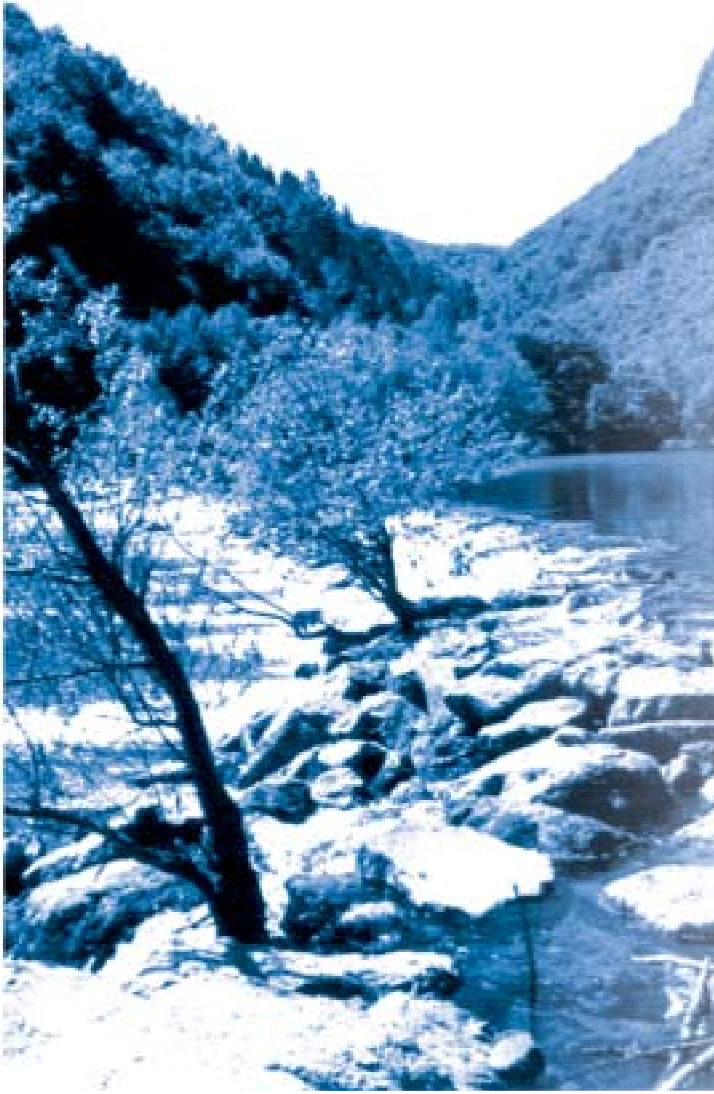
Water Water

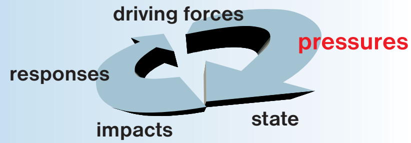


Water, as a natural element, constitutes a condition for the beginning and persistence of life. The quantity of water and the form in which it appears, as well as its temporal distribution affect the diversity of natural animal and plant species, as well as the life of humankind, its prosperity, living patterns and attitude towards aquatic environment. Due to human consumption, the water resources are subject to quantity changes, while due to natural factors and various human activities, they are also subject to quality changes.

Irrespective of the fact that there exist large quantities of available water in Slovenia, i.e. in comparison with the quantities of water used, human attitude towards water and the aquatic environment still does not reflect a sufficient understanding of the consequences of human actions. The latter contribute to the increased burdening of all types of water resources, i.e. running water and groundwater, lakes and the sea. Agriculture, as the main dispersed source of pollution, is a great introducer of nutritional and hazardous substances into water. In addition to this activity, the more important emitters are also point sources from industry and certain households which, to a considerable degree, still do not dispose with a proper waste water treatment system.

As a consequence of all these effects, the quality of water resources deteriorates. In 2002, almost 30 % of all assessed watercourses in Slovenia were still classified into the two most unfavourable quality classes, however, an improving trend has been perceived in the last decade. Concerning groundwater as an important source of drinking water, the threshold values for pesticides and nitrates were exceeded predominantly in the North-East of Slovenia. As regards the sea, nutritional substances, chlorophyll and cadmium constitute a core problem. In recent years, two bigger lakes demonstrated a reducing trend in pollutants, as well as an improving trend in the quality and transparency of water, which is the result of remedial actions, in particular in the area of sewage system.

To ensure sustainable protection and use of water resources, the Government will have to introduce the most appropriate water management at both the ecosystem and economic levels as well as observing the fact that water represents a determining factor for sustainable development.



20. USE OF WATER RESOURCES

The water exploitation index describes how the overall required amount of water exerts pressure on the available amount of water. The index is determined as the ratio between the mean total annual quantity of consumed water and the long-term average of available water. The users of water are grouped into sectors, which are determined according to the method of water supply and the records deriving therefrom: public water supply (households and public institutions), agriculture (irrigation), industry (industrial facilities, health resorts), and energy (cooling water for thermal and nuclear power stations).

Figure 20-1: Water exploitation index in Slovenia by sector according to the available amount of water

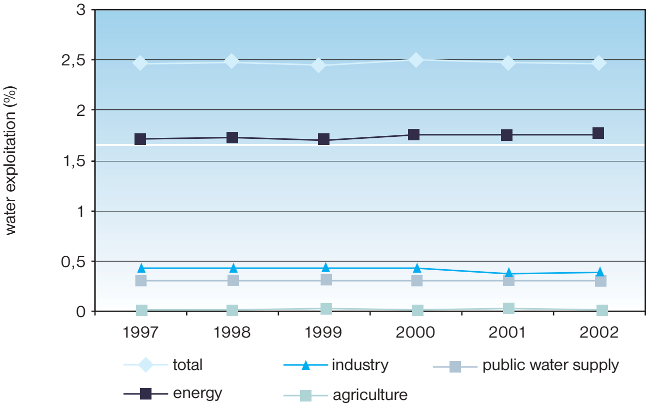
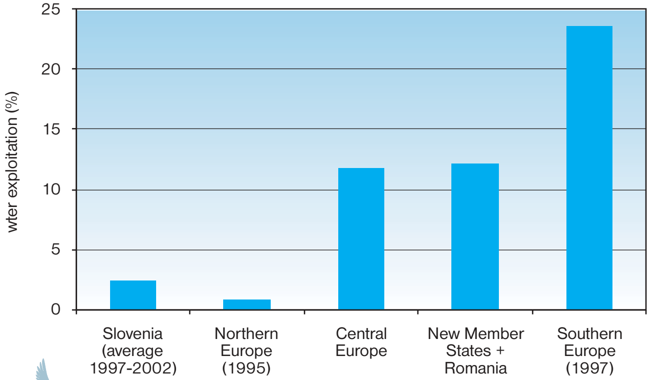


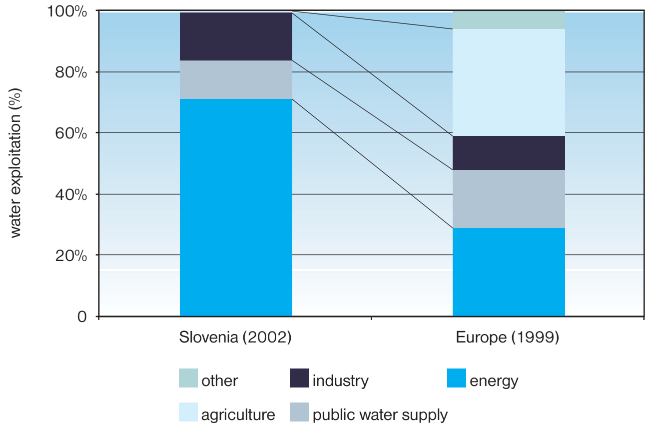
Figure 20-2: Water exploitation index in Slovenia and European regions



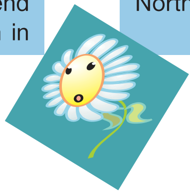
GOAL

The National Environmental Action Programme indicates the abundance of water as one of the greatest comparative advantages of Slovenia and as a determinant factor for sustainable development which requires optimum management. One of the aims of the Water Framework Directive 2000/60/EC is also the promotion of such use of water that in the long term will protect available water resources and ensure their good status. The Sixth EU Environmental Action Programme (2001-2010) focuses on reduced consumption of raw materials in production and supply, respectively, of goods and services. Since water is also considered to be a raw material, more efficient use of water should be encouraged according to the principle that an abundance of the resource can sustain exploitation. In order to achieve this goal, we must implement measures for more efficient water use in all sectors, at the national, regional and local levels. Under the Water Framework Directive, an economic analysis of water use at the catchment area level must be taken into consideration with a view to ensuring efficient exploitation of water. Equally, the Member States must take into account the principle of reimbursing the costs of the public services operating in the water sector and the costs of protecting the environment and water resources.

Figure 20-3: Structure of water use by sector in Slovenia in 2002 and in Europe in 1999



In the period under review (1997-2002), the water use index has shown practically no change, since in comparison with what is consumed, available water is plentiful in Slovenia. The share of consumed water amounted to 2.5 %. The biggest consumer of water in this period was the energy sector with 70.9 %. The industry and public water supply sectors consumed 28.4 % (83.5%) of the total amount of water used, while the smallest share, i.e. 0.7 %, was consumed by agriculture. Given the trend in annually available water, which indicates a reduction in the available annual quantities of water and appearance of excessive precipitation in those periods of the year that are unfavourable for use in individual sectors (presumably as a result of climate change), we may presume that the share of water use will increase in the coming period. In terms of annual consumption of water, Slovenia ranks among the European countries with the lowest water use, an even lower water use rate appearing only in the countries of the Northern Europe.



DATA AND SOURCES

Table 20-1: Water exploitation index in Slovenia by sector according to the available amount of water
Source: Hydrological Databank, Environmental Agency of the Republic of Slovenia, 2002; Statistical Office of the Republic of Slovenia, 2003; Database of Water Fees, Taxes and Concessions, Environmental Agency of the Republic of Slovenia, 2003

sector	unit	1997	1998	1999	2000	2001	2002
energy	%	1.72	1.73	1.7	1.75	1.75	1.75
industry	%	0.43	0.43	0.43	0.43	0.38	0.39
public water supply	%	0.30	0.3	0.3	0.31	0.31	0.31
agriculture	%	0.01	0.02	0.03	0.02	0.03	0.02
total	%	2.46	2.47	2.45	2.5	2.47	2.46

Table 20-3: Structure of water use by sector in Slovenia in 2002 and in Europe in 1999
Source: data for Slovenia: Hydrological Databank, Environmental Agency of the Republic of Slovenia, 2002; Statistical Office of the Republic of Slovenia, 2003; Database of Water Fees, Taxes and Concessions, Environmental Agency of the Republic of Slovenia, 2003; data for Europe: Water Exploitation, Indicator Fact Sheet. European Environment Agency, 2002

sector	unit	Slovenia (2002)	Europe (1999)
energy	%	70.93	29
industry	%	15.86	11
public water supply	%	12.55	119
agriculture	%	0.66	35
other	%	0	6

Table 20-2: Water exploitation index in Slovenia and European regions
Source: data for Slovenia: Hydrological Databank, Environmental Agency of the Republic of Slovenia, 2002; Statistical Office of the Republic of Slovenia, 2002, 2003; Database of Water Fees, Taxes and Concessions, Environmental Agency of the Republic of Slovenia, 2003; data for Europe: Water Exploitation, Indicator Fact Sheet. European Environment Agency, 2002

	unit	Slovenia (average 1997–2002)	Northern Europe (1995)	Central Europe (1997)	New Member States+ Romania (1997)	Southern Europe (1997)
water exploitation	%	2.47	0.88	11.8	12.1	23.5

Data for Slovenia

In the period from 1961 to 2000, the long-term average quantity of available water (Q; in m^3/s) in Slovenia constituted 32 147 million m^3/year. The long-term average quantity is determined as the mean value of annual quantities Q = O + I:

- O (outflow) is the average annual quantity of water flowing out of the country, and

- I (loss) is the average annual quantity of water which in the annual cycle does not flow out of the country, or is not returned to the water cycle at the point of abstraction, and is not included in the O outflow.

Given the negligible losses, the average annual quantity of available water determined in this way (Q) is comparable with the available quantity of water determined according to the balance sheet method (Q = P (precipitation) – E (evapotranspiration) + D (inflow into the country)).

The data on the long-term average quantity of available water derive from the state monitoring service for measuring, observing and determining basic hydrological parameters (Environmental Agency of the Republic of Slovenia). The data on the gauge heights are recorded continuously (hourly and daily values) and enable the determination of hourly and daily flow rates. Hydrometric measurements in profiles are carried out in compliance with international standards approximately 6 times a year. The state monitoring service monitors the basic hydrological parameters (quantity of water, its distribution in time and space) and the water regime, as well as drawing attention to extraordinary hydrological phenomena and so forth. In compliance with international hydrological standards (WMO, World Meteorological Organization) and the actual conditions, water measuring stations cover approximately 18,000 km^2 of the national territory. On average, one water measuring station covers approximately 120 km^2 of the national territory. The aggregation of data for the national territory requires an estimate for those areas that are not covered by the water measuring stations (approximately 1800 km^2 or 10 % of the territory of the Republic of Slovenia).

Our assessment is that the data on flow rates may deviate from the actual values by +/- 5 %. One weakness in estimating the datum on the average annual quantity of available water for the country as a whole also stems from the fact that water measuring stations do not cover the entire territory, for which reason the quantity for a part of the territory is only an estimate.

The quality of the datum assessed for the parts of the territory without water measuring stations is not known. The data on flow rates at water measuring stations are not compared and harmonised with the meteorological data on precipitation and evapotranspiration.

The data on flow rates are maintained in the Hydrological Databank (BHP) at the national Environment Agency as mean daily flow rates expressed in cubic meters per second (m^3/s).

The data on water use derive from two sources: statistical records on the consumption of water for irrigation in Slovenia, Statistical Office of the Republic of Slovenia (Statistical Office of the Republic of Slovenia), and the Database of Water Fees, Taxes and Concessions (Environmental Agency of the Republic of Slovenia). On the basis of the Water Act (OJ RS No 67/02) and the Decree on the Water Fee (OJ RS No 41/95, 84/97, 124/00, 110/01), the Database of Water Fees, Taxes and Concessions is being maintained by virtue of declarations of the bases for calculating water fees. The persons liable are municipal water supply companies, industrial plants and facilities. The data in the database relate to the period from 1997 to 2002. The new Decree on the Water Fee (OJ RS No 103/02) binds certain other water users to make declarations also.

