANSBOUNDARY WATERS IN THE VUOKSI RIVER BASIN[9]

51. Finland and the Russian Federation share the basin of the Vuoksi River, also known as the Vuoksa. The headwaters are situated in the Russian Federation and discharge to Finland. After leaving Finnish territory, the river runs through the Russian Federation and ends up in Lake Ladoga.

Basin of the Vuoksi River

Area	Countries	Countries' share	
68,501km^2	Finland	52,696 km^2	77%
	Russian Federation	15,805 km^2	23%

Source: Finnish Environment Institute (SYKE).

A. Vuoksi River

Hydrology

52. In the recorded period 1847–2004, the annual mean discharges at the Vuoksi/Tainionkoski station have varied between 220 m^3/s (1942) and 1,160 m^3/s (1899). The mean annual discharge is 684 m^3/s (21.6 km^3/a).

53. There are hydroelectric power plants in Imatra (Finland) as well as Svetogorsk and Lesogorsk (Russian Federation). Thus, the shore areas of the Vuoksi are affected by hydropower production. Although there are no major water-quality problems, the biggest issues are exceptionally low water levels and water level fluctuations.

Pressure factors

54. There are no pressure factors in the area of the headwaters, located in the Russian Federation.

55. In Finland, urban wastewaters are discharged to the river from two cities, Imatra and Joutseno; both cities are equipped with sewage treatment plants.

56. Other pressure factors are wastewater discharges from the Imatra Steel Oy[10] (steel plant, waste water treatment plant), from Stora Enso Oy Imatra (pulp and paper mill, waste water treatment plant), the Metsä-Botnia Oy Joutseno mill (pulp and paper mill, biological treatment plant) and the UPM Kaukas paper mill (pulp and paper mill, biological treatment plant). Due to improved technology and new wastewater treatment plants, the wastewater discharges from the pulp and paper industry have been significantly reduced.

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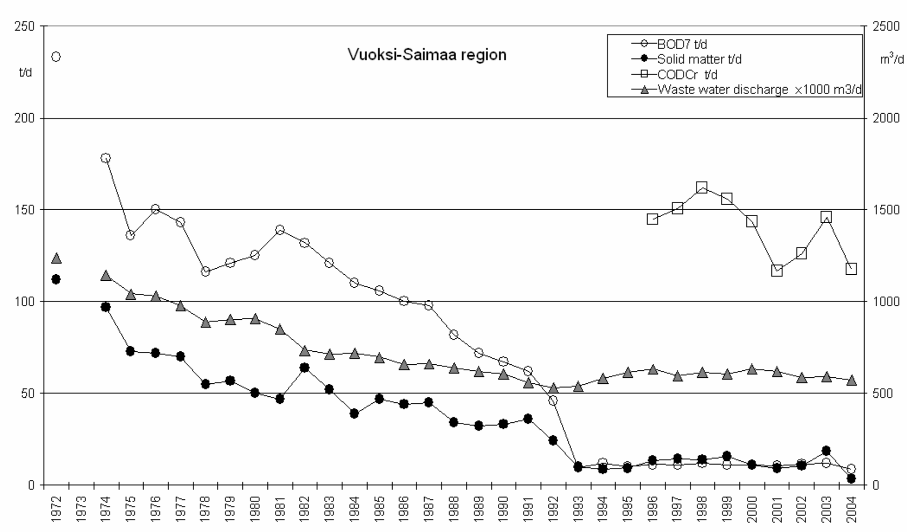
[9] Based on information provided by the Finnish Environment Institute (SYKE).
[10] In Finland, the abbreviation Oyj is used by public companies which are quoted on the Stock Market, and Oy for the other ones.

