Water supply in Slovakia

Jozef Kriš

ABSTRACT

The development of the Slovak public water supply has fallen behind other European countries. In 2000, only 82.9% of the population was connected to public water systems which supplied them with drinking water. The development of public sewerage not only pales in comparison with that of other European countries, but is also even behind the public water supply system. In 2000, only 54.7% of the total population of Slovakia lived in buildings connected to public sewerage.

This paper deals with issues relating to water resources, water utilization, water quality and protection, water supply systems and sewerage discharge. The crucial topics discussed, not only by professionals but also by the general public, include water management and the ongoing process of water and sewerage works (WSW) privatization. This is a highly demanding task, in particular for those Slovak authorities and organizations responsible for meeting these requirements. The task is especially formidable since, besides resolving all major current problems, they are also expected to outline the future perspectives of Slovak water management.

Key words | legal framework, water management, water protection, water resources, water supply

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INTRODUCTION

The Slovak Republic (territory 49,014 km^2; population 5.4 million) is situated in the temperate climate zone of the northern hemisphere with regularly alternating seasons (Figure 1). About 38% of the country is forested. Based on measurements of the average annual air temperature, the warmest part of the country is the area of Štúrovo in the south (10.4°C); while the peaks of the High Tatras in the north, in particular the Lomnický Peak (-3.7°C), are considered the coldest. The average amount of precipitation is around 760 mm, with the Danubian Lowland being the driest (below 550 mm) and the High Tatras the most humid part of the country (above 2,000 mm).

Since the Slovak Republic is situated on the watershed of the Black Sea and the Baltic Sea, which is the territory where the majority of European rivers rise (excluding the Danube), the regularity of the hydrological regime, in particular the high and medium level discharges in the springtime, is of great importance. Should we fail to store at least a certain portion of this discharge in water reservoirs, it would quickly and uselessly drain from our territory, and the uncontrolled, heavy flood peak flows not only threaten people's lives, but, more and more often, also result in enormous damage.

Based on measurements taken from 1931 through 1980, the average rate of flow in the Slovak streams is 3,328 $m^3 \cdot s^{-1}$; out of that, only some 12% (398 $m^3 \cdot s^{-1}$) initiates in the territory of Slovakia. The remaining 88% (2,930 $m^3 \cdot s^{-1}$) flows into our territory from neighbouring countries—mainly through the Danube, Morava, Dunajec, Uh, Latorica and Tisa rivers. Regular maximal discharges typically occur in springtime, March and April in particular. However, in the Danube, Poprad and Dunajec rivers they occur about 2 months later. Minimal discharges are usually recorded in late summer, autumn and winter.

The Danube River is heavily regulated; its average water discharge at the point where it leaves Slovak territory is 2,348 $m^3 \cdot s^{-1}$. However, the other streams are