Data for Europe

The European countries (for which the data are available) are grouped into the following regions:

- Central Europe: Austria, Belgium, Denmark, Germany, Ireland, Luxembourg, Netherlands, United Kingdom (England and Wales only),

- Northern Europe: Finland, Iceland, Norway, Sweden,

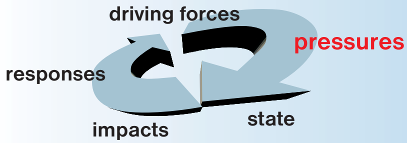
- Southern Europe: France, Greece, Italy, Portugal, Spain,

- New Member States: Czech Republic, Lithuania, Malta, Poland, Slovakia and Slovenia.

The data on quantities of water consumed in individual sectors by individual country in the last year for which data were available are pooled together and compared with the total quantity of water consumed in Europe.

The source of data is Water Exploitation, Indicator fact sheet. European Environment Agency, 2002.

The original data used in the indicator fact sheet are from the Eurostat New Cronos Database (Eurostat-OECD JQ 2000), the EEA data warehouse (as at 26 July 2002) and the OECD Environmental Data Compendium, 1999. The data were gathered using the so-called Joint Questionnaires (JQ 2000), which Eurostat and the OECD provide to countries (national statistical offices) every two years.

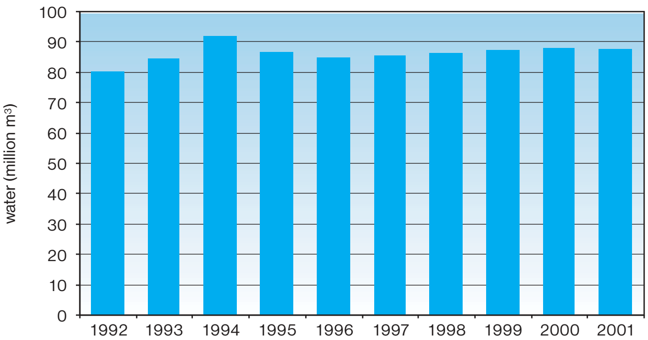


21. HOUSEHOLD WATER CONSUMPTION

Household water consumption is normally based on the anticipated average consumption of water from public water supply and is most frequently expressed in consumption per household or capita (depending on the source of data). Various sources use different methodologies for assessment and sometimes the data are not always available.
Drinking water is water that by its microbiological, physical, chemical and radioactive properties meets the criteria prescribed by the Rules on hygienic suitability of water. Hygienically safe water is used for the public supply of population and the production of foodstuffs intended for sale.

GOAL
The 2002 Report on the State of the Environment sets the establishment of a more efficient use of water, and thereby the carrying out of equilibration between the abstraction and replenishment of groundwater as a primary source of drinking water, as the basic objective concerning the use of water resources. The Water Act (OJ RS No 67/2002) among other things requires long-term protection of available water resources.

Figure 21-1: Water supplied to households from public water supply network



The trend of annual potentially available water is decreasing. The main source of drinking water is groundwater, while surface waters are used primarily for technological needs. The spatial distribution of groundwater reserves is uneven. In line with the records on water fees, 70 % of water is consumed in the form of cooling water, 16 % in the form of drinking water and 14 % in the form of process water.
A typical distribution of drinking water consumption in households is as follows: bathing and washing 32 % (approximately 50 l), toilets 32 % (45 l), laundering 14 % (20 l), washing 7 % (10 l), watering and other 7 % (10 l), cleaning 4 % (6 l), cooking 4 % (5 l). The total amounts to an average of 146 l of drinking water per capita in a single day. By employing more efficient water consumption, it would be possible to decrease the quantity of water used by at least one third. The effect would be even greater if we used rain water for certain types of consumption (toilets, laundering, cleaning, washing, watering and other).
The consumption of drinking water in households is constantly increasing. In the period from 1992 to 2001, it has increased on average by 8 %. In the past, the loss of water in the public water supply network was attributed to increased consumption; however, the data show (Statistical Yearbook) that the losses of water in the water supply network are decreasing.
Among European countries, Spain holds the greatest share in the consumption of water in households, i.e. 265 l/capita/day, followed by Norway (224 l/capita/day), Netherlands (218 l) and France (164 l). The lowest rate of consumption was perceived in two Baltic countries, Lithuania and Estonia with 85 and 100, respectively, l/capita/day, and Belgium consumes 115 l/capita/day. It is generally recognized that the Western European countries consume more water in households per capita than the new member states which is the result of institutional and economic changes.

DATA AND SOURCES:

Table 21-1: Water supplied to households from public water supply network
Source: Statistical Yearbook of the RS 1995, 1998, 2003, Statistical Office of the Republic of Slovenia

	unit	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Water for households from public water supply	million m^3	80 326	84 496	91 765	86 475	84 824	85 625	86 122	87 178	87 968	87 684
Water for households from public water supply	index (1992 = 100)	100	105	114	108	106	107	107	109	110	109

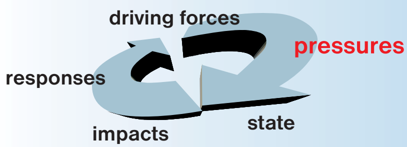
Statistical Yearbook of the Republic of Slovenia 1995, 1998, 2003, Statistical Office of the Republic of Slovenia.

The Statistical Office of the Republic of Slovenia collects data on the water sector through annual reports submitted by companies and organizations from the areas of processing industry, mining, agriculture and fishery, forestry, water sector and housing-municipal activities, and by local communities managing public water supply and public sewage system.

The basis for all the data are the measurements of water meters installed at water sources and in production devices. Where there are no water meters, quantities of recovered water are estimated on the basis of standards of individual branches of activities, on the basis of the core project, working hours and water pump capacity, and on the basis of expert assessments.

Environment in Slovenia 2002, Ministry of the Environment, Spatial Planning and Energy

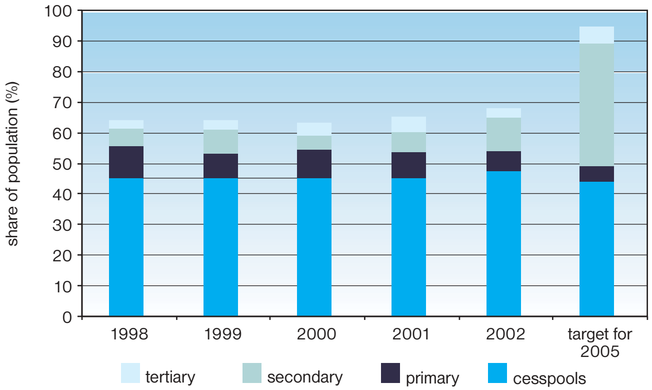
Household Water Consumption in Selected Countries, Indicator Fact Sheet, European Environmental Agency, 1999



22. WASTE WATER TREATMENT

This indicator shows the quantity of urban waste water and the share of population whose urban waste water is treated in waste water treatment plants classified according to the level of treatment under the methodology determined in the EC Council Directive 91/271/EEC Concerning Urban Waste Water Treatment. This methodology is also adopted in the Slovenian Decree on the Emission of Substances in Waste Water Discharged from Urban Waste Water Treatment Plants (OJ RS No 35/96, 90/98, 31/01, 62/01). The methodology determines that primary treatment is treatement of urban waste water by physical and/or chemical process involving settlement of suspended solids or other processes in which the BOD5 of the incoming waste water is reduced by at least 20% before discharge and the total suspended solids of the incoming waste water are reduced by at least 50%. Secondary treatment means treatment of urban waste water by a process generally involving biological treatment with a secondary settlement or other process in a major portion of the organic loading and part (20 % - 30 %) of the nutrient loading are removed. Tertiary treatment is treatment in which, in addition to the organic loading, a major portion of the nutrient loading is also removed.

Figure 22-1: Share of Slovenian population whose urban waste water was treated, in individual years, in urban or common waste water treatment plants of a certain treatment level and cesspools, respectively, and the target share envisaged for 2005



GOAL

The National Environmental Action Programme which assumes the objectives of the EC Council Directive 91/271/EEC Concerning Urban Waste Water Treatment provides for a gradual upgrading and construction of new waste water treatment facilities for all agglomerations with more than 2000 inhabitants. The targets which the EU seeks to attain in the area of urban waste water treatment are set out in the Council Directive on urban waste water treatment. In their pre-accession negotiations with the EU in this area Slovenian negotiators were able to secure an agreement guaranteeing that Slovenia would meet these targets with a certain deferment. This is primarily a consequence of the fact that in order to reach the targets set out by the Council Directive on urban waste water treatment Slovenia would need major financial input and time to build the infrastructure. In Slovenia, the targets for this area are noted in the Decree on the Emission of Substances in Waste Water Discharged from Urban Waste Water Treatment Plants (OJ RS No 35/96, 90/98, 31/01, 62/01), which sets out precisely by which year we will construct the necessary treatment facilities in specific agglomerations. These targets are operationalized in the Ordinance on the Operational Programme for Urban Waste Water Drainage and Treatment with the Programme of Water Supply Projects (OJ RS No 94-4485/1999). This document also contains a precise definition as to which treatment facilities will be constructed/upgraded, under what timetables and how much financial input will be needed.

Figure 22-2: Quantity (in million m³/year) of waste water treated in urban or common waste water treatment plants of a certain treatment level and cesspools, respectively, and the target share envisaged for 2005

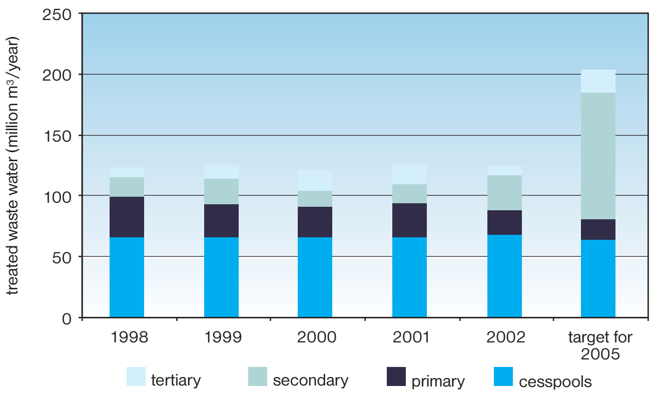
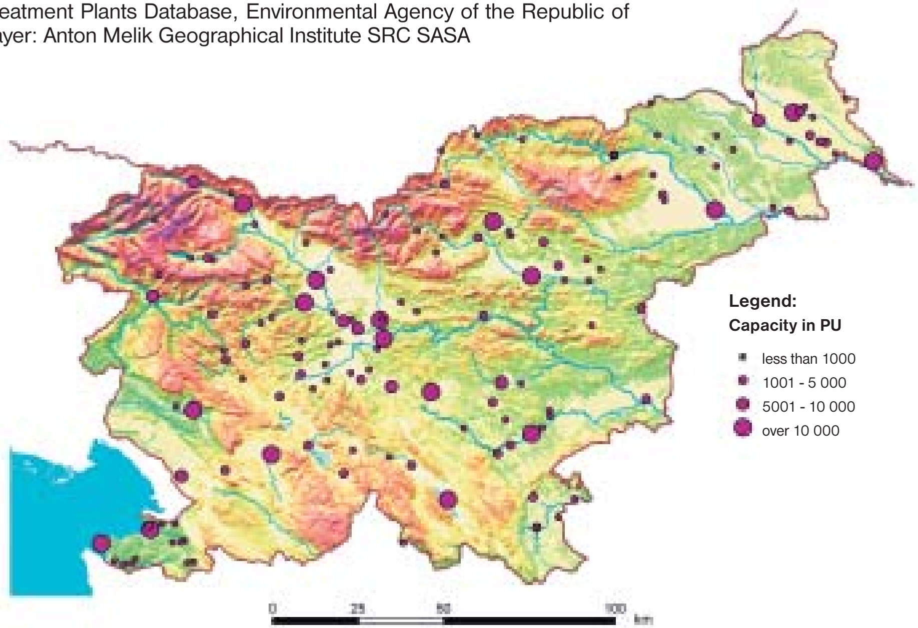


Figure 22-3: Urban or common waste water treatment plants
Source: Waste Water Treatment Plants Database, Environmental Agency of the Republic of Slovenia, 2003; basic layer: Anton Melik Geographical Institute SRC SASA



The Operational Programme is being implemented according to the envisaged plan. In illustration of its effects, figures 22-1 and 22-2 represent the envisaged situation in the area of waste water treatment in 2005, when the programme will already be partly carried out. By that time, we envisage the construction of the majority of larger treatment facilities, so that the share of treated waste water will increase significantly in comparison with the current situation. After 2006, only smaller treatment facilities will be constructed and no major increase in the share of treated waste water can be expected thereafter.

DATA AND SOURCES

Table 22-1: Share of Slovenian population whose urban waste water was treated, in individual years, in urban or common waste water treatment plants of a certain treatment level and cesspools, respectively, and the target share envisaged for 2005
Source: Waste Water Treatment Plants Database, Environmental Agency of the Republic of Slovenia, 2003; expert assessment

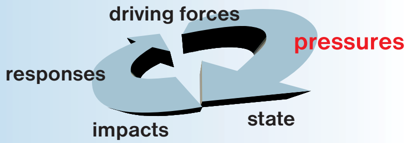
level of treatement	unit	1998	1999	2000	2001	2002	target for 2005
cesspools	%	45.0	45.0	45.0	45.0	47.6	44.0
primary	%	10.5	8.4	9.3	8.7	6.3	5.1
secondary	%	5.9	7.6	4.7	6.7	11.2	40.2
tertiary	%	2.6	3.2	4.5	5.0	3.0	5.2

Table 22-2: Quantity (in million m^3/year) of waste water treated in urban or common waste water treatment plants of a certain treatment level and cesspools, respectively, and the target share envisaged for 2005
Source: Waste Water Treatment Plants Database, Environmental Agency of the Republic of Slovenia, 2003; expert assessment

level of treatement	unit	1998	1999	2000	2001	2002	target for 2005
cesspools	million m^3/year	65.7	65.7	65.7	65.7	67.4	64.2
primary	million m^3/year	33.6	27.7	25.7	28.1	20.6	16.6
secondary	million m^3/year	15.5	20.8	12.6	15.5	28.7	103.8
tertiary	million m^3/year	7.4	10.9	17.0	16.0	8.1	18.6

The data on the quantities of treated water (with the exception of the data on cesspool treatment) and the population data are taken from reports on operational monitoring of urban and common waste water treatment plants. The obligation to perform monitoring of treatment facilities and issue reports on monitoring is defined in Article 24 of the Decree on the Emission of Substances and Heat in the Discharge of Waste Water from Pollution Sources (OJ RS No 35/96). The actual form of treatment facility monitoring is defined in the Rules on Initial Measurements and Operational Monitoring of Waste Water and on Conditions for their Implementation (OJ RS No 35/96, 29/00, 106/01). The data are collected in written and electronic forms. They are processed in the Waste Water Treatment Plants Database at Environmental Agency of the Republic of Slovenia.