Total nitrogen and total phosphorus contents in the Vuoksi River					
Determinands	Country	1994–2003			
		n	Minimum	Maximum	Average
Total nitrogen µg/l	FI	120	330	900	452
	RU	116	200	950	453
Total phosphorus µg/l	FI	121	5	24	8.8
	RU	116	<20	91	<20
Abbreviation(s): n means the number of measurements					

Heavy metal contents in the Vuoksi River					
Determinands	Country	1994–2003			
		n	Minimum	Maximum	Average
As µg/l	FI	36	0.12	0.3	0.225
Cd µg/l	FI	28	<0.03	0.05	<0.03
Cr µg/l	FI	28	0.05	0.7	0.439
Cu µg/l	FI	36	0.8	5.08	1.192
Hg µg/l	FI	23	<0.002	0.01	0.003
Ni µg/l	FI	28	0.76	2.8	1.130
Pb µg/l	FI	28	<0.03	0.65	0.104
Zn µg/l	FI	36	1	5.1	2.210
Abbreviation(s): n means the number of measurements					

57. Other smaller industries, settlements, agriculture, the increasing water use for recreation and the rising number of holiday homes pose pressure on the basin and its water resources.

58. The significant reduction of pollution loads (BOD_7, COD_{Cr} and suspended solids) in the lower part of the river basin (Vuoksi-Saimaa area) during the period 1972–2004 is illustrated in the figure below.



Pollution loads in the lower part of the Vuoksi River

Source: Suomen ryhmän ilmoitus vuonna 2004 suoritetuista toimenpiteistä rajavesistöjen veden laadun suojelemiseksi likaantumiselta (Announcement by the Finnish party of Finnish-Russian transboundary water commission of the measures to protect the quality of transboundary waters in year 2004).

Transboundary impact

59. The headwaters in the Vuoksi River basin situated in Russian Federation and discharging to Finland are in natural status.

60. Most of the water-quality problems arise in the southern Finnish part of the river basin, in Lake Saimaa and in the outlet of the river basin. However, in 2004 the water quality of river Vuoksi was classified as "good".

Trends

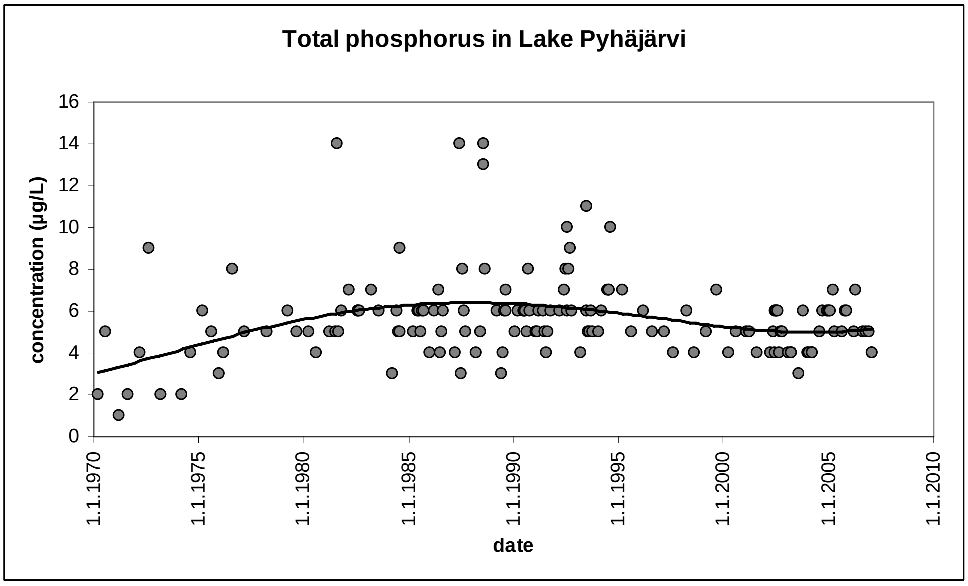
61. The Vuoksi is in good status; it is stable and slightly improving.