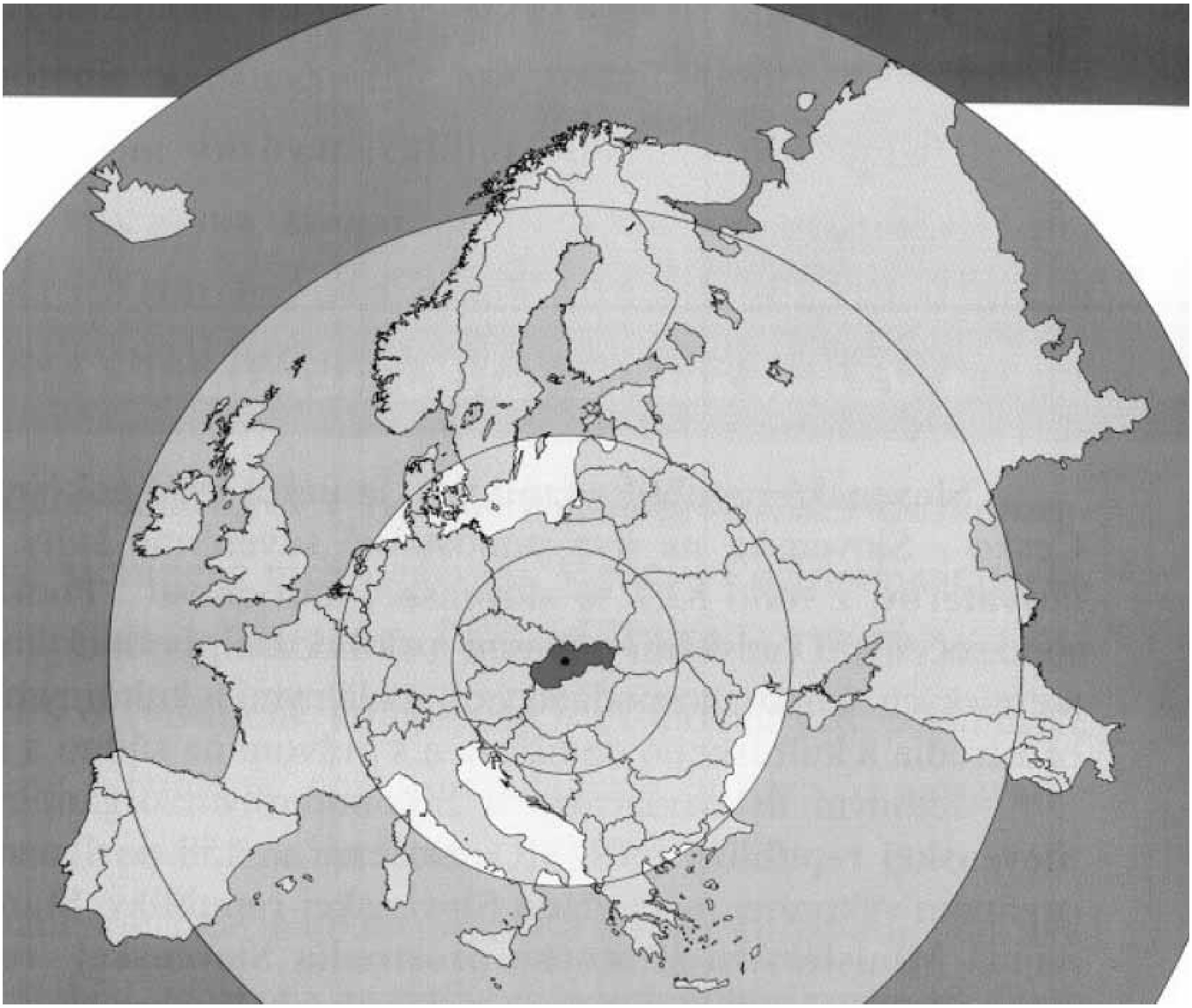

Figure 1 | Location of the Slovak Republic in Central Europe.

highly unstable. This is an unfavourable fact when considering how to best utilize this energy (ratio 1:20–1:4250), since the largest withdrawals generally happen in the periods of minimal discharge.

WATER RESOURCES

Surface water

In dry periods, the capacity of natural surface water sources amounts to approximately 90.3 $m^3 \cdot s^{-1}$. When subtracting ecological discharges (minimum discharge needed for supporting and maintaining aquatic life and other functions of a stream), only 36.5 $m^3 \cdot s^{-1}$ is available for utilization (excluding the Danube, Morava and Tisa rivers). Water reservoirs across Slovakia allow the discharges in dry periods to be increased by 53.8 $m^3 \cdot s^{-1}$, thus increasing utilizable discharges to 90.3 $m^3 \cdot s^{-1}$.

At present, there are 54 water reservoirs across Slovakia (with the overall capacity exceeding 1 million m^3) with the gross controllable capacity of 1,890 million

Table 1 | Use of surface water in Slovakia in 2000 (in million m^3)

Public supply	Industry	Irrigation	Other agriculture	Total	Discharges
66,318	564,956	77,486	2,215	710,975	1,015

Source: SHMI; Kriš (2000).

m^3. The capacity of these reservoirs allows for the interception of about 14% of the annual mean discharge from our country's territory, as well as the increase of low discharges in dry periods by about $55.5\ m^3 \cdot s^{-1}$ (above discharge Q355d $80\ m^3 \cdot s^{-1}$). Thus the total increased discharge in rivers initiating within the territory of Slovakia reaches approximately $80.0 + 55.5 = 135.5\ m^3 \cdot s^{-1}$ (Q355d increased by 69%) (Figure 2).

Water withdrawal, currently amounting to $39.0\ m^3 \cdot s^{-1}$, is equal to about 29% of the discharges during dry periods and to 10% of the mean discharge. The water consumption in Slovakia varies between 6.0 and $9.0\ m^3 \cdot s^{-1}$ and decreases during an average year by 1.5 to 2.3%.

The previously mentioned water reservoirs include seven reservoirs. Their major purpose is to ensure large-scale drinking water supplies for northern, central and eastern parts of Slovakia. During the most unfavourable dry periods—during decreased yield of groundwater sources—these reservoirs can provide approximately $4{,}000\ l \cdot s^{-1}$ of quality drinking water, ensuring the highest level of water supplies for about 270,000 inhabitants (Ministry of Soil Management of the SR 2000*c*). The utilization of surface water in Slovakia in 2000 is given in Table 1.