According to the 1996 Report on the State of the Environment in Slovenia, 45 % of the population were served by cesspools. The datum showing that in 2002 47.6 % of the population were served by cesspools is taken from the data of the Statistical Office of the Republic of Slovenia. We estimated the quantity of waste water produced in water treatment via cesspools at 0.2 m^3/day per population unit, i.e. for 900 000 people 65 700 *1000 m^3/year and for 923 300 people 67 400 *1000 m^3/year, respectively.



23. ACCIDENTAL OIL TANKER SPILLS

This indicator shows the annual number of pollution incidences at sea in Slovenia which were reported to the Office for the Protection of Coastal Waters according to the identified polluter and type of pollutant (oil or other).

Under the indicator methodology, as shown by the EEA (Indicator Fact Sheet – 41a: Accidental oil tanker spills), Slovenia is below the detection limit as regards sea pollution resulting from accidental oil tanker spills exceeding the quantity of 7 tons, for which reason international comparability for this indicator is presently not relevant.

GOAL

One of the fundamental objectives is the improvement of prevention and intervention action plans for cases of sea accidents resulting in pollution. For this reason, it is necessary to ensure efficient equipment and, if requisite, upgrade cooperation with the neighbouring maritime countries. This is provided for by the International Maritime Organisation (IMO) and conventions concerning marine protection against pollution, safety in maritime transport, prevention of pollution from ships (International Convention for the Prevention of Pollution from Ships as amended by the Protocol relating thereto (MARPOL 73/78)), readiness and responsiveness in cases of pollution, as well as responsibility and amount of compensation for the damage resulting from pollution. The Protocol Concerning Cooperation in Combating Pollution of the Mediterranean Sea by Dumping from Ships and in Cases of Emergency is currently under the ratification procedure. The International Convention on Readiness, Response and Cooperation in Cases of Oil Spills 1990 (OJ RS – International Agreements, No 9/01) is already ratified. Since June 2003, the control of navigation under the mandatory ship reporting system and the vigilance service at the competent Maritime Directorate of the Republic of Slovenia are being implemented which attests to successful integration of environmental protection into sector policies.

Figure 23-1: Number of reported pollutions at sea in Slovenia with identified and unidentified polluters in the period from 1977 to 2002

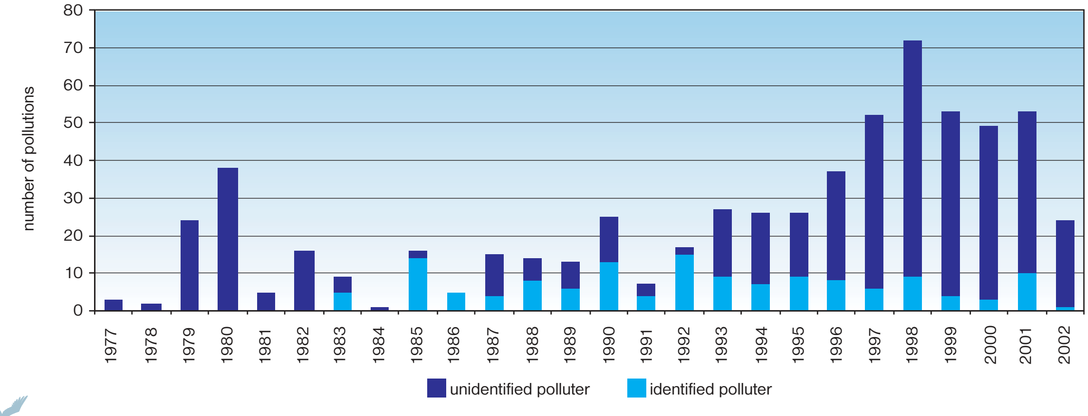
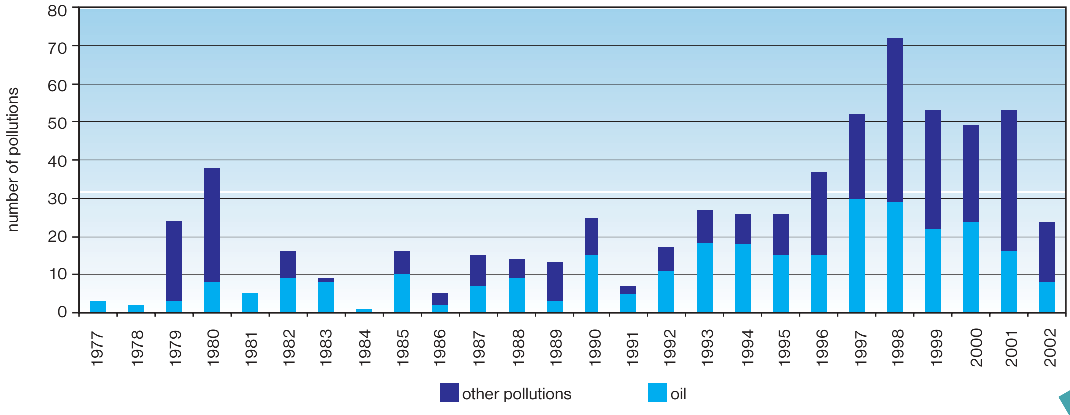


Figure 23-2: Number of reported sea pollutions by oil and/or other sources in Slovenia in the period from 1977 to 2002



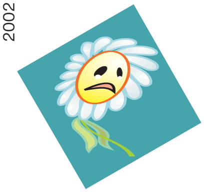


Figure 23-1 shows that in the period from 1977 to 2002, the Office for the Protection of Coastal Waters (OPCW) acted in 629 cases, of which 296 were pollutions by oil. Polluters were identified in 140 cases, while in 489 cases the polluters remained unidentified.

It is evident from the graphic representation that a slight increase in the number of reported pollutions occurred in the period from 1992 to 2002, which fact is difficult to comment upon due to the insufficient database. Greater awareness of people reporting such incidences and most likely the increase in the number of registered smaller boats intended for recreation (approximately 9000 registered boats in Slovenia) also partly contributed to this fact.

The indicated data and facts, as regards actual cases of spills below the detection limit of the EU standard by no means attest to the fact that pollution by spills exceeding 7 tons is not possible in Slovenia or in the immediate vicinity of the Slovenian sea. Namely, the north Adriatic sea is becoming, globally speaking, one of the most important waterways for oil and its derivatives and other more or less hazardous substances. This also represents a high risk for our sea, i.e. in view of the potential greater sudden oil or oil derivative spills.

Should greater quantities of oil or oil derivatives spill into our sea we would witness a rapid spread of pollution to crucial parts of the sea and coast-line i.e. upon momentarily inadequate equipment of the OPCW. Due to the closed nature and shallow waters of our sea as well as geomorphological diversity of the coast-line, the cleaning and remedying of consequences of pollution in the aforementioned areas would constitute a very difficult task and the economic and ecological damage to the sea and the coast would be enormous.

Concerning events of major spills, interstate activities (in Slovenia, Italy, and Croatia) for preparing a joint action plan for major spill events resulting from accidents in the north Adriatic sea are underway. These are being coordinated and implemented under expert guidance by the Regional Marine Pollution Emergency Response Centre for Mediterranean Sea (REMPEC) in Malta.

DATA AND SOURCES

Table 23-1: Number of reported pollutions at sea in Slovenia with identified and unidentified polluters in the period from 1977 to 2002
Source: Data of the Office for the Protection of Coastal Waters (OPCW), 2003

	unit	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
polluter identified	number	0	0	0	0	0	0	5	0	14	5	4	8	6
polluter unidentified	number	3	2	24	38	5	16	4	1	2	0	11	6	7

	unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
polluter identified	number	13	4	15	9	7	9	8	6	9	4	3	10	1
polluter unidentified	number	12	3	2	18	19	17	29	46	63	49	46	43	23

Table 23-2: Number of reported sea pollutions by oil and/or other sources in Slovenia in the period from 1977 to 2002
Source: Data of the Office for the Protection of Coastal Waters (OPCW), 2003

type of pollution	unit	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
oil	number	3	2	3	8	5	9	8	1	10	2	7	9	3
other pollution	number	0	0	21	30	0	7	1	0	6	3	8	5	10

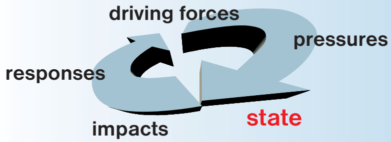
type of pollution	unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
oil	number	15	5	11	18	18	15	15	30	29	22	24	16	8
other pollution	number	10	2	6	9	8	11	22	22	43	31	25	37	16

The data are taken from the Tabular review of pollutions taken from monthly reports on the work of the Office for the Protection of Coastal Waters (OPCW), Koper.

The collection of data was carried out in the event of individual incidences with a view to keep an internal record for the needs of the OPCW. According to the aforestated, the existing data are insufficient and can serve only for orientation. Irrespective of the fact that the data do not contain weighted quantities (tons, m^2 …) for individual incidents it may be deduced from individual reports that so far there have been no incidences resulting in spills exceeding the quantity of 7 tons of oil (therefore, this fact was taken into consideration). Despite great shortcomings the data clearly show the number of incidences by years, the number of oil pollutions and other, as well as identified or unidentified polluters.

Irrespective of the quality of the existing data source it may be assumed that illegal discharges of smaller quantities of oil (oil derivatives which are not readily degradable) into the sea are predominant in Slovenia. Taking into account the total number of noted and reported incidences we may assume that these pollutions, according to all the characteristics of our sea (semi-closed, shallow bay, relatively small volume, great impact of climate factors and poor exchange of water mass …), have considerable negative effects on marine environment, in particular in comparison with open seas.

This fact dictates the need for the establishment of a system for detection and thereby the forming of an appropriate database for the following-up of related indicators from the area of transport whose target is to eliminate pollutions by non-readily degradable oils and prohibit their discharge. Namely, in addition to shipping, boats contribute an important share of smaller, illegal spills of oil into the marine environment, predominantly in the summer-time period.



24. RIVER BALANCE

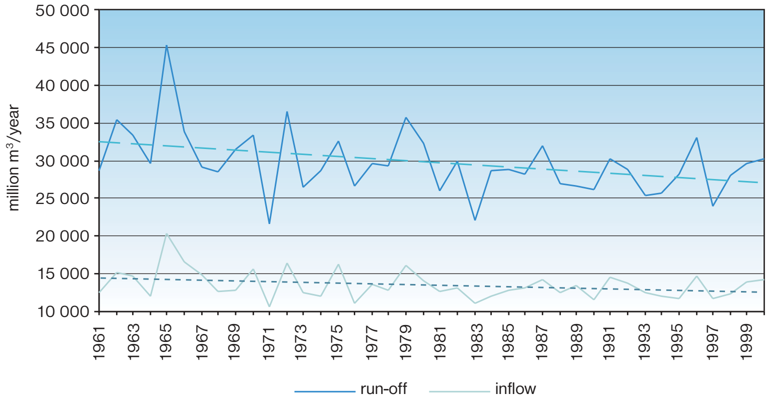
This indicator shows the annual river balance of the Republic of Slovenia as a whole. The balance is composed of the river water inflow and run-off expressed in million m^3/year. Both elements are calculated on the basis of mean annual discharge (flow, Qs) of the water measuring stations catching the majority of inflow and run-off of river water in and from Slovenia. The balance of the river flow rates in Slovenia represents one of the fundamental and more dynamic elements of the Slovenian water balance which is also composed of precipitation, evaporation, changes in groundwater reserves and water use. Discharge measurements are reliable and have a certain tradition, so that a longer temporal frame of comparable data is available for them. Upon accurate assessment of immediate anthropogenic effects on the river regime, the river balance may serve as a good indicator for the assessment of (potential) effects of climate changes on the quantities of available water.

GOAL

The National Environmental Action Programme indicates the abundance of water as one of the greatest comparative advantages of Slovenia and as a decisive factor for sustainable development which requires optimum management. The Water Framework Directive 2000/60/EC also sets as one of its objectives the promotion of such use of water that in the long term will protect available water resources, and indirectly also as harmonious a river balance as possible.

WATER

Figure 24-1: River balance (inflow - run-off) of Slovenia in the period from 1961 to 2000



Due to a rather high annual variability of river discharges, a longer temporal data frame is appropriate for trend assessment. According to the operating of the observed water gauging stations, we find as the most appropriate the frame which begins with the year 1961 and ends with 2000. When taking account of the entire frame of data (1961-2000) or a thirty-year period (1971-2000), the decreasing trend in river run-off is rather obvious, however, if we take account only of the period from 1981 to 2000, the trend is barely detectable. Indirectly, the annual river run-off trends also recall the increase or decrease in the probability of low water (droughts) and flood hazard occurrences. However, the annual river run-off trends do not always correspond to trends of high or low water.

DATA AND SOURCES:

Table 24-1: River balance (inflow - run-off) of Slovenia in the period from 1961 to 2000
Source: Hydrological Databank, Environmental Agency of the Republic of Slovenia, 2003

		1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
inflow	million m^3/year	12 453	15 163	14 629	11 969	20 300	16 564	14 929	12 715	12 858	15 595	10 553	16 409	12 512	12 081
run-off	million m^3/year	28 699	35 475	33 294	29 531	45 265	33 854	29 115	28 472	31 449	33 382	21 601	36 552	26 541	28 743

		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
inflow	million m^3/year	16 325	11 028	13 551	12 898	16 075	14 103	12 652	13 152	11 069	11 965	12 754	13 098	14 189	12 499
run-off	million m^3/year	32 543	26 566	29 571	29 262	35 669	32 300	26 077	29 880	22 087	28 633	28 763	28 177	31 944	26 871

		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
inflow	million m^3/year	13 414	11 602	14 611	13 736	12 566	12 033	11 746	14 737	11 706	12 344	13 873	14 299
run-off	million m^3/year	26 557	26 188	30 235	28 802	25 296	25 725	28 176	32 994	24 027	28 092	29 659	30 263

The data are taken from the Hydrological Databank maintained by Environmental Agency of the Republic of Slovenia. The methodology for monitoring, control and processing of hourly and daily gauge heights, hydrometric measurements, conversions of gauge heights into flow rates, longitudinal equalizations and harmonisations is standard. The mean annual flow rates are calculated from mean daily flow rates. It is considered that the original data may deviate from actual values by ±5 %. The data on mean annual flow rates (Qs) of the water measuring stations derive from the measurements and observations in the measuring network of the state water monitoring (the data for the hydroelectric power stations Dravograd and Formin, Dravske elektrarne Maribor, was also taken into consideration). The year 2000 is the last year for which we hold official (verified) data on the flow rates of the water measuring stations.