B. Lake Pyhäjärvi

62. Lake Pyhäjärvi (total surface area 248 km^2) in Karelia is part of the Vuoksi River basin. The lake is situated in North Karelia approximately 30 km northwest of Lake Ladoga, the largest lake in Europe. Of the total lake surface area, 207 km^2 of Lake Pyhäjärvi lies in Finland and 41 km^2 in the Russian Federation. The drainage basin of the lake is also divided between Finland (804 km^2) and the Russian Federation (215 km^2). The mean depth is 7.9 m on the Finnish side, and 7.0 m on the Russian side, and the maximum depth of the lake is 26 m (on the Finnish side). The theoretical retention time is long, approximately 7.5 years. Almost 83% of the drainage basin on the Finnish side is forested and about 13.5% of covered by arable land. The population density is approximately 9 inhabitants/km^2.

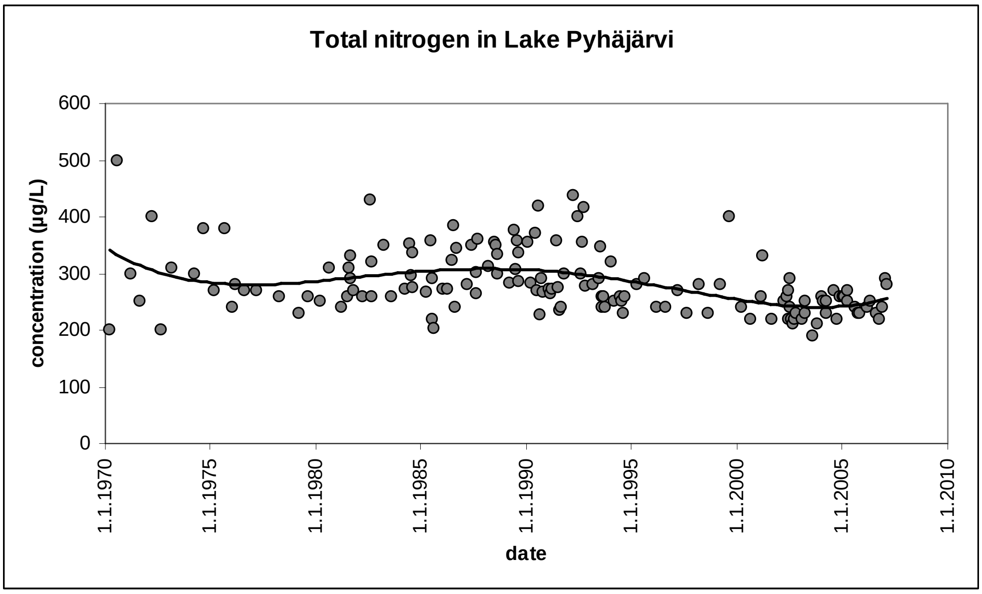
63. Lake Pyhäjärvi is a clear water lake valuable for fishing, recreation, research and nature protection. The anthropogenic impact is evident on the Finnish side, whereas the Russian side is considered almost pristine. The lake has been monitored since the 1970s.

64. The estimated nutrient load into Lake Pyhäjärvi has decreased since 1990. The phosphorus load has decreased by 55% and nitrogen by 12%. In particular, the phosphorus load from point sources has diminished. Some loading sources have closed or are closing. The decrease of phosphorus and nitrogen loading are also reflected as changed nutrient concentrations of the lake.