Groundwater

Groundwater in the Slovak Republic is considered extremely important because it represents the major source of drinking water. Although the hydrogeological conditions of accumulation, circulation and production of groundwater are generally favourable, the uneven distribution of groundwater resources and the fact that there are some hydrogeological structures practically without usable groundwater supplies, represent a disadvantage.

The basic groundwater unit is a hydrogeological zone. According to the existing groundwater zoning, the territory of Slovakia is broken down into 141 hydrogeological zones. Most of the documented usable groundwater resources are in the western Slovak region (56% of the total), found in Quaternary sediments of the Danubian Lowland and the alluvia of the Váh River and its tributaries. On the other hand, the eastern Slovak region has significantly lower documented volumes of usable ground water (17% of the total). The remaining 27% represents the resources of the central Slovak region.

In terms of water availability, the southern parts of central and eastern Slovakia, in particular the districts of Prievidza, Nitra, Lučenec, Rimavská Sobota, Vranov, Trebišov, Humenné, Bardejov, Stropkov, Svidník, but also Čadca and Trenčín, are, to a certain extent, considered areas of deficient groundwater.

According to the Slovak Hydrometeorology Institute's (SHMI) documentation from December 1998, the natural groundwater resources in the territory of Slovakia represent $146{,}720\ m^3 \cdot s^{-1}$, out of which $74{,}237\ m^3 \cdot s^{-1}$, i.e. 50.59%, are documented usable sources (Ministry of Soil Management of the SR 2000*c*).

Usable groundwater resources

Usable groundwater resources are defined as those groundwaters that can be withdrawn from the subsurface by technical means, while keeping the natural balance of the environment (ecological limits).

The established utilizable volumes of groundwater are broken down into two basic categories:

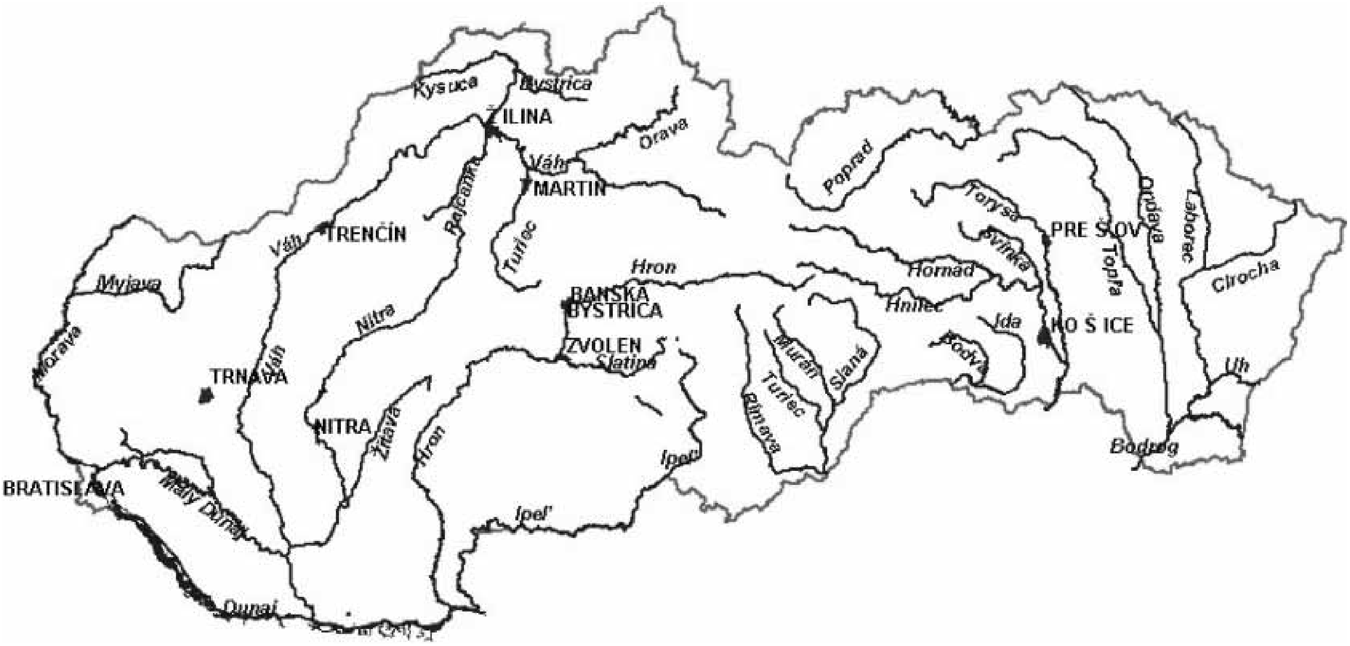

Figure 2 | Map of Slovakia—major streams. Source: Water Research Institute.