Since national borders do not coincide with the watersheds determining the borders of water catchment basins of water measuring stations, the river inflow and run-off expressed with the flow rates of selected water measuring stations and the actual inflow and run-off are not consistent. The level of consistency is different for different catchment areas. The data on the flow rate of the Mura River are harmonized with the Austrian Hydrological Service. Such harmonization does not exist for other water measuring stations which represent balance profiles for inflow/run-off into/from Slovenia.

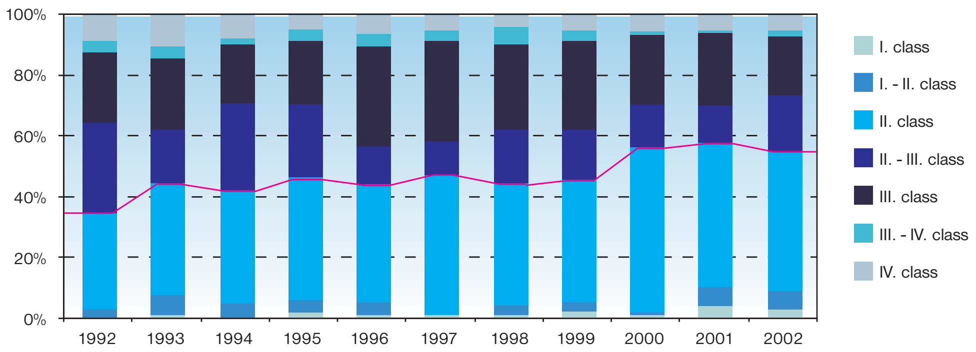
25. QUALITY OF WATERCOURSES

Watercourse quality is represented with the share of measuring stations at watercourses in Slovenia in individual quality classes. The classification that was used is the watercourse classification according to the national system for the assessment of watercourse quality. In Slovenia, watercourses were ranked into four quality classes until 2002. We used the combined method of assessment since the overall assessment of quality is made on the basis of basic physical and chemical analyses, analyses of heavy metals (Hg, Zn, Cr, Pb, Cd, Ni, Cu), organic micropollutants, microbiological and saprobiological analyses (saprobic index). Based on the results of the aforementioned individual analyses, an overall assessment of the quality of the surface watercourse is made for every individual measuring station for a given year, taking into account the hydrometeorological conditions during sampling. The threshold values between individual quality classes for basic physical and chemical, bacteriological and saprobiological parameters have been determined by national regulations. The threshold values for dangerous substances have been taken from international regulations, above all from EU directives

GOAL

Care for a better status of the entire aquatic environment is one of the priority areas of the National Environmental Action Programme. The aim of the Water Framework Directive (2000/60/EC), as well, is to attain the good status of all bodies of surface water by 2015. Another primary goal of this guideline is to prevent a deterioration in quality, in other words to maintain a good status.

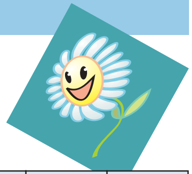
Figure 25-1: Watercourse quality – share of sampling stations in a specific quality class in Slovenia



In 2002, the Government issued the Decree on the Chemical Status of Surface Waters (OJ RS No 11/2002) whereby the surface waters are classified in accordance with the requirements of the Water Framework Directive into waters with good or poor chemical status, i.e. according to the content of hazardous substances, nitrates and sulphates. Under the Water Framework Directive, the quality of surface water bodies is determined according to chemical, hydromorphological and ecological elements.

For the purposes of comparison with previous years, the watercourse quality represented with the indicator is assessed according to the previously applied, i.e. combined method of assessment. Ranked in quality class I and quality class I-II are unpolluted and low polluted surface watercourses whose water is suitable for drinking upon possible disinfection. In 2002, approximately 9 % of all sampling stations were classified into quality class I and quality class I-II. Under this classification, the boundary between quality classes II and II-III represents the threshold between good and poor quality status of quality. According to this classification, a quality improvement trend was observed in the period from 1992 to 2002. There has been a marked increase in the share of sampling stations ranked in

the first and second quality classes with a corresponding reduction in heavily polluted watercourses. In 2002, slightly more than 50 % of all sampling stations were ranked in quality class I and quality class II, while in 1992 this share was under 40 %. The share of surface watercourses ranked in the lowest quality class, i.e. quality class IV, has not changed in recent years, and accounts for around 5 % of sampling stations.
In Slovenia, running waters create a very dense network of rivers, with its density averaging as much as 1.33 km/km^2. Owing to Slovenia's highly varied landscape and its rocky composition, the watercourses are short. Of the total length of the river network (28 398 km), as much as 15 656 km (around 55 %) are rivers or canals that are occasionally without water. Only 46 watercourses are longer than 25 km, amounting to only 22 % of the entire network. Only the Sava, Drava, Kolpa and Savinja rivers are longer than 100 km.



DATA AND SOURCES:

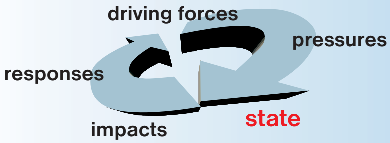
Table 25-1: Watercourse quality – share of sampling stations in a specific quality class in Slovenia
Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, 2003

sampling station in the quality class	unit	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
class I	number	0	1	0	2	1	1	1	2	1	4	3
class I - II	number	3	7	5	4	4	0	3	3	1	6	6
class II	number	33	38	38	41	37	43	37	37	57	46	44
class II - III	number	31	18	29	24	12	10	16	15	15	12	18
class III	number	24	24	20	21	31	31	26	27	24	23	19
class III - IV	number	4	4	2	4	4	3	5	3	1	1	2
class IV	number	9	11	8	5	6	5	4	5	6	5	5
total	number	104	103	102	101	95	93	92	92	105	97	97

The national monitoring of surface watercourse quality is established on rivers with an average flow rate greater than 1 m^3/s. The length of surface watercourses on which the monitoring is carried out amounts to 2141 km. The share of watercourses that are being monitored, calculated relative to the total length of all watercourses in Slovenia, amounts to only 7.5 %, given the large proportion of impermanent watercourses. According to the total length of watercourses wider than 5 m, the share of watercourses subject to monitoring amounts to 96 %.

The threshold values among individual quality classes for basic physical and chemical, bacteriological and saprobiological parameters were determined by regulations from 1976 and 1978: the Decree on the Classification of the Water of Inter-Republic Watercourses, International Water and Coastal Sea Water of Yugoslavia (OJ SFRY 6/78) and the Ordinance on Maximum Permissible Concentrations of Radionuclides and Hazardous Substances in Inter-Republic Watercourses, International Water and Coastal Water of the Yugoslav Sea (OJ SFRY 8/78). For classification of heavy metals and organic toxins in the first and second quality classes, which are defined in the regulation as drinking water, we also took into account the drinking water regulations, i.e. the Rules on Hygienic Suitability of Drinking Water and amendments thereto (OJ RS No 46/97, 52/97, 54/98, 7/2000), as well as foreign regulations for other threshold values, chiefly directives of the EC, i.e. Council Directive 75/440/EEC, of 16 June 1975, Concerning the Quality Required for Surface Water Intended for the Abstraction of Drinking Water in the Member States, Council Directive 80/778/EEC, of 15 July 1980, Relating to the Quality of Water Intended for Human Consumption, the German rules on surface watercourses, Allgemeine Güteanforderungen für Fliessgewässer (AGA)-Entscheidungshilfe für die Wasserrechtbehörden in Wasser-rechtlichen Erlaubnisverfahren, Ministerium für Umwelt, Raumordnung und Landwirtschaft vom 14. Mai 1991 (MBI.NW S. 863), and the recommendation of the WHO (World Health Organization) Regional Office for Europe, Revision of the WHO Guidelines for Drinking Water Quality, Report on the First Review Group Meeting on Pesticides, Italy, June 1990.

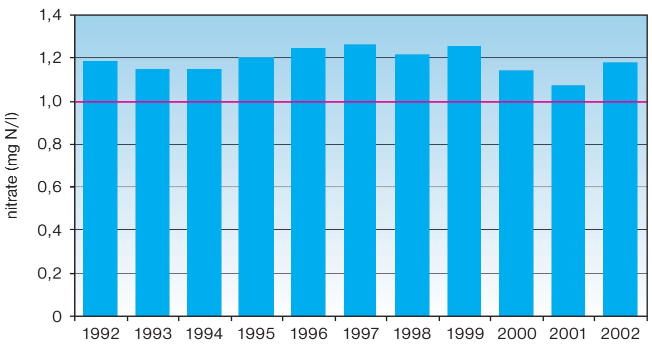
The data obtained from the analyses of samples are collected and processed in the standardised Database for Water Quality Monitoring at Environmental Agency of the Republic of Slovenia



26. NUTRIENTS IN RIVERS

The input of greater quantities of nutrients (nitrogen and phosphorus) into water may result in eutrophication or bloom. The phenomenon is caused by ecological changes evident in the decreased number of plant and animal species and consequently also affects the use of water (e.g. use for drinking water, recreation ...). It is represented as the average annual value of concentration of nitrates and orthophosphates in samples taken within the framework of the monitoring of surface water quality. Average values are compared to the so called background values (or presumed natural values). Natural values of phosphorus content vary from basin to basin, and depend mostly on the geological structure and soil type. Values vary from 0 µg P/l to 10 µg P/l. Nitrate contents below 0.3 mg N/l are deemed natural background for the majority of water catchment areas in Europe, however, a value of 1 mg N/l is given for certain areas. Nitrate contents collected for drinking water and exceeding the recommended value of 5.6 mg N/l, a value determined in the Council Directive Concerning the Quality Required of Surface Water (75/440/EEC), represent a relatively poor quality of water.

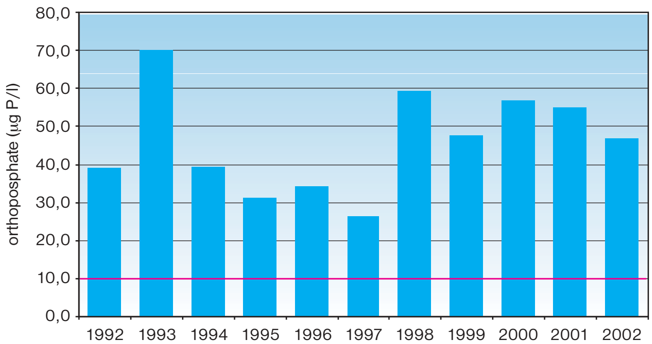
Figure 26-1: Average annual value of nitrate concentration in rivers (mg N/l). Indicative value for natural state is 1 mg N/l.



GOAL

The Nitrate Directive (91/676/EEC), the Council Directive 91/271/EEC Concerning Urban Waste Water Treatment, the Directive on Integrated Pollution Prevention and Control (IPPC) (96/61/EC) and the Water Framework Directive 2000/60/EC require in this area a reduction and prevention of water pollution by reducing the input of nutrients from various sources of pollution and thereby contributing to the prevention of quality deterioration and maintaining good water status, respectively.

Figure 26-2: Average annual value of orthophosphate concentration in rivers (µg P/l). Indicative value for natural state is 10 µg P/l. In 1998, the method for the monitoring of orthophosphate concentration in water was changed.



Pollution by nitrogen compounds results in the great majority of water catchment areas from the leaching from agricultural land. However, discharges from industrial plants may contribute a substantial share as well. Pollution by phosphorus is most frequently caused by industrial waste water and household effluents.

Nitrate content is represented in figure 26-1.We have not observed any statistically relevant trend in the given time-

frame. Values are slightly above the background values which are represented for the majority of European rivers (1 mg N/l).
Concerning orthophosphate content in the period from 1992 to 2002, we have not observed any statistically relevant trend either. In 1998, we changed the method for the determination of orthophosphates in the water. Orthophosphate contents substantially exceed the background values which are represented for the majority of European rivers (10 µg P/l).

DATA AND SOURCES:

Table 26-1: Average annual value of nitrate concentration in rivers (mg N/l). Indicative value for natural state is 1 mg N/l.
Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, 2003

	unit	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
nitrate	mg N/l	1.19	1.15	1.15	1.20	1.25	1.26	1.22	1.25	1.14	1.07	1.18

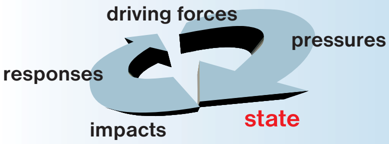
Table 26-2: Average annual value of orthophosphate concentration in rivers (µg P/l). Indicative value for natural state is 10 µg P/l. In 1998, the method for the monitoring of orthophosphate concentration in water was changed.
Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, 2003

	unit	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
orthophosphate	µg P/l	39.2	70.0	39.4	31.2	34.2	26.5	59.3	47.8	56.9	55.1	46.8

We are implementing the monitoring of quality of surface watercourses in line with the annual programme for the monitoring of surface water quality. Around 85 sampling stations are included in the network. We analyze the basic physical and chemical analyses, bacteriological and saprobiological analyses at all sampling stations, while at the selected intake points, we analyze the content of metals (water, suspended particles, sediment), organic substances (phenols, pesticides, polycyclic organic compounds, volatile organic compounds), AOX, EOX and PCB (water, sediment). Within the framework of basic physical and chemical parameters we also analyze the content of nitrate and orthophosphate. The number of analyses conducted at individual sampling stations ranges from 2 to 24 a year.

In the processing, we have represented the average annual values of nitrate and orthophosphate concentrations; in calculations, we substituted the contents below the detection level with 0 (zero).

Data are maintained in the Standardised Database for Water Quality Monitoring at Environmental Agency of the Republic of Slovenia.