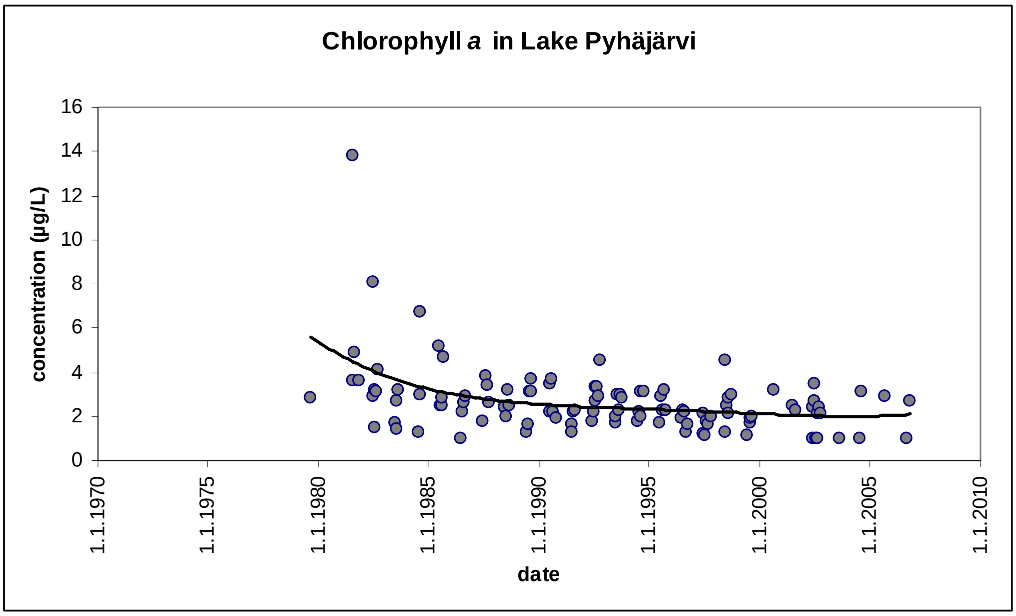
Total phosphorus concentration in the surface layer of Lake Pyhäjärvi in 1970–2006

65. The lake is very vulnerable to environmental changes. Because of the low nutrient status and low humus concentration, an increase in nutrients causes an immediate increase in production, and the long retention time extends the effect of the nutrient load.



Total nitrogen concentration in the surface layer of Lake Pyhäjärvi in 1970–2006

66. The main problem is incipient eutrophication because of non-point and point source loading, especially during the 1990s. However, chlorophyll a has shown a slight decrease during the last years. The overall quality of the lake's water is classified as excellent, although some small areas, subject to more human interference, receive lower ratings.



Chlorophyll α in the surface layer of Lake Pyhäjärvi in 1980–2006

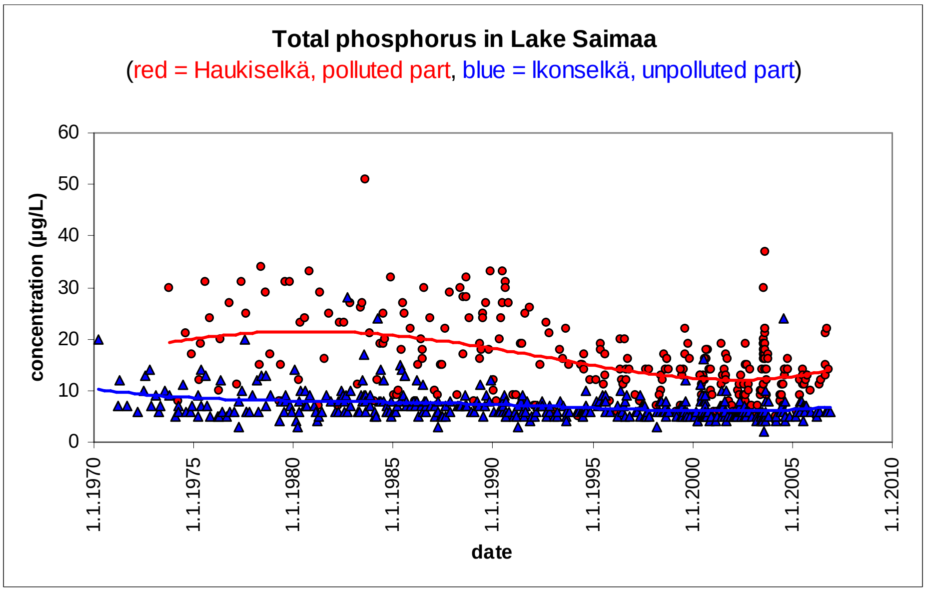
C. Lake Saimaa

67. Lake Saimaa, the largest lake in Finland, is a labyrinthine watercourse that flows slowly from north to south, and finally through its outflow channel (the Vuoksi River) over the Russian