1. Sources and supplies approved by the Subcommittee for Groundwater Resource and Supply Classification (GRSC). They are classified into categories A, B, C1 and C2 according to the degree of the quality of verification and the level of knowledge of supplies, as prescribed by the existing *Groundwater Supply Classification Principles* (Slovak Technical Standard (STS) 75-72-21 (1989) Classification of surface water quality). In 1988 the individual categories of the usable groundwater supplies were as follows (Ministry of Soil Management of the SR 2000*c*):
   Category A807.0 $l \cdot s^{-1}$
   Category B 1,862.0 $l \cdot s^{-1}$
   Category C1 125,505.3 $l \cdot s^{-1}$
   Category C2 11,595.9 $l \cdot s^{-1}$
   Total 39,770.2 $l \cdot s^{-1}$
   Categories A and B include groundwater sources already used as drinking water supplies; categories C1 and C2 include sources ready to be used as drinking water supplies.
2. Sources and supplies of groundwater that have not been approved by GRSC. Data on their volume are documented and broken down into three categories: I, II, III, according to the degree to which they have been studied and the reliability of gathered data. In 1998, the volume of usable groundwater resources not approved by GRSC was 34,466.44 $l \cdot s^{-1}$ (Ministry of Soil Management of the SR 2000*c*).

For the utilization of ground water in Slovakia in 1999 see Table 2.

SURFACE AND GROUNDWATER QUALITY

Surface water quality

The quality of surface water in the Slovak Republic is assessed by summarizing results of classification as defined by the STS 75-72-21, using the following major indicator groups: (a) microbiological and biological indicators; (b) physical and chemical indicators; (c) radiological indicators. Depending on the water quality, the streams are classified into categories of cleanliness:

Table 2 | Use of groundwater in Slovakia in 1999 (in $l \cdot s^{-1}$)

Public supply	Food production	Other industry	Agriculture and live-stock farming	Cultivation of plants	Community purposes	Other	Total use
11,550	362	1,647	482	8	419	279	14,747

Source: SHMI; Kriš (2000).

Groups I–V. The oxygen regime indicators of the Slovak streams have developed favourably. Since 1990, the percentage of the worst quality category, V, has rapidly decreased at sampling sites. In 1990, 19% of the sampling sites were classified as category V. Since 1995 the percentage has varied between 5 and 6%. This improvement can also be expressed in kilometres. According to the oxygen regime indicators, in 1990, there were 618 km of streams polluted enough to receive the category V rating (16% of the total assessed length); in 1995, it was only 160 km (4.6% of the total assessed length), while the overall length of monitored streams was about the same. The 666 km of streams falling in the undesirable category IV in 1990 (15% of the sampling sites) decreased to 560 km in 1995 (12% of the sampling sites).

Of the negative indicators, biological and microbiological indicator groups D and E should be mentioned, since the results of water quality assessment with these group indicators have been classified as categories V and IV in the majority of monitored sampling sites (87% and 91% in 1990 and 1998, respectively). Given the changes in assessment procedures beginning in 1995, it is difficult to evaluate the categories between 1990 and now. However, the 1995–1998 assessment results indicated that the number of category IV and V sampling sites decreased from 91% to 85%, taking the overall assessed sampling sites into consideration. In 1998 the quality of Slovak surface water was monitored in 199 sampling sites.

From the 199 sampling sites assessed in 1999, 140 sampling sites (70.35%) recorded the favourable status (A), 19 sampling sites (9.55%) the tense status (B) and 40 sampling sites (20.10%) the passive balance status (C). Compared with 1998, in 1999 the number of changes in the balance status of surface water quality increased in values of COD, BOD and N-NH4 indicators. Although compared with 1998 the overall annual discharge of surface water in Slovakia decreased in 1999 from 1,057,578 to 1,045,000 thousand $m^3 \cdot s^{-1}$, the overall load of balance indicators, TDS and non-polar extractable substances increased. During the assessment period 56 significant sources of pollution were registered (Ministry of Soil Management of the SR 2000*c*).

Groundwater quality

In 1999, the groundwater quality was monitored in 26 areas that are considered significant in terms of water management, mainly in river alluvia and in Mesozoic and neovolcanic complexes, primarily throughout the basic network of SHMI stations, supplemented by wells and utilized, as well as non-utilized, springs. The overall monitoring network consists of 284 monitoring sites with a twice-a-year monitoring frequency. In 1998 there were 291 monitoring sites. The Rye Island (Danube Lowland) represents a separate section of the Slovak groundwater quality monitoring network. In 1998, the groundwater quality was monitored in 46 monitoring stations in 4 areas there, with a monitoring frequency of 2 to 12 times a year.