27. BIOCHEMICAL OXYGEN DEMAND AND AMMONIUM IN RIVERS

Every river has a certain autopurification capacity, which means that it is capable of decomposing certain quantities of organic mass into the inorganic substance with the aid of micro-organisms present in the water. The biochemical oxygen demand (BOD_5), which normally increases upon the presence of organic pollution, constitutes an approximate criterion for the autopurification capacity of a watercourse. The increased ammonium content in rivers also results from organic pollution of a watercourse caused by urban waste water, industrial waste water and leaching from agricultural land.

GOAL

Care for a better status of aquatic environment is one of the priority areas of the National Environmental Action Programme. The Council Directive 91/271/EEC Concerning Urban Waste Water Treatment and the Water Framework Directive 2000/60/EC require in this area a reduction of organic pollution of watercourses caused by urban waste water and biodegradable industrial waste water, and thereby the improvement of water quality.

Figure 27-1: Average annual values of BOD_5 (mg O_2/l)

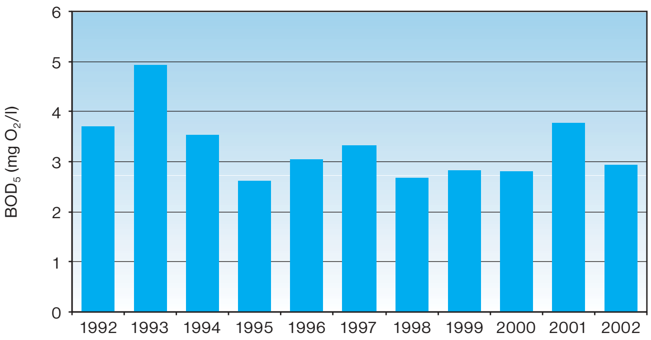
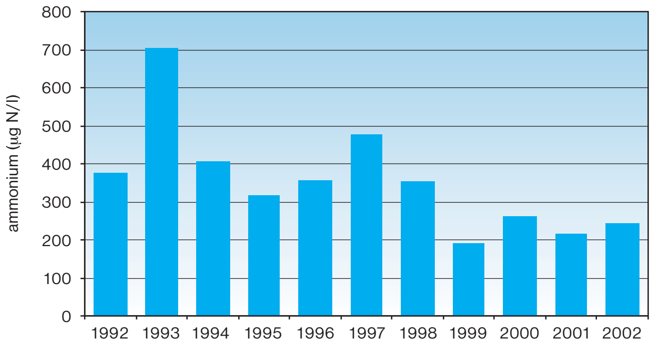


Figure 27-2: Average annual concentration of ammonium (µg N/l). In 1998 the method for the determination of ammonium in water was changed.



A high value of BOD_5 is usually a consequence of organic pollution caused by discharges of urban and industrial waste water and leaching from agricultural land. The effects of high BOD_5 values are evident in the deterioration of chemical and biological quality of water, as well as in the decrease in biological diversity of water biotic community and poorer microbiological quality of water. On the contrary, a decrease in the BOD_5 value attests to a general improvement in water quality according to both chemical and microbiological parameters.

The average annual values of BOD_5 are represented in figure 27-1. In recent years, a slight decrease in values has been perceived; however, this trend is statistically irrelevant. A decrease in BOD_5 values is most likely a consequence of improvements in the area of waste water treatment and the phasing-out of industry which is a great polluter of watercourses by waste water.

In the aqueous medium, ammonium enters the oxidation process where it oxidises into the oxidised forms of nitrogen, mostly nitrate. The oxidation process also affects the oxygen balance, which additionally contributes to the deterioration of the quality status. Under certain conditions (the combination of water temperature, salinity and pH), ammonium changes into gaseous form, which is poisonous for aquatic organisms even at low quantities.

The average annual contents of ammonium are represented in figure 27-2. In 1998, we changed the laboratory method for determining ammonium content in water. Due to a short temporal frame, we cannot establish a statistically typical trend. The ammonium content in surface watercourses of Slovenia is still higher than 15 µg N/l which serves as a background and natural content, respectively.

DATA AND SOURCES:

Table 27-1: Average annual values of BOD_5 (mg O_2/l)
Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, 2003

	unit	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
BOD_5	mg O_2/l	3.71	4.92	3.53	2.61	3.03	3.32	2.67	2.84	2.81	3.76	2.94

Table 27-2: Average annual concentration of ammonium (µg N/l). In 1998 the method for the determination of ammonium in water was changed.
Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, 2003

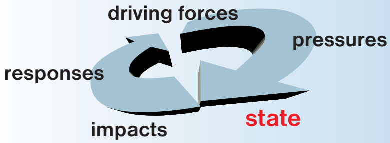
	unit	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
ammonium	µg N/l	376	704	406	316	356	477	355	192	263	216	245

We are implementing the monitoring of quality of surface watercourses in line with the annual programme for the monitoring of surface water quality. Around 85 sampling stations are included in the network. We analyze the basic physical and chemical analyses, bacteriological and saprobiological analyses at all sampling stations, while at the selected intake points we analyze the content of metals (water, suspended particles, sediment), organic substances (phenols, pesticides, polycyclic organic compounds, volatile organic compounds), AOX, EOX and PCB (water, sediment). Within the framework of basic physical and chemical parameters we also analyze the BOD_5 value and ammonium content. The number of BOD_5 value and ammonium content analyses conducted at individual sampling stations ranges from 2 to 24 a year.

In the processing, we have represented the average annual values of BOD5 and ammonium content; in calculations, we have substituted the contents below the detection level with 0 (zero).

The data are maintained in the Standardised Database for Water Quality Monitoring at Environmental Agency of the Republic of Slovenia.

The biochemical oxygen demand (BOD_5) represents one of the key parameters among oxygenation conditions. A test is applied for the determination of BOD_5 whereby we determine the dissolved oxygen content, which is followed by sample incubation at 20°C in complete darkness and repeated determination of dissolved oxygen. The difference between the initial and final values is the value of BOD_5.



28. NITRATES IN GROUNDWATER

Pollution of groundwater by nitrates is represented by the share of sampling points at aquifers with inter-granular and karst-fracture porosity where threshold values of NO_3 concentrations in samples taken were exceeded at all times, occasionally or never. The threshold value concerning NO_3 concentrations in groundwater is determined in the Decree on the Quality of Underground Water (OJ RS No 11/02) and constitutes 25 mg NO_3/l. With a view to comparing the data with that of other European countries, a double threshold value determined for drinking water, i.e. 50 mg NO_3/l (98/83/EC and OJ RS No 7/00), was taken into consideration in the representation of this indicator.

GOAL

The National Environmental Protection Programme provides for a reversal of groundwater pollution by nitrates. This area is governed by the Decree on the Quality of Underground Water (OJ RS No 11/02) and the Decree on the Input of Dangerous Substances and Plant Nutrients into the Soil (OJ RS No 68/96 and 29/04). Indirectly, it is also governed by the Rules on Drinking Water Quality (OJ RS No 46/97, 54/98 and 7/00). EU targets in this area are determined in the Council Directive 98/83/EC on the Quality of Water Intended for Human Consumption.

Figure 28-1: Frequency of excessive burdening by nitrates (concentrations exceeding 50 mg NO_3/l) at sampling points at selected aquifers in 2002

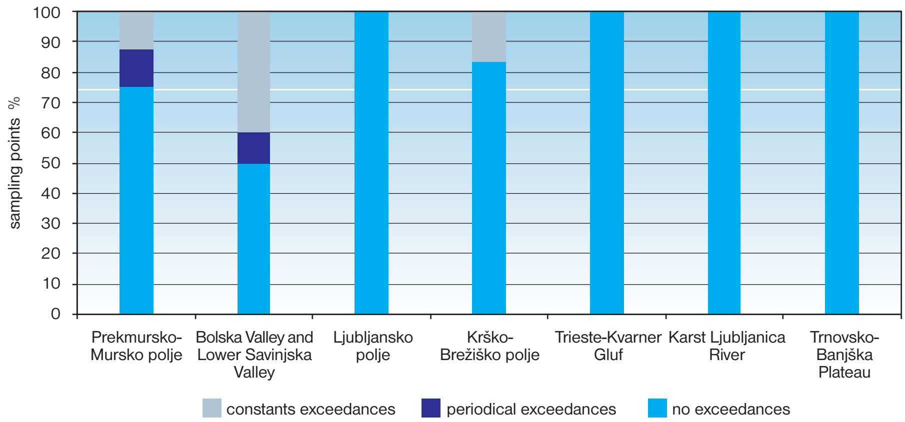


Figure 28-2: Trend in nitrate concentrations at monitored bodies of groundwater in the period from 1993 to 2003

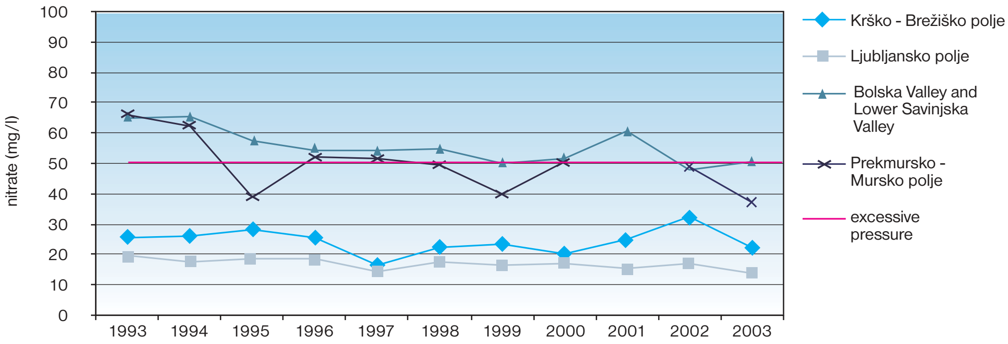


Figure 28-3: Frequency of excessive pressure by nitrates (50 mg NO_3/l) at aquifers included in the EUROWATERNET database – comparison of Slovenia (2002, 7 aquifers) with the countries of the European Environment Agency (period from 1998 to 2001, 279 aquifers)

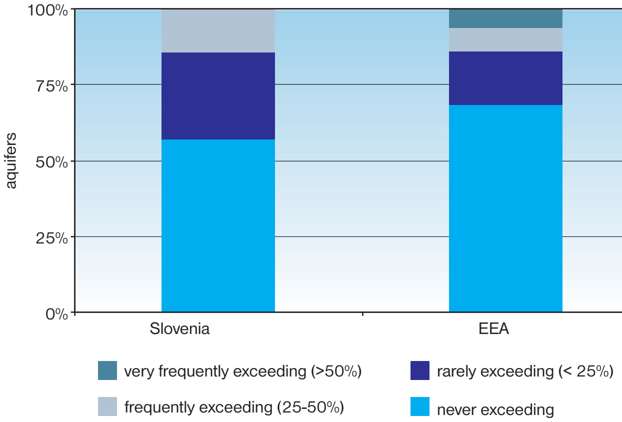
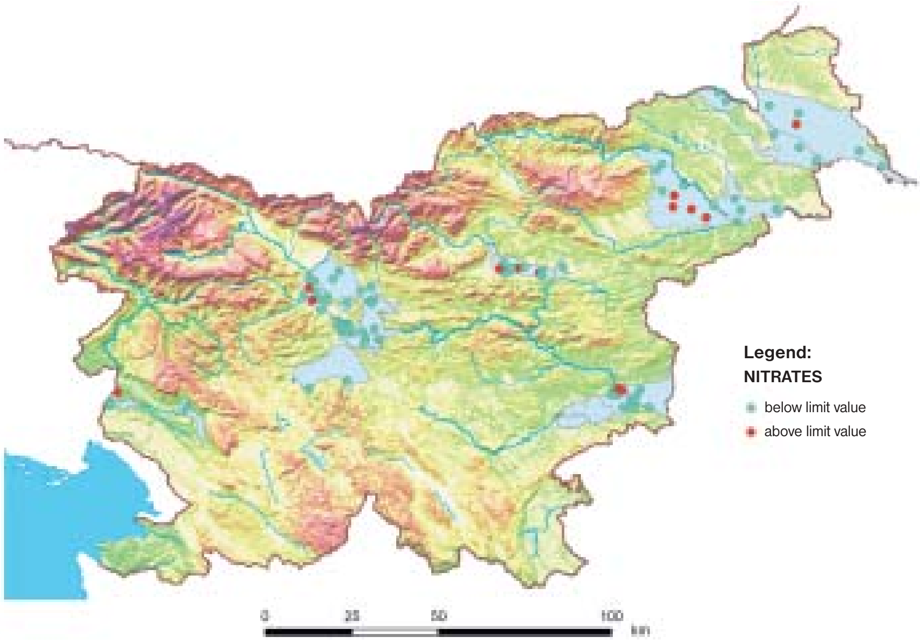


Figure 28-4: Nitrate concentrations at the sampling points of groundwater
Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, 2003; basic layer: Anton Melik Geographical Institute SRC SASA



In 2002, the double threshold value designated for nitrates was exceeded in the North-East of Slovenia (Prekmursko-Mursko polje, Bolska Valley and Lower Savinjska Valley) and at Krško-Brežiško polje. A reduction trend in nitrates pollution at Prekmursko-Mursko polje was monitored.
Nitrate content in Karst-fracture aquifers is extremely low (lower than 6 mg NO_3/l).
Concerning the percentage of aquifers exceeding the threshold value designated for nitrates (50 mg NO_3/l), the conditions in Slovenia are better than those in Austria and the Czech Republic and similar to the European average in respect of selected aquifers. The reason for a relatively high share of aquifers polluted by nitrates in Slovenia, i.e. in comparison with other countries, is the high representation of alluvial aquifers in Slovenian lowlands with intensive agricultural activity.
In the period from 1993 to 2002, a reducing trend in nitrate contents was established at one aquifer out of seven. However, it was not possible to establish a trend for other aquifers.