border to Lake Ladoga. Having a 15,000 km long shoreline and 14,000 islands, Lake Saimaa is very suitable for fishing, boating and other recreational activities. The lake is well known for its endangered population of Saimaa ringed seals, one of the world's two freshwater seal species.

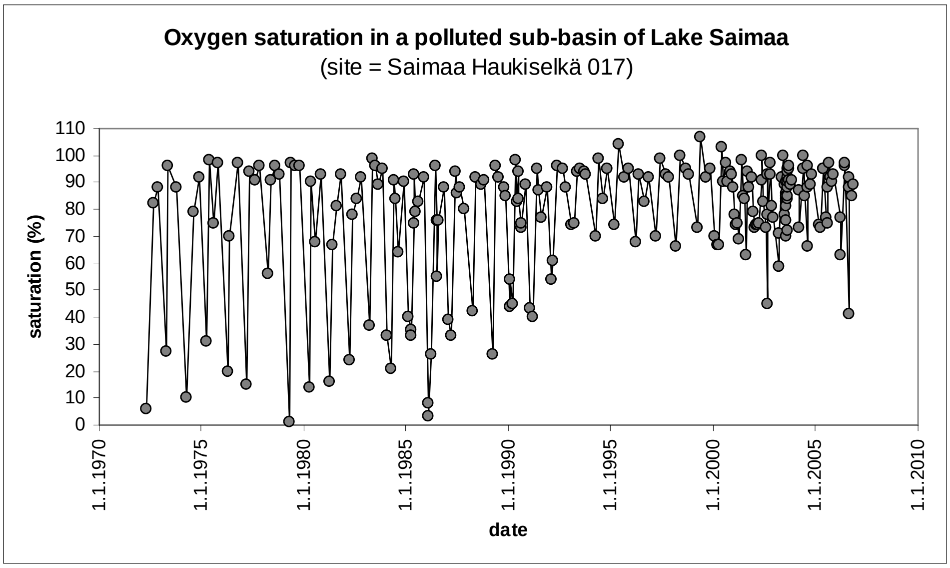
68. Due to its complexity with approximately 120 sub-basins lying on the same water level (76 m above sea level), the definition on what basins are in fact included in Lake Saimaa is not clear. In many cases, "Lake Saimaa" only refers to Lake Southern Saimaa (386 km^2), a smaller part of the entire Lake Saimaa system/Lake Greater Saimaa (4400 km^2). On a broad scale, Lake Saimaa starts from the north-eastern corner of the city of Joensuu in the North Karelia province and from the north-western end of Varkaus. Whatever the definition is, Lake Saimaa is a relatively deep (maximum depth 86 m, mean depth 10 m) and by far the largest and most widely known lake in Finland.

69. The catchment area of the whole Lake Saimaa water system is 61,054 km^2 of which 85% lies in Finland and 15% in the Russian Federation. Even though there are several nationally important cities on the shores of Lake Saimaa in Finland, the main portion of nutrients comes from diffuse sources, especially from agriculture and forestry. In the southernmost part of the lake, the pulp and paper industry has had a pronounced effect on water quality. During the last two decades, however, effective pollution control methods implemented in municipal and industrial wastewater treatment system have substantially improved the quality of the southernmost part of Lake Saimaa substantially. Especially the loading of phosphorus, the algal growth limiting nutrient in the lake, and loading of organic substances has remarkably diminished. Up to the mid-1980s, oxygen saturation was occasionally very low in the bottom layer of the polluted southern sub-basin of the lake; but since then no oxygen deficiency have been recorded. This is especially true for sites close to the pulp and paper mills.