The ongoing monitoring has proved that in monitored areas problems are emerging relating to negative oxidation-reduction conditions in groundwater. This has been proven by frequently increased concentrations of Fe, Mn and NH_4. Compared with previous years, the pollution from organic substances (indicated by frequent exceedances of marginal concentration limits of non-polar extractable substances, COD and phenols) has remained the same. It should be mentioned that due to changes in the STS 75-7111 (*Drinking Water*) effective from July 1998, the concentrations of arsenic, antimony, nickel and lead are being exceeded; due to this, the Mesozoic region of the Low Tatras has been reclassified from an area with a low number of exceeded limits to an area with a medium degree of groundwater pollution.

The prevailing type of land use in the monitored areas (urban and/or agricultural areas) is reflected in the relatively frequent increases in the parameters of oxidized and reduced forms of nitrogen in the water. The most frequently recorded concentrations of trace elements included mostly aluminium. However, together with pollution caused by other indicators, it occurred only locally (Kriš 1999).

Drinking water quality

The drinking water quality of public water supplies is assessed on the basis of inspections made by waterworks operators (i.e. water and sewage works) from the sector of the Slovak Ministry of Soil Management. In 1999, the water and sewage works laboratories made a total of 353,786 analyses of samples taken from the distribution network, examining particular water quality indicators (an increase of 25.2% compared with 1998). The microbiological and biological water quality indicators were those most frequently examined (114,585 analyses).

In summarizing the results of the analyses, we can state that in 1999, despite some changes in the limits of some indicators, the total share of analyses meeting STS limits remained at 98%. From among inorganic indicators, antimony and arsenic proved to be the most problematic. Before July 1998, pursuant to the STS 75-7111, antimony was not subject to monitoring, and the permissible limit of arsenic per litre of water was decreased from 50 μg to 10 μg.

At present, more than 120 water treatment plants operate in the Slovak Republic producing drinking water by treating both surface and groundwater. These water treatment plants treat approximately 15–16% of the total volume of water (4000–4500 $l \cdot s^{-1}$) (Ministry of Soil Management of the SR 2001). Some of the currently operating water treatment plants were built back in the 1930s, while others are relatively new. The diversity of water treatment technology processes is reflected by the era in which a particular water treatment plant was designed and built. Small water treatment plants operate as well as the large ones–the latter treating hundreds of litres per second, using modern water treatment technologies.

WATER RESOURCE PROTECTION

Water resource protection should be viewed as an integrated protection of quality and quantity of surface and groundwater, including natural curative springs and mineral waters. The major determinant in terms of water resource *quality* protection is the water pollution source, having either a direct or indirect impact on water resources. Water *quantity* protection is based on increasing the accumulation capacity of watersheds and aquifers and on controlling the observance of calculated values for the volumes of withdrawn water. This has been done by establishing groundwater utilization limits (ecological limits), as well as binding minimal discharges (ecological discharges–MQECO) in the streams, in conformity with the principles of surface water management in the respective watersheds.

Both aspects of water protection (quantitative and qualitative) are subordinated to a *territorial water protection* system, in particular in such source areas that are considered significant from the perspective of water management. The system consists of three types of protection: general protection, resulting from the Act on Waters No. 184/02; broader regional protection, implemented by means of protected water management areas; and special protection with increased severity–a specific protection of water sources utilized for drinking purposes implemented by means of hygienic protection zones (Ministry of the Environment of the SR 1999).

Protection of water quality

One of the key roles of water protection in terms of water quality is to resolve the problems relating to sources of pollution. Pollution sources, which have a negative impact on water quality, are broken down into two categories based on the type and severity of their impact: *point* sources of pollution and *non-point* sources of pollution.

The most significant *point sources of pollution* are wastewater discharges from industrial and agricultural facilities and from residences. Even though the volume of discharged wastewater has been declining since 1990, in order to ensure active water quality protection the proportion of the population connected to the sewage system has to be increased and measures relating to wastewater treatment have to be taken.

Legally, the polluter is in charge of drainage water and sewerage treatment and is obliged to monitor the quantity and quality of discharged wastewater. The validity of monitoring results depends on the precision of the sampling procedure and the level of expertise of laboratories providing wastewater analyses.

The currently operated wastewater treatment plants represent a specific problem, because they are overloaded (both hydraulically and from a load point of view), and the wastewater treatment technology no longer complies with legal regulation standards.