DATA AND SOURCES

Table 28-1: Frequency of excessive burdening by nitrates (concentrations exceeding 50 mg NO_3/l) at sampling points at selected aquifers in 2002

Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, 2003

sampling points	unit	Prekmursko-Mursko polje	Bolska Valley and Lower Savinjska Valley	Ljubljansko polje	Krško-Brežiško polje	Trieste-Kvarner Gulf	Karst Ljubljanica River	Trnovsko-Banjška Plateau
total	number	8	10	10	11	1	1	4
no exceedances	number	6	5	9	10	1	1	4
no exceedances	%	75	50	100	83.3	100	100	100
periodical exceedances	number	1	1	0	0	0	0	0
periodical exceedances	%	12.5	10	0	0	0	0	0
constant exceedances	number	1	4	0	2	0	0	0
constant exceedances	%	12.5	40	0	16.7	0	0	0

Table 28-2: Trend in nitrate concentrations at monitored bodies of groundwater in the period from 1993 to 2003

Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, 2003

	unit	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Krško-Brežiško polje	mg/l	25.8	26.0	28.3	25.8	16.4	22.4	23.3	20.3	24.7	32.5	22.2
Ljubljansko polje	mg/l	19.5	17.7	18.6	18.7	14.1	17.8	16.6	17.0	15.4	16.8	13.9
Bolska Valley and Lower Savinjska Valley	mg/l	64.9	65.6	57.6	54.2	54.5	54.6	50.0	51.6	60.69	47.9	50.5
Prekmursko-Mursko polje	mg/l	65.8	62.2	38.7	52.3	51.4	49.3	39.8	50.7	n/a	49.2	37.2

Table 28-3: Frequency of excessive burdening by nitrates (50 mg NO_3/l) at aquifers included in the EUROWATERNET database – comparison of Slovenia (2002, 7 aquifers) with the countries of the European Environment Agency (period from 1998 to 2001, 279 aquifers)

Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, 2003, Nitrates in Groundwater, Indicator Fact Sheet, European Environment Agency, 2002

aquifers	unit	Slovenia	EEA
never exceeding	number	4	191
never exceeding	%	57.1	68.4
rarely exceeding (< 25 %)	number	2	49
rarely exceeding (< 25 %)	%	28.6	17.6
frequently exceeding (25–50 %)	number	1	21
frequently exceeding (25–50 %)	%	14.3	7.5
very frequently exceeding (> 50 %)	number	0	18
very frequently exceeding (> 50 %)	%	0	6.5

Data for Slovenia

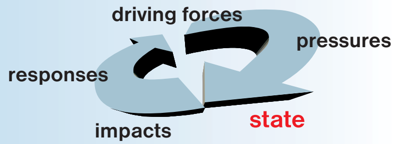
The quality of groundwater in Slovenia is monitored within the framework of the national monitoring of groundwater, springs and surface waters (Ministry of the Environment, Spatial Planning and Energy, Environmental Agency of the Republic of Slovenia). Pollution of shallow-water alluvial aquifers (populated and agricultural areas) and karst-fracture aquifers, where pollution is lower due to land-use, is monitored.

Groundwater bodies are selected according to the intermediate phase, i.e. phase II intended for the determination of such bodies. Representation of individual types of aquifers in the area of water supply was also taken into consideration, and constitutes 60% of population as regards alluvial aquifers and 40% of population as regards karst-fracture aquifers. For the purpose of representation of the indicator, the proposed groundwater bodies indicated here below were taken into consideration: Prekmursko-Mursko polje (8 sampling points, alluvial) and Bolska Valley and Lower Savinjska Valley (10 sampling points, alluvial), Ljubljansko polje (10 sampling points, alluvial), Krško-Brežiško polje (11 sampling points, alluvial), Trieste-Kvarner Gulf (1 sampling point, karst), Karst Ljubljanica River (1 sampling point, karst) and Trnovsko-Banjška Plateau-Hrušica (4 sampling points, karst).

The following are sampling points for nitrates: drinking water pumping stations (33.3%), industrial wells (8.9%), common facilities for water quantity and quality monitoring (42.2%) and facilities for water quality monitoring (15.6%). 45 sampling points (wells, drilling wells, springs) were taken into consideration for the purposes of representation of this indicator. Samplings were conducted 2-6 times a year.

Data for Europe

Data source is Nitrates in Groundwater, Indicator Fact Sheet, European Environment Agency, 2002. Original data used in the indicator fact sheet are taken from the EUROWATERNET-Groundwater database, 2001/2. The EUROWATERNET-Groundwater database contains data on the properties of selected relevant aquifers on which countries report to the European Environment Agency (EEA). Countries have made their selection of relevant aquifers on the basis of the following criteria: size (a minimum of 300 km^2), regional relevance and exposure to anthropogenic effects. Each country is obliged to report on a minimum of three aquifers with different types of sampling points.



29. PESTICIDES IN GROUNDWATER

Pollution of groundwater by pesticides is represented by the share of sampling points in aquifers with inter-granular and karst-fracture porosity where threshold values of concentrations of individual pesticides and the sum of pesticides, respectively, in samples taken were exceeded at all times, occasionally or never. The threshold values concerning pesticide concentrations in groundwater in Slovenia as determined in the Decree on the Quality of Underground Water (OJ RS No 11/02) is 0.06 µg/l for individual pesticides, 0.1 µg/l for atrazine and desethyl-atrazine, and 0.5 µg/l for the sum of pesticides.

GOAL

The National Environmental Protection Programme provides for a reversal of groundwater pollution by pesticides. The following legislation represents a legal basis for the attainment of the said objective: the Decree on the Quality of Underground Water (OJ RS No 11/02), the Decree on the Designation of the Status of Endangerment Due to Phytopharmaceuticals to Areas of Aquifers and Their Drainage Basins and on the Integrated Rehabilitation Measures (OJ RS No 97/02), the Ordinance on the Areas of Aquifers and Their Drainage Basins Endangered Due to Phytopharmaceuticals (OJ RS No 97/02), the Rules on Drinking Water Quality (OJ RS No 46/97, 54/98 and 7/00) and the Council Directive 98/83/EC on the Quality of Water Intended for Human Consumption.

Figure 29-1: Frequency of exceeding the threshold value designated for the sum of pesticides (0. 5 µg/l) at sampling points in selected aquifers in 2002

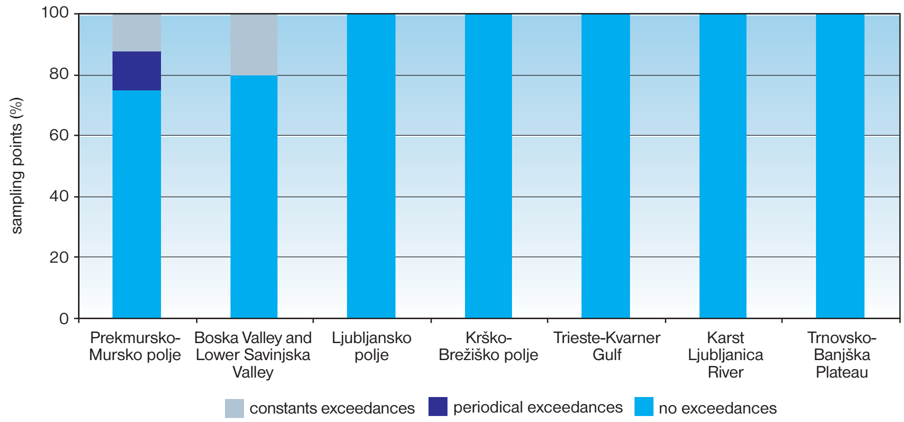


Figure 29-2: Trend in pesticide sum concentrations at groundwater bodies monitored in the period from 1993 to 2003. The threshold value for the sum of pesticides is 0.5 µg/l

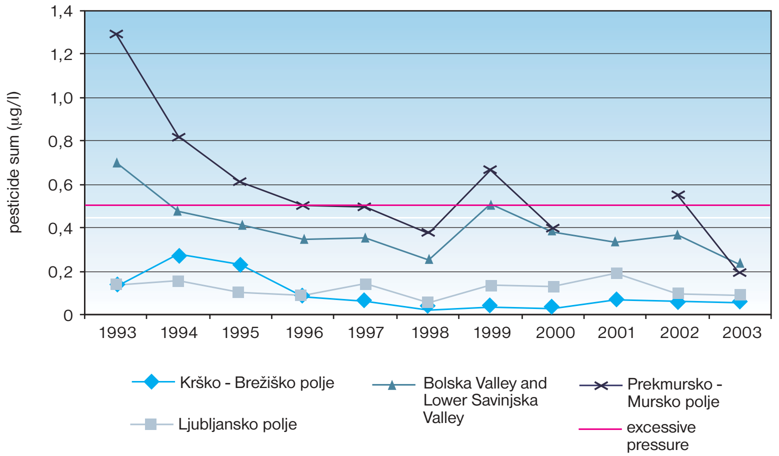
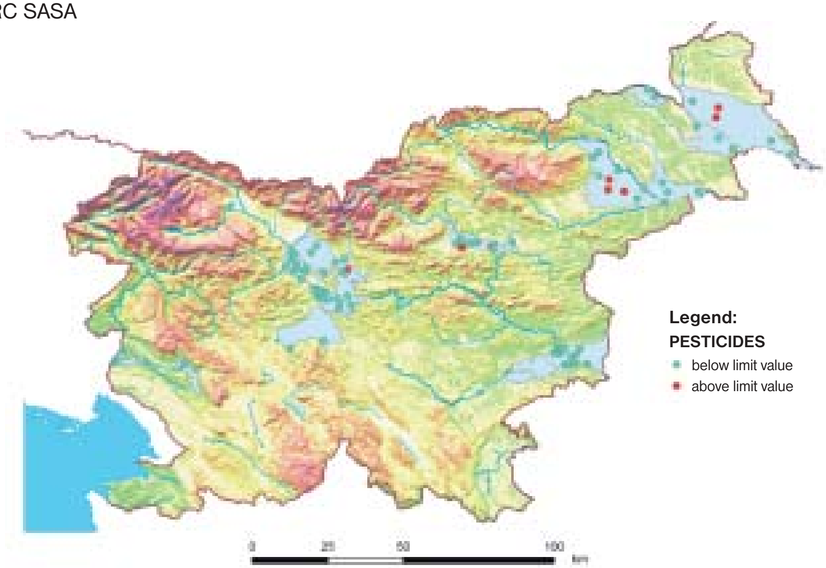


Figure 29-3: Pesticide concentrations at the sampling points of groundwater

Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, 2003; basic layer: Anton Melik Geographical Institute SRC SASA



In 2002, the arithmetic mean values designated for the sum of pesticides exceeded the threshold value (0.5 µg/l) only in the groundwater at Prekmursko-Mursko polje. In the period from 1993 to 2003, a reducing trend in the sum of pesticides was monitored at aquifers located at the Mura River (Prekmursko-Mursko polje) and the Savinja River (Lower Savinja Valley – Bolska Valley). The contents of the sum of pesticides at Ljubljansko polje and Krško-Brežiško polje appear to have been within permissible levels in the period from 1993 to 2002. Concerning the karst-fracture aquifers, pesticide contents are below the identifiable level of analytical methods. The highest share of threshold value exceedances at sampling points was established for atrazine and its metabolite desethyl-atrazine. The share of sampling points where the concentration of the aforementioned pesticides exceeded the threshold values determined in legislation is higher in Slovenia in comparison with the European average.

DATA AND SOURCES:

Table 29-1: Frequency of exceeding the threshold value designated for the sum of pesticides (0.5 µg/l) at sampling points in selected aquifers in 2002

Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, 2003

sampling points	unit	Prekmursko-Mursko polje	Bolska Valley and Lower Savinjska Valley	Ljubljansko polje	Krško-Brežiško polje	Trieste-Kvarner Gulf	Karst Ljubljanica River	Trnovsko-Banjška Plateau
total	number	8	10	10	11	1	1	4
no exceedances	number	6	8	9	12	1	1	4
no exceedances	%	75	80	100	100	100	100	100
periodical exceedances	number	1	0	0	0	0	0	0
periodical exceedances	%	12.5	0	0	0	0	0	0
constant exceedances	number	1	2	0	0	0	0	0
constant exceedances	%	12.5	20	0	0	0	0	0

Table 29-2: Trend in pesticide sum concentrations at groundwater bodies monitored in the period from 1993 to 2003. The threshold value for the sum of pesticides is 0.5 µg/l

Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, Pesticides in Groundwater, Indicator Fact Sheet, European Environment Agency, 2002

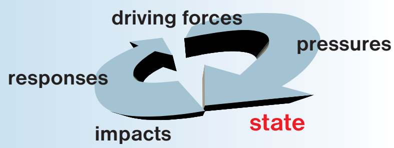
	unit	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Krško-Brežiško polje	µg/l	0.13	0.28	0.23	0.08	0.06	0.02	0.03	0.03	0.07	0.06	0.05
Ljubljansko polje	µg/l	0.14	0.16	0.10	0.09	0.14	0.05	0.14	0.13	0.19	0.10	0.09
Bolska Valley and Lower Savinjska Valley	µg/l	0.70	0.47	0.42	0.34	0.35	0.25	0.51	0.38	0.34	0.37	0.23
Prekmursko-Mursko polje	µg/l	1.29	0.82	0.61	0.51	0.50	0.37	0.67	0.40	n/a	0.55	0.19

The quality of groundwater in Slovenia is monitored within the framework of the national monitoring of groundwater, springs and surface waters (Ministry of the Environment, Spatial Planning and Energy, Environmental Agency of the Republic of Slovenia). Pollution of shallow-water alluvial aquifers (populated and agricultural areas) and karst-fracture aquifers, where pollution is lower due to land-use, is monitored.

Groundwater bodies are selected according to the intermediate phase, i.e. phase II intended for the determination of such bodies. Representation of individual types of aquifers in the area of water supply was also taken into consideration and constitutes 60% of population in respect of alluvial aquifers and 40% of population in respect of karst-fracture aquifers. For the purpose of representation of the indicator, the proposed groundwater bodies indicated here below were taken into consideration: Prekmursko-Mursko polje (8 sampling points, alluvial) and Bolska Valley and Lower Savinjska Valley (10 sampling points, alluvial), Ljubljansko polje (10 sampling points, alluvial), Krško-Brežiško polje (11 sampling points, alluvial), Trieste-Kvarner Gulf (1 sampling point, karst), Karst Ljubljanica River (1 sampling point, karst) and Trnovsko-Banjška Plateau-Hrušica (4 sampling points, karst).

The following are the facilities within the measuring network: wells at drinking water pumping stations (33.3%), industrial wells (8.9%) and facilities for groundwater quantity and quality monitoring (57.8%: drilling wells, piezometers and wells). 45 sampling points (wells, drilling wells, springs) were taken into consideration for the purposes of representation of this indicator. Samplings were conducted 2-6 times a year.