Total phosphorus concentration in polluted (red) and more pristine (blue) sub-basins in the southernmost part of Lake Saimaa in 1970–2006

70. According to the general classification of Finnish surface waters, a major part of Lake Saimaa was in excellent or good condition at the beginning of 2000s. Only some restricted areas close to the pulp and paper mills in the Lappeenranta, Joutseno and Imatra regions were classified as “satisfactory or acceptable in quality”. There is no finalized classification of Lake Saimaa’s ecological status according to the classification requirements set by the Water Framework Directive. However, it is probable that no major changes compared to the general classification are to be expected in the near future.



Oxygen saturation (%) in the near-bottom water of a polluted sub-basin in the southernmost part of Lake Saimaa in 1970–2006

VIII. ASSESSMENT OF THE STATUS OF TRANSBOUNDARY WATERS IN THE JUUSTILANJOKI RIVER BASIN[11]

71. Finland (upstream country) and the Russian Federation (downstream country) share the basin of the Juustilanjoki River.

Basin of the Juustilanjoki River			
Area	Countries	Countries’ share	
296 km^2	Finland	178 km^2	60%
	Russia	118 km^2	40%
Source: www.rajavesikomissio.fi			

[11] Based on information provided by the Finnish Environment Institute (SYKE).

A. Juustilanjoki River

72. On the Finnish side, the Juustilanjoki basin includes the Mustajoki River, the catchment of the Kärkjärvi River and part of the Saimaa canal, including the Soskuanjoki River. The Juustilanjoki has its source in Lappee, runs from the Finnish side through Lake Nuijamaanjärvi south-east to Lake Juustila (Bol'shoye Zvetochnoye[12]) in the Vyborg region (Russian Federation), and discharges to the bay of Vyborg.

73. Random measurements by current meter at the Mustajoki site showed an average discharge of 0.8 m^3/s, and at the Kärkisillanoja site of 0,2 m^3/s.

B. Lake Nuijamaanjärvi

74. Lake Nuijamaanjärvi (total lake surface 7.65 km^2) is part of the Juustilanjoki river basin. The lake is situated south of the Salpausselkä ridge at the border of Finland and the Russian Federation. From the total lake area, 4.92 km^2 are in Finland and 2.73 km^2 in the Russian Federation. The theoretical retention time of the lake is only about 100 days. The population density in the basin area is 24 persons/km^2.

75. It should be noted that the Saimaa canal, an intensively used shipping route from Finland to the Russian Federation, runs from Lake Saimaa (see separate assessment above) and through Lake Nuijamaanjärvi to the Gulf of Finland.

76. Transboundary monitoring has been carried out regularly since the 1960s. The sampling activity in stationary monitoring takes place twice a year (February/March and August), and there are two sampling stations. National transboundary monitoring is carried out once a month at one sampling station.

77. Some 28.2% of the catchment consists of agricultural land. In addition to the impact from agriculture, pollution by the pulp and paper industry affects Lake Nuijamaanjärvi through the Saimaa Canal. However, the Canal's traffic and harbour activity are the most important pressure factors.

78. Eutrophication, caused mainly by nutrient loading from agriculture and the pulp and paper industry, is the most significant water-quality problem of the lake. Since the beginning of 1990s, total nitrogen content has varied from year to year without any clear upward or downward trends, but the total phosphorus content has decreased slightly. The amounts of suspended solids and organic matter have decreased slightly during the last 15 years. The electrical conductivity values have increased slightly. The basic levels of total nitrogen and total phosphorus concentrations suggest that Lake Nuijamaanjärvi is mesotrophic. However, the lake's ecological status is good and the situation is stable.