Protection of water quantity

The major objective of water utilities is to maximize usage of the stored water resource. In the period between 1989 and 1991, the impact of environmentally uncontrolled exploitation of water-deficit regions was highly adverse, ultimately resulting in the depletion of groundwater resources by using the accumulated reserves. As a consequence, water managers, in addition to qualitative water resource protection, began to pay closer attention to quantitative protection, i.e. protection of the volume of water reserves.

The quantitative protection of the yield of groundwater was introduced in 1993. At the same time, the 'Methodology of Establishing Ecological Limits of Groundwater Resource Utilization' was developed and applied in the 'General Protection and Rational Water Utilization'. The methodology defines how to establish usable volumes of groundwater resources while ensuring sustainable development of the land by defining general ecological limits for the entire watershed–a hydrogeological zone or hydrogeological structure, as well as local ecological limits for particular sources that are being used (springs and wells). Previous experience shows a decrease in the volume of continuously used springs (Qmin) and wells (Qrec) of 15–20% and 20–30%, respectively (Ministry of the Environment of the SR 1999).

Territorial protection of water resources

In addition to the protection of water quality and water quantity, a territorial water protection system has also been introduced for the source areas considered significant from the perspective of water management. The system consists of three types of protection:

- General protection of water resources pursuant to Act No. 184/02 Collection of Waters is clearly spelled out for the entire territory of the Slovak Republic. In practice, general protection of water sources is reflected in the scope of responsibilities of all entities dealing with or handling water.
- Broader regional water protection is implemented by means of protected water management areas (PWMA, also called 'Protected areas of natural water accumulation'). Currently there are 10 PWMAs declared in Slovakia, covering a territory of 6,942 km^2.
- Special protection with increased severity is stipulated by the Act on Waters. It is primarily implemented by means of hygienic protection zones according to the Regulation of the Ministry of Health of SR No. 17/1979 Coll., and also by designating streams for water supply purposes and their watersheds. For the overview of PWMAs and watersheds of water supply streams and reservoirs see Figure 3.

Natural curative and mineral water resources are protected in conformity with Act No. 184/02 Coll. On Waters and Constitution of SR Act No. 277/94 Coll. On Health Care by establishing protection zones (PZ), in which any action that could have adverse effects on the above