30. PHOSPHORUS IN LAKES



Phosphorus is the least frequent among other essential biogenic elements appearing in the aquatic environment. Therefore, the content of phosphorus in water affects the biological productivity of aquatic ecosystems. In Slovenian lakes phosphorus represents the most common limiting factor in productive processes, for which reason we use the average annual content of the entire phosphorus load as the indicator for the evaluation of the trophic status of lakes or as the indicator of eutrophication of lakes. Inappropriate discharge of urban effluent and leaching of phosphorus from agricultural land are the biggest and most common allochthonous sources of phosphorus in lakes. Therefore, the phosphorus content in lakes depends to a great extent on the density of population and the intensity of land-use in lakelands. The increased content of nutrients in lakes, in particular phosphorus, accelerates the productivity of plankton algae which contributes to a poorer transparency of lakes. The transparency of lakes, which is measured as the Secchi depth, is therefore used as the auxiliary indicator of the status or productivity of lakes. A decreased transparency of lakes affects the appearance of lakes, limits bathing and other sporting activities on and by the lakes

GOAL

Care for a better status of aquatic environment is one of the priority areas of the National Environmental Action Programme. The fundamental objective of the Water Framework Directive (2000/60/EC), to which also relate the Water Act (OJ RS No 67/2002) and the Decree on the Chemical Status of Surface Waters (OJ RS No 11/2002), is the improvement of ecological status and potential of all bodies of water, which also includes the catchment areas (drainage basins) of lakes where it is necessary to decrease the input of nutrients in lakes, in particular phosphorus, by means of appropriate measures.

Figure 30-1: Average (annual) concentration of the entire phosphorus load in selected lakes expressed in

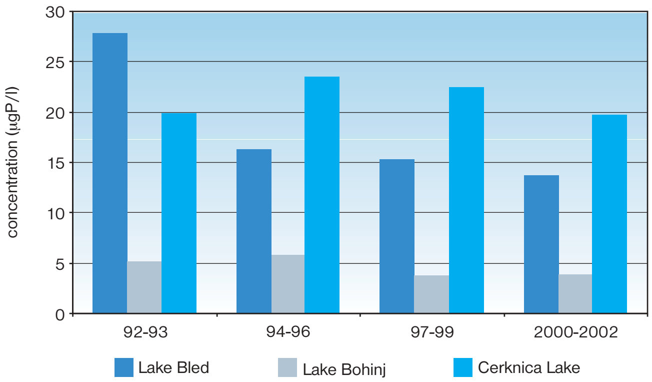
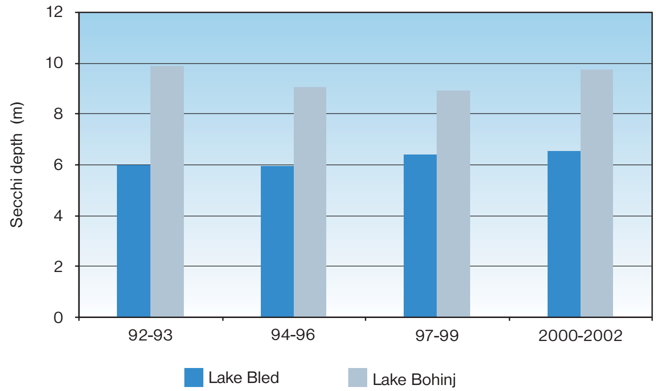


Figure 30-2: Average transparency of Lake Bled and Lake Bohinj expressed in meters



In Europe, the number of lakes with lower phosphorus content and greater transparency is increasing as a result of measures affecting the decrease in the burdening of lakes from lakelands. A similar trend was also perceived in larger natural Slovenian lakes.
In Lake Bled and Lake Bohinj, the only two bigger (>0.5 km^2) permanent natural lakes in Slovenia, the phosphorus content has been decreasing over the last decade and remains at the same level as in previous years. The decrease in phosphorus content is more pronounced in Lake Bled where the first remedial measures, including the upgrading of the sewage system, were implemented in the beginning of the 1970's. The improvement of status and decrease in the trophic status of Lake Bled is also evident from the average annual transparency of the lake which has been gradually increasing.
The lakeland of Lake Bohinj extends to the mountain karst area where the effects of human activities are limited, for which reason the phosphorus content and the productivity of phytoplankton are low in Lake Bohinj. With the permanent increase in tourism at Lake Bohinj, the establishment of a sewage system (2000/02) constitutes a necessary preventive measure, despite the good status of the lake. The transparency of Lake Bohinj at high flow rate points does not depend solely on the density of phytoplankton, but also on the quantity of inorganic floating particles which are being introduced into the lake from swollen streams and torrents especially during storms. For this reason transparency is not a thoroughly adequate auxiliary indicator of status in this particular case.
Due to the constant drying up, Cerknica Lake represents a special aquatic ecosystem that cannot be compared to permanent lakes, such as Lake Bled and Lake Bohinj. Due to the aforementioned drying up of the lake, there appear no problems of excessive burdening by nutritional substances and eutrophication relating thereto. In the period during which Cerkniško polje, rich in its dense wetland vegetation, is flooded, the vegetation constitutes a natural purification system which consumes nutrients that are being introduced into the lake from tributaries. The system, which functions as a big biological purification facility, stops functioning upon the drying up of the lake. Then, the water accumulates only in the bed of the Stržen River and its quality is poorer than in the period of greater ponding. The water level fluctuation also affects the fluctuation of phosphorus content in the lake which has not increased in the period from 1992 to 2002, i.e. globally speaking. Irrespective of this fact, the Cerknica Lake catchment area requires appropriate measures which would reduce the burdening by nutrients, in particular faecal pollution of certain tributaries. Due to the shallowness of the lake and rich wetland vegetation, transparency does not represent an adequate auxiliary indicator of the status of Cerknica Lake.

DATA AND SOURCES:

Table 30-1: Average (annual) concentration of the entire phosphorus load in selected lakes expressed in µg P/l
Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, 2003

	unit	1992–1993	1994–1996	1997–1999	2000–2002
Lake Bled	µg P/l	27.8	16.3	15.4	13.7
Lake Bohinj	µg P/l	5.2	5.8	3.7	3.9
Cerknica Lake	µg P/l	19.9	23.5	22.4	19.8

Table 30-2: Average transparency of Lake Bled and Lake Bohinj expressed in meters
Source: Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, 2003

	unit	1992–1993	1994–1996	1997–1999	2000–2002
Lake Bled	Secchi depth (m)	6.00	5.97	6.40	6.57
Lake Bohinj	Secchi depth (m)	9.90	9.07	8.93	9.77

In the period from 1992 to 2002, all bigger natural lakes of the Republic of Slovenia (Lake Bled, Lake Bohinj and Lake Cerknica with tributaries) were included in the regular national monitoring of the lake water quality.

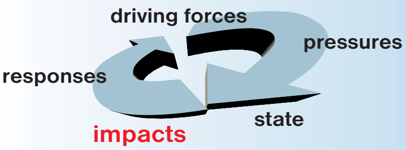
The Standardised Database for Water Quality Monitoring, Environmental Agency of the Republic of Slovenia, Monitoring Office, Water Quality Section (Relational Database).

The lake water quality monitoring is being implemented under the standard procedures that comprise of sampling and individual analyses. The samples for the analysis of the entire phosphorus load were taken from Lake Bled and Lake Bohinj during monthly intervals at two and three, respectively, intake points, at every two and three, respectively, meters of depth according to the vertical depth. We submitted the data on the average annual content of the entire phosphorus load which we calculated by taking into account the volumes of individual depth layers (the average of measured phosphorus values in a depth layer X depth layer volume).

Conditions are different at Cerknica Lake, i.e. the sampling is not implemented according to depths. The data on the entire phosphorus load that we submitted is the annual average of individual measurements carried out at different locations at Lake Cerknica.

EUROWATERNET lakes (average summer-time content of the entire phosphorus load).

The data on phosphorus content in European lakes take into consideration the EEA countries. Due to the heterogeneous distribution and different types of lakes, the comparison between the countries is unreliable.



31. DRINKING WATER QUALITY

According to the latest Slovenian legislation, drinking water, in its original or treated state, is intended for drinking, cooking, preparing of food or other household purposes, or for the production and placement on the market of food products, irrespective of its origin and irrespective of whether it is being supplied from the public drinking water supply network or tanks, or as a pre-packaged water. Every drinking water supply system must have a manager who is obliged to ensure the compliance of water with the water-quality standards. If Manager is not appointed, the local community implements all managerial obligations. Compliance must be ensured at places where water is being used as drinking water; compliance is established by means of taking and testing of samples. The safety of drinking water supply is also being monitored and is ensured through the implementation of a regime in safeguard zones.

This indicator represents the share of unsuitable samples, i.e. unsuitable according to the microbiological, physical and chemical criteria, at drinking water supply systems supplying 5 000 citizens or more (in total, they supply 75 % of the citizens of the Republic of Slovenia – the share increases annually), as well as the share of the citizens of the Republic of Slovenia who were exposed to unsuitable drinking water via these systems. The testing parameters are classified into the indicator microbiological and physical-chemical parameters which do not pose a direct threat to human health (e.g. coliform bacteria, colour, odour …), and microbiological and chemical parameters which pose a potential threat to human health: E.coli, enterococci and toxic substances. Among toxic substances, the most frequent are pesticides and its metabolites and nitrates.

GOAL

The objective is to establish the actual state in the field of drinking water supply in Slovenia, determine the values and trends of microbiological and physical-chemical parameters for the assessment of health suitability of drinking water, and propose general measures for the improvement of drinking water quality.

Figure 31-1: Share of unsuitable samples from microbiological tests due to the presence of E.coli and enterococci, and share of unsuitable samples from physical-chemical tests due to the exceeded concentration of pesticides and/or nitrates in the drinking water supply systems supplying 5 000 citizens or more in the period from 1992 to 2002 in the Republic of Slovenia

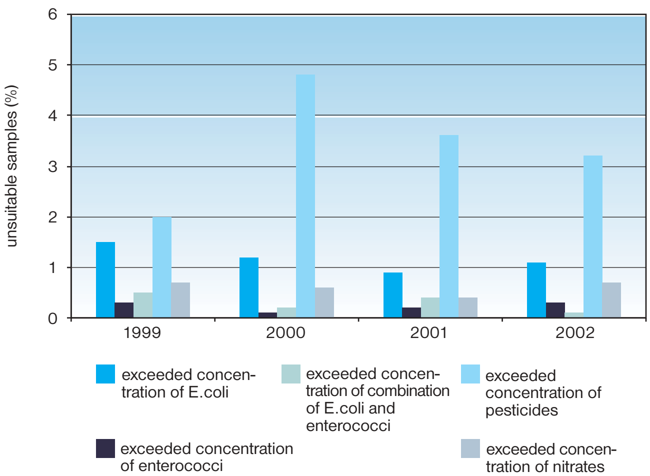


Figure 31-2: Share of population served by the drinking water supply systems where there were 5 % or more of identified unsuitable samples of drinking water according to the microbiological and physical-chemical parameters in the period from 1999 to 2002

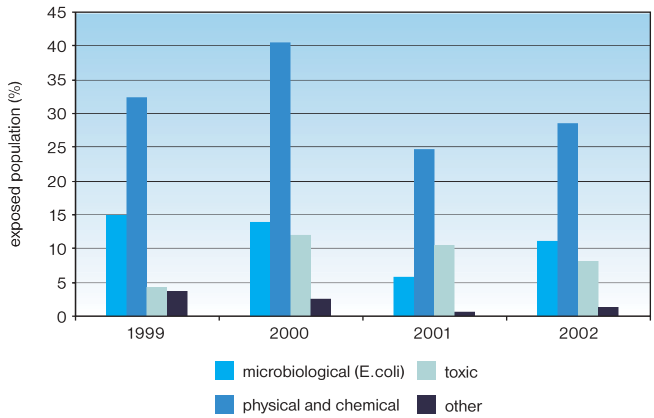
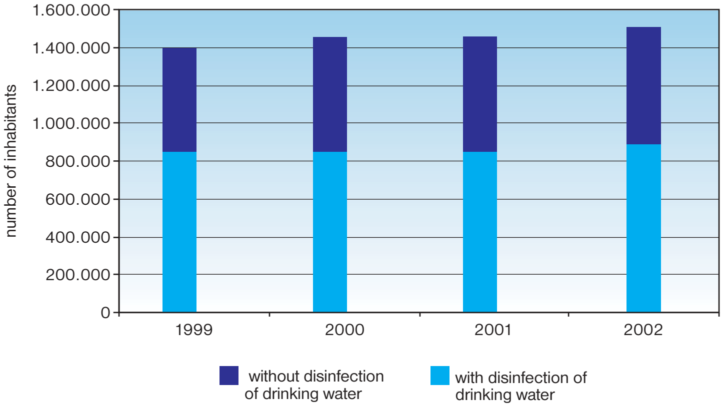


Figure 31-3: Number of inhabitants served by the drinking water supply systems supplying 5 000 citizens or more and of these the number of citizens served by the systems at which the disinfection of drinking water was being implemented



In 2002, the indicators were governed by the requirements of the Rules on the Sanitary Suitability of Drinking Water (OJ RS No 46/97, 52/97, 54/98 and 7/00), which were substantially harmonized with the EU Council Directive 98/83/EC on the quality of water intended for human consumption. In 2004, the Rules on Drinking Water (OJ RS No 19/04 and 35/04) were adopted which are harmonized with the EU directive in their entirety.

In Slovenia, the number of waterborne outbreaks is relatively small as is the number of affected people. With a view to ensure compliance and health suitability of drinking water, internal control is implemented by managers under the latest legislation, as well as monitoring of conditions as ensured by the Ministry competent for health. In addition, official supervision is being implemented. In 2003, internal control was established which is being implemented by managers on the basis of the HACCP system (Hazard Analysis of Critical Control Points) in line with the Act Regulating the Sanitary Suitability of Foodstuffs, Products and Materials Coming into Contact with Foodstuffs (OJ RS No 52/2000, 42/02), the Rules on the Official Control of Foodstuffs (OJ RS No 73/03, 45/04) and the Rules on Hygiene of Foodstuffs (OJ RS No 60/02). The »smaller« systems supplying up to 500 and up to 1 000 citizens proved to be especially problematic. In most cases, these system are unmanaged, unregulated, with no proper means and equipment, poorly maintained, protective measures are not being implemented in safeguard zones ... The implementation of measures and establishment of permanent control of these systems contribute a substantial share to the improvement of the sanitary suitability of drinking water. Connecting the citizens to big systems which are managed and properly controlled and maintained constitutes a long-term solution.