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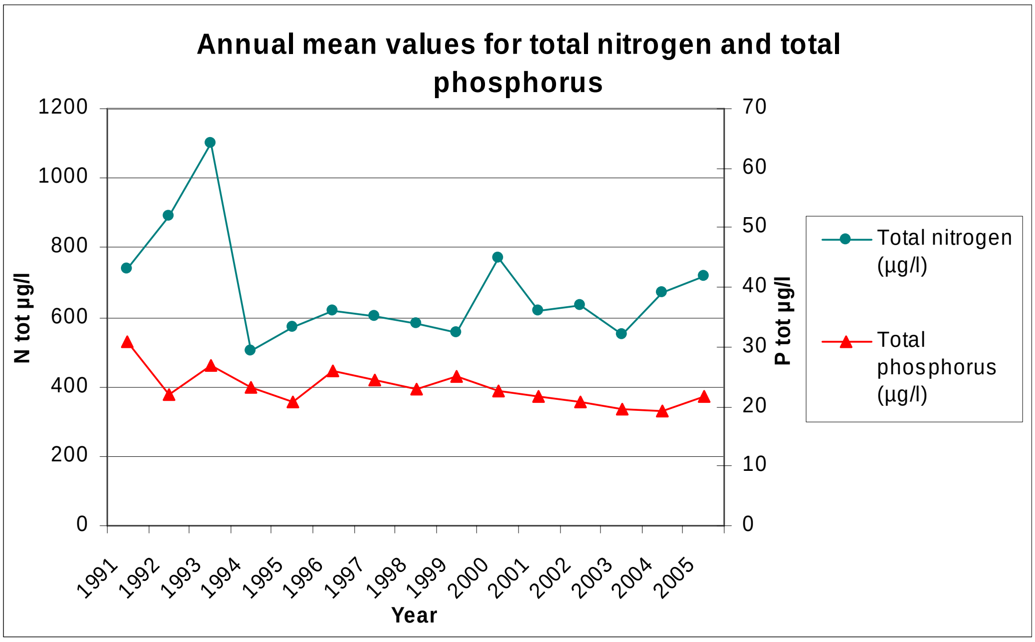
[12] Озеро Большое Цветочное.



Annual mean values for total nitrogen and total phosphorus in Lake Nuijamaanjärvi, the Finnish territory

IX. ASSESSMENT OF THE STATUS OF THE RAKKOLANJOKI RIVER[13]

79. Finland and the Russian Federation share the basin of the Rakkolanjoki River with a total area of only 215 km^2.

Basin of the Rakkolanjoki River			
Area	Countries	Countries' share	
215 km^2	Finland	156 km^2	73%
	Russian Federation	59 km^2	27%
Source: Finnish Environment Institute (SYKE).			

Hydrology

80. The Rakkolanjoki River, a transboundary river in Finland and the Russian Federation, is a tributary of the Hounijoki. The final recipient of the Hounijoki is the Gulf of Finland (Baltic Sea).

81. The mean annual discharge at the border with the Russian Federation is very small (1.3 m^3/s) and varies between 0.2 and 7.4 m^3/s (1989 – 2001).

[13] Based on information provided by the Finnish Environment Institute (SYKE).

Pressure factors

82. The main pollution sources on Finnish territory are treated wastewaters from the town Lappeenranta (40%–60%), agriculture (20%–40%) and natural leaching (15%–20%). Another pressure factor is the limestone industry (Nordkalk OYj, Lappeenranta). The internal load of Lake Haapajärvi also contributes to the pressures; this load originates from nutrients, which have been accumulated during a long period of time.

83. The overall pollution load is too big compared to the size of the watercourse and its run-off. This is one reason for its poor water quality.

Transboundary impact

84. The water quality in the river is poor and there is a significant transboundary impact. Wastewater treatment, although improved over the years, was not yet sufficient enough, and other pollution control measures are needed.

85. There is strong eutrophication in the river.

Trends

86. The poor water quality is a long-lasting problem, and it will take a long time and more effective water protection measures to improve the situation in this relatively small river with a discharge of only 1.3 m^3/s. The Joint Finnish–Russian Commission has emphasized the need for these protection measures.