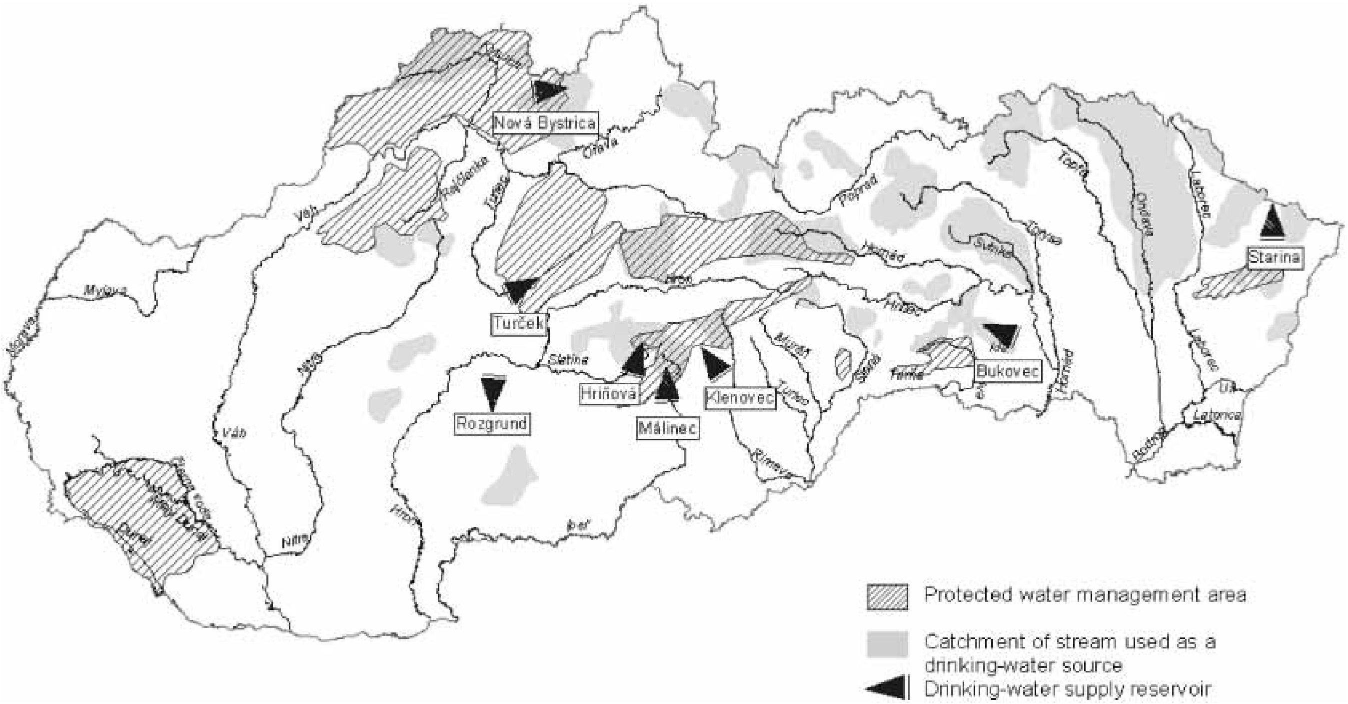

Figure 3 | Protected water management areas, catchments of drinking-water supply streams and reservoirs. Source: Water Research Institute.

Table 3 | Growth of total population and population supplied with drinking water from the public water supply systems

	1995	1996	1997	1998	1999	2000
Total population in thousands	5363.7	5373.9	5383.2	539.4	539.3	540.0
Population supplied by WSW, in thousands	425.8	429.4	435.6	441.1	444.8	447.2
Proportion (%)	79.4	79.8	80.8	81.8	82.4	82.9

Source: Water Research Institute.

resources is prohibited or restricted. The zones are set by regulations of the Ministry of Health of SR.

PUBLIC WATER SUPPLIES

Compared with 1999, the overall number of inhabitants connected to public water supply systems increased in 2000 by 24.3 thousand to 4,479,200, i.e. 82.9% of the total population of the Slovak Republic (Table 3 & Figure 4). The increase of 0.5% of those supplied in 2000 was smaller than increases made in 1999 and 1998, which amounted to 0.8 percent. The population supplied by public water systems varies in different regions. The majority of those supplied by public water systems are in the Bratislava region; the regions of Trenčín, Žilina and Banská Bystrica also exceed the Slovak average. The population supplied by public water systems in the Košice and Prešov regions is below the Slovak average. The drinking water supply situation is even more disproportionate when broken down by districts, since the proportion of the population supplied with drinking water varies between 50% (Vranov