Among toxic substances, the most frequently exceeded threshold values are those of certain pesticides and their metabolites, in particular atrazine and desethyl-atrazine, and nitrates, in particular in those systems that use groundwater as the source of drinking water. Among other toxic substances, lead appeared in one of the systems.

We have been systematically establishing the presence of nitrates in the samples of drinking water taken from public system networks since 1995. The number of »smaller« systems in which threshold values are exceeded relatively frequently decreased from 112 498 in 1995 to 3 716 in 2002.

DATA AND SOURCES:

Table 31-1: Share of unsuitable samples from microbiological tests due to the presence of E.coli and enterococci, and share of unsuitable samples from physical-chemical tests due to the exceeded concentration of pesticides and/or nitrates in the drinking water supply systems supplying 5 000 citizens or more in the period from 1992 to 2002 in the Republic of Slovenia
Source: Drinking Water Supply Systems Database, Institute of Public Health, 2003

	unit	1999	2000	2001	2002
exceeded E. coli	%	1.5	1.2	0.9	1.1
exceeded enterococci	%	0.3	0.1	0.2	0.3
exceeded combination of E. coli and enteroccoci	%	0.5	0.2	0.4	0.1
exceeded pesticides	%	2.0	4.8	3.6	3.2
exceeded nitrates	%	0.7	0.6	0.4	0.7

Table 31-2: Share of population served by the drinking water supply systems where there were 5 % or more of identified unsuitable samples of drinking water according to the microbiological and physical-chemical parameters in the period from 1999 to 2002
Source: Drinking Water Supply Systems Database, Institute of Public Health, 2003

inhabitants served by the drinking water supply systems	unit	1999	2000	2001	2002
total	number	1 398 137	1 455 981	1 452 773	1 505 618
Microbiologically (E.coli) unsuitable	number	209 919	204 260	84 798	168 277
Microbiologically (E.coli) unsuitable	%	15.0	14.0	5.8	11.2
Physically and chemically unsuitable	number	451 985	591 418	358 963	430 957
Physically and chemically unsuitable	%	32.3	40.6	24.7	28.6
Toxically unsuitable	number	58 740	176 677	150 695	123 645
Toxically unsuitable	%	4.2	12.1	10.4	8.2
Otherwise unsuitable	number	50 865	37 040	10 310	19 040
Otherwise unsuitable	%	3.6	2.5	0.7	1.3

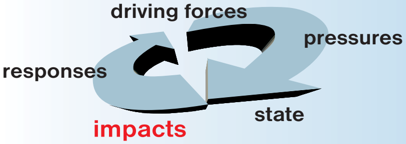
Table 31-3: Number of inhabitants served by the drinking water supply systems supplying 5,000 citizens or more and of these the number of citizens served by the systems at which the disinfection of drinking water was being implemented
Source: Drinking Water Supply Systems Database, Institute of Public Health, 2003

inhabitants served by the drinking water supply systems	unit	1999	2000	2001	2002
total	number	1 398 137	1 455 981	1 452 773	1 505 618
with disinfection of drinking water	number	853 518	851 773	848 474	894 319
without disinfection of drinking water	number	544 619	604 208	604 299	611 299

The data on the sanitary suitability of drinking water are aggregated by individual drinking water supply systems supplying 5 000 citizens or more, i.e. for the territory of the Republic of Slovenia.

The source of data is the Drinking Water Supply Systems Database which is being updated annually at the Institute of Public Health and amended in accordance with the data submitted by the regional institutes of public health and according to reporting requirements. The data are reported by the managers of public systems to the regional institutes of public health with whom they have concluded an agreement, and thereafter the regional institutes submit the data to the Institute of Public Health which draws up an annual report and submits it to the Ministry of Health.

The source contains data about the manager, drinking water supply system (water type, size of system, number of citizens served by the system) and safety, as well as results obtained from the testing of drinking water samples in line with the requirements of the Rules on the Sanitary Suitability of Drinking Water (OJ RS No 46/97, 52/97, 54/98 and 7/00). On the basis of results obtained from regular and periodic microbiological and physical-chemical tests we establish the level of compliance and sanitary suitability of drinking water. Measures for remedying deficiencies and improvement of conditions are also being implemented.



32. BATHING WATER QUALITY

Bathing water at natural bathing sites is a body of surface water – i.e. running and still inland water (rivers, lakes) and coastal water (the sea or part of the sea). The bathing water areas, i.e. areas where is normally large number of bathers and bathing is not prohibited, are determined in the Decree on Bathing Water Areas and the Monitoring of Bathing Water Quality (OJ RS No 70/03). The bathing water quality must comply with the requirements of the Rules Regarding Hygienic Suitability of Bathing Water (OJ SRS No 9/88).

GOAL

The goal is to establish the actual status of bathing water quality in Slovenia, implement control at individual natural bathing sites and bathing water areas with a view to protect human health, determine quality trends and propose measures for the improvement of bathing water quality.

Figure 32-1: Percentage of comply samples taken for microbiological and physical-chemical tests for inland bathing waters in the period from 1996 to 2002

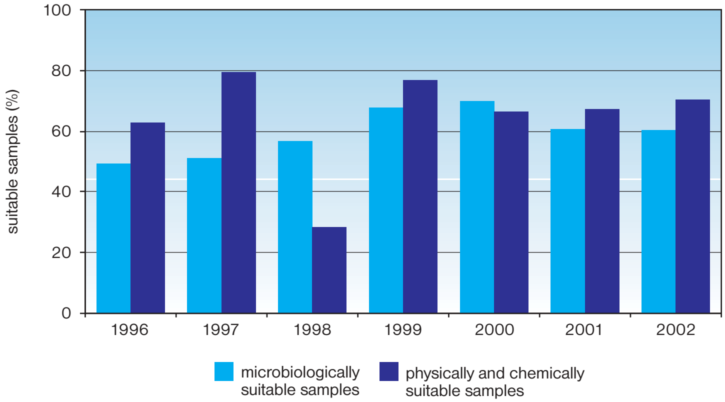


Figure 32-2: Percentage of comply samples taken for microbiological and physical-chemical tests for marine bathing waters in the period from 1996 to 2002

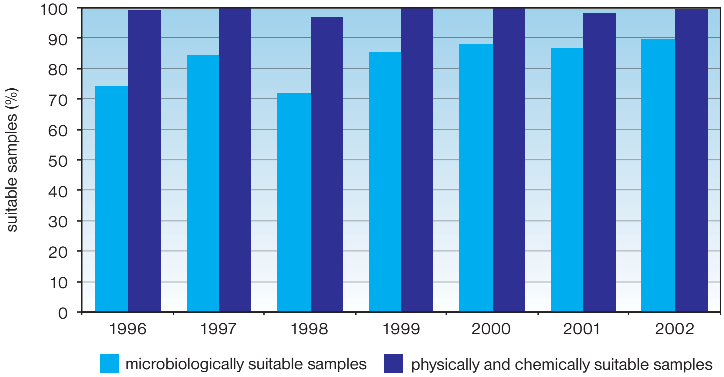
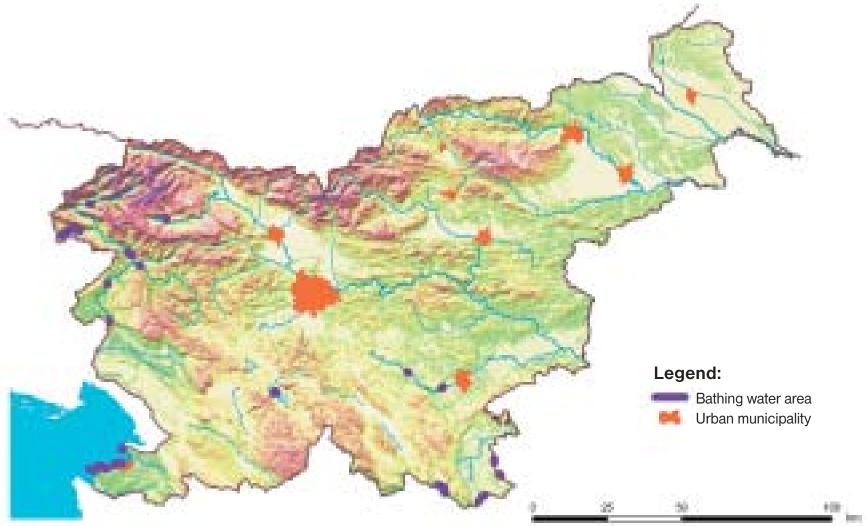


Figure 32-3: Bathing water areas
Source: Surveying and Mapping Authority of the Republic of Slovenia, Environmental Agency of the Republic of Slovenia, 2004; basic layer: Anton Melik Geographical Institute SRC SASA



In 2003, the following new implementing regulations for the control of natural bathing sites and bathing water areas were adopted: the Decree on Bathing Water Areas and the Monitoring of Bathing Water Quality (OJ RS No 70/03), the Rules on Detailed Criteria for Determining Bathing Water Areas (OJ RS No 79/03) and the Rules on the Quality of Bathing Water (OJ RS No 73/03) which were harmonized with the EC directive from 1975 (76/160/EEC) and the Water Act (OJ RS No 67/2002).
In 2002, 10.1 % of all the samples taken at bathing sites by the sea were microbiologically not in compliance with the regulation and only one sample was physically and chemically not in compliance with the regulation. Therefore, we may assess that the water of bathing sites by the sea complied with the prescribed requirements for bathing waters.
For the purposes of microbiological tests, there were multiple samples taken from inland surface waters, i.e. Lake Bled, Lake Bohinj and the Šobec pond; of the total of 50 samples taken from 9 bathing sites, only one sample failed to comply with microbiological criteria. The number of samples taken for the purposes of physical- chemical tests was smaller by almost half (3 a season/bathing site); there was a total of 4 failed samples, 3 of which failed to comply due to the exceeded content of nitrates. We may assess from the results that the water at these bathing sites was suitable for bathing. We could give similar assessment for several other bathing sites at the Kolpa River, however, it

would be necessary to increase the number of samples to obtain a more realistic assessment.
At all the remaining locations at inland surface waters and by the sea, where people bath at their own risk, less than 3 samples per season were taken, at 65 bathing sites only once and two to three times at 52 bathing sites. 45 % of tested samples taken from these bathing sites were polluted by faeces. 27 % were also chemically polluted, 50 % due to the exceeded concentration of nitrates. Due to the insufficient number of samples taken, the assessment of bathing water quality cannot be given for the majority of these sites where people bath. Bathing sites, in particular those by rivers, gravel pits and ponds, are completely unregulated and unmanaged; there, people bath at their own risk.

Data and sources:

Table 32-1: Number and percentage of comply samples taken for microbiological and physical-chemical tests for inland bathing waters in the period from 1996 to 2002
Source: Database on Bathing Sites by Natural Waters, Institute of Public Health, 2003

	unit	1996	1997	1998	1999	2000	2001	2002
samples taken for microbiological tests	number	166	151	166	148	208	184	233
microbiologically suitable samples	number	82	77	94	100	145	112	140
microbiologically suitable samples	%	49.4	51,0	56.6	67.6	69.7	60.9	60.1
samples taken for physical and chemical tests	number	132	132	78	108	172	140	194
physically and chemically suitable samples	number	83	105	22	83	114	94	136
physically and chemically suitable samples	%	62.9	79.5	28.2	76.8	66.3	67.1	70.1

Table 32-2: Number and percentage of comply samples taken for microbiological and physical-chemical tests for marine bathing waters in the period from 1996 to 2002
Source: Database on Bathing Sites by Natural Waters, Institute of Public Health, 2003

	unit	1996	1997	1998	1999	2000	2001	2002
samples taken for microbiological tests	number	640	640	608	640	608	608	415
microbiologically suitable samples	number	476	541	439	548	537	527	373
microbiologically suitable samples	%	74.4	84.5	72.2	85.6	88.3	86.7	89,9
samples taken for physical and chemical tests	number	621	636	570	640	608	608	415
physically and chemically suitable samples	number	616	636	553	640	608	599	414
physically and chemically suitable samples	%	99.2	100	97	100	100	98.5	99.8

According to the new legislation from 2003, the Database on Natural Bathing Sites is managed by the Institute of Public Health (IPH) and the Database on Bathing Water Areas by the Ministry competent for the environment. The source for the indicator for the year 2002 (managed by IPH) contains data on the location of a bathing site, name of water and name of bathing site, bathing water type, established control, frequency of sampling, number of samples taken for microbiological and physical-chemical tests, the number of unsuitable samples and cause of unsuitability in line with the applicable Rules Regarding Hygienic Suitability of Bathing Water (OJ SRS No 9/88). With a view to protect human health, hygienic suitability of bathing water is assessed and measures for the remedying of deficiencies and improvement of bathing water quality are determined on the basis of test results.

The source of data is the Database on Bathing Sites by Natural Waters, which was being updated and amended annually at the Institute of Public Health in accordance with the data submitted by the regional institutes of public health and according to reporting requirements. The data are reported by the managers of natural bathing sites to the regional institutes, with whom they concluded an agreement, and thereafter the regional institutes submit the data to the Institute of Public Health which draws up an annual report and submits it to the Ministry of Health. Certain regional institutes also take test samples at certain locations where usually a greater number of people bathe at their own risk.

In 2002, 168 natural bathing sites and bathing locations were recorded. 19 water samples were taken (weekly) from 20 (12%) bathing sites or bathing locations and 4-5 samples (every 14 days) from 10 (6 %). The Slovenian Health Inspectorate or institutes did not take any samples from 21 (12.5 %) recorded bathing sites or bathing locations.

For the purposes of laboratory testing, a total of 1 202 samples of bathing water by surface waters were taken; for the purposes of microbiological tests, a total of 620 (51.6 %) samples were taken; and for the purposes of physical-chemical tests, a total of 582 (48.4 %) samples were taken. In past years, the sampling was being carried out, in line with regulations, at the bathing sites by the sea, Lake Bled, Lake Bohinj and the Šobec pond (approximately 45 bathing sites), which are either being managed or have concluded an agreement on control with the regional institute of public health, and at the bathing locations where the institutes implemented monitoring themselves. The data are maintained by the payer.

The data on the hygiene suitability of surface bathing waters (reports by regional institutes and IPH laboratories) are aggregated according to the type of bathing water (sea, standing and running inland waters), areas of control – public institutes of public health, frequency of sampling in a season, and according to microbiological and physical-chemical suitability of samples taken by individual types of surface waters. The data are prepared in the form of an annual report to the Ministry of Health of the Republic of Slovenia.