BOD_7, COD_{Mn}, total nitrogen and total phosphorus contents in the Rakkolanjoki River

Determinands	Country	1994–2003			
		n	Minimum	Maximum	Average
BOD_7 mgO_2/l	FI	118	<3	16	4.2
	RU	94	1.0	13.9	3.8
COD_{Mn} mg/l	FI	120	5.7	33	14.8
	RU	90	5.7	33	16.0
Total nitrogen µg/l	FI	119	1,100	17,000	3,940
	RU	94	500	12,000	2,410
Total phosphorus µg/l	FI	119	53	470	121
	RU	95	24	300	106

Abbreviation(s): n means the number of measurements

Heavy metal contents in the Rakkolanjoki River					
Determinands	Country	1994–2003			
		n	Minimum	Maximum	Average
As µg/l	FI	38	0.40	1.72	0.75
Cd µg/l	FI	30	<0.005	0.05	<0.03
Cr µg/l	FI	30	0.85	4.13	1.98
Cu µg/l	FI	38	<1	7.9	1.81
Hg µg/l	FI	11	<0.002	<0.01	<0.002
Ni µg/l	FI	29	1.48	7.8	2.60
Pb µg/l	FI	30	0.06	1.4	0.40
Zn µg/l	FI	38	0.4	12.8	5.4
Abbreviation(s): n means the number of measurements					

Amount of wastewater discharged to the river basin of the Rakkolanjoki River					
Year	Amount of waste water (m^3/d)	BOD_7 (t/d)	Solid matter (t/d)	Nitrogen (kg/d)	Phosphorus (kg/d)
1990–1994	18,900	140	273	295	6.2
1995–1999	19,500	140	227	321	7.4
2000	16,400	86	80	307	5.3
2001	15,000	130	50	320	7.9
2002	14,300	97	59	300	5.0
2003	13,200	150	51	304	9.6
2004	18,500	122	56	324	6.7

X. ASSESSMENT OF THE STATUS OF THE URPALANJOKI RIVER[14]

87. Finland (upstream country) and the Russian Federation (downstream country) share the basin of the Urpalanjoki River, also known as the Serga River.

Basin of the Urpalanjoki River			
Area	Countries	Countries' share	
557 km^2	Finland	467 km^2	84%
	Russian Federation	90 km^2	16%
Source: Finnish Environment Institute (SYKE).			

[14] Based on information provided by the Finnish Environment Institute (SYKE).

Hydrology

88. The Urpalanjoki River flows from Lake Suuri-Urpalo (Finland) to the Russian Federation and ends up in the Gulf of Finland. Its mean annual discharge at the gauging station in Muurikkala is 3.6 m^3/s (0.11 km^3/a); the discharge maximum and minimum values are: MQ = 3.6 m^3/s; MNQ = 0.9 m^3/s and NQ = 0.23 m^3/s.

89. In the river basin, the Joutsenkoski and the Urpalonjärvi dams regulate the water flow. Altogether there are also 11 drowned weirs.

Pressure factors

90. Agriculture is the most important pressure factor in Urpalanjoki.

91. Currently, urban wastewater is discharged from the municipality of Luumäki (sewage treatment plant of Taavetti with biological/chemical treatment) and the municipality of Luumäki (sewage treatment plant of Jurvala, not operational, see *"Trends"* below). Both wastewater treatment plants are located in Finland.

Transboundary impact

92. In 2004, the river water quality was classified as "moderate (class IV)". The permissible limits of manganese, iron, copper, zinc and phenols were often exceeded. The BOD values were too high and the concentration of dissolved oxygen was too low.

Trends

93. Improvements on the Finnish side are expected: Wastewater treatment is being centralized and made more effective at a wastewater treatment plant at Taavetti and measures are being examined to reduce pollution load from agriculture.