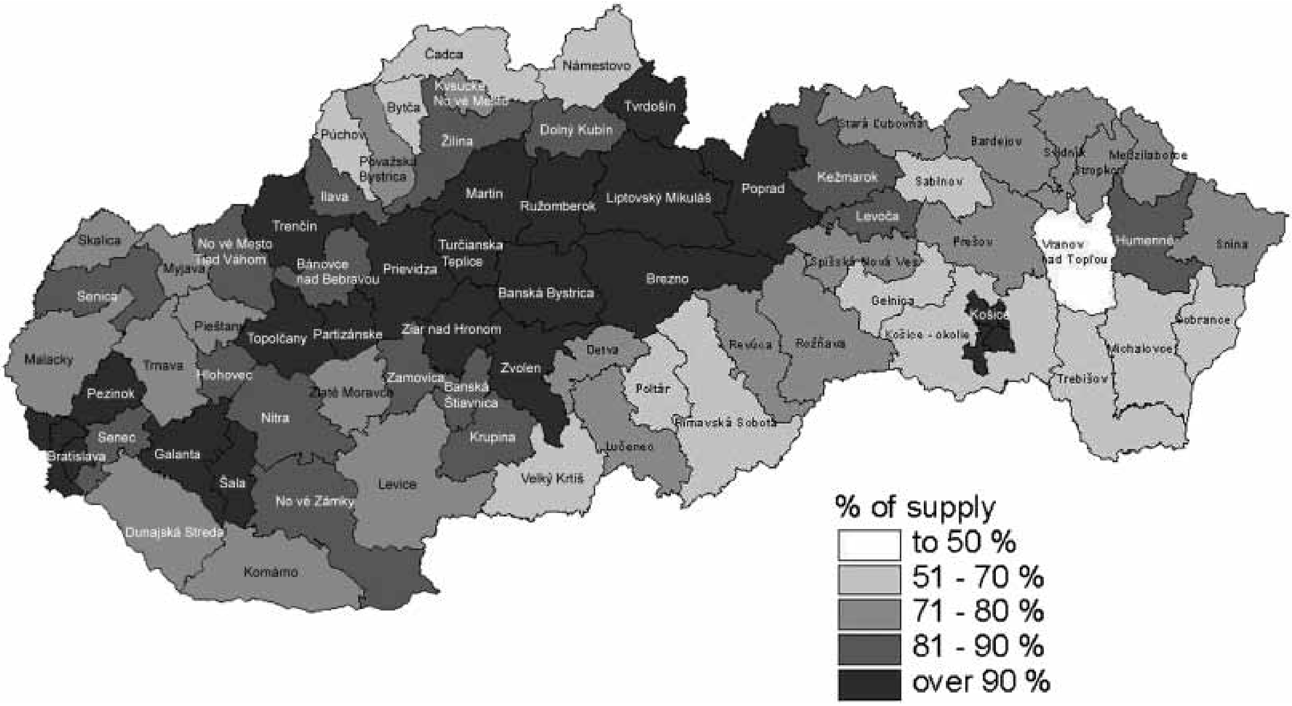

Figure 4 | Proportion of inhabitants supplied with drinking water from public water supplies (in 1999). Source: Water Research Institute.

and Topľou, Sabinov, Bytča, Košice-environs) and 100% (Bratislava, Prievidza, Martin, Banská Bystrica, Partizánske and others) (Ministry of Soil Management of the SR 2001).

In 1999, the water treatment works produced 402.5 million m^3 of drinking water. Compared with 1998, this is a decrease of 31.2 million m^3. Table 4 clearly demonstrates that the volume of metered water also continues to decrease. In 1999 it decreased by 28.4 million m^3, including a decrease in households of 15.1 million m^3. The amount of metered water amounted to 72% of water designated for utilization. The household water supplies keep decreasing despite the increase in the number of supplied residents. This implies that the specific water demand in 1999 decreased (Figure 5).

Since 1991, water consumption in Slovakia has been constantly decreasing. This phenomenon is caused partially by decreasing industrial production, but also by the gradual decrease in public water consumption due to increasing drinking water prices. The specific demand for drinking water has decreased since 1990 by almost 38%; the current consumption value is $124.8\ \mathrm{l \cdot person^{-1} \cdot day^{-1}}$. Compared to EU countries, which consume approximately $145.0\ \mathrm{l \cdot person^{-1} \cdot day^{-1}}$, the specific water demand in Slovakia decreases year after year. The consumption of drinking water is falling well below the average, leaving us dangerously close to approaching minimal hygienic standards. This trend also applies to other water use categories, since the demand of industrial and other users—compared to 1990—has decreased by 30.2%. The overall withdrawal of irrigation water also shows a significant decrease (88.7%).

The findings of recent analyses and comprehensive studies show that, since 1990, the overall volume of water use has been decreasing. Predictions are that, by 2005, the water demand will decrease by 17–18% compared to demand in 1998. Based on analyses, the specific household water demand should reach the bottom line ($107\ \mathrm{l \cdot person^{-1} \cdot day^{-1}}$) by 2005; and consequently, the overall water use is predicted to decrease to $165\ \mathrm{l \cdot person^{-1} \cdot day^{-1}}$. Beginning in 2005, we assume a linearly-increasing trend, because the conditions in our

Table 4 | Water delivery and trends in development of water supply systems in WSW administration

No.	Indicator	Unit	Year 1997	1998	1999	2000
1.	Population supplied by water supply systems (WSW)	Thousand	4,155.3	4,189.5	4,014.4	4,028.9
2.	Surface water resource capacity	$l \cdot s^{-1}$	30,624	30,556	29,308	29,530
3.	Distribution network length	km	22,013	22,481	22,950	23,328
4.	Groundwater resource capacity	$l \cdot s^{-1}$	25,645	25,638	24,396	24,401
5.	Water produced in WSW facilities	$mil \cdot m^3$	445.1	433.7	402.5	391.7
	From groundwater		377.6	352.1	336.0	323.6
6.	Total water produced	$mil \cdot m^3$	445.9	433.8	402.8	392.1
7.	Metered water—total	$mil \cdot m^3$	320.7	314.9	286.5	275.1
	—households		199.7	201.0	185.9	181.6
8.	Not revenue water	$mil \cdot m^3$	125.3	118.9	116.3	117.0
	Of which: losses in the piping network	$mil \cdot m^3$	104.1	98.3	96.8	94.7
	Of which: losses in the piping network	%	22.4	22.2	23.9	24.1
9.	Specific water consumption	l per capita per day	131.9	131.4	126.9	123.5

Source: Water Research Institute.

country shall approach the current standard of living in developed countries. The average specific water demand for households in 2030 is predicted to reach $145\,l \cdot person^{-1} \cdot day^{-1}$; and the overall specific water demand $220\,l \cdot person^{-1} \cdot day^{-1}$ (Kriš 1999; Kriš *et al.* 2000).

The overall volume of non-metered (non-revenue) water has decreased to 116.3 million m^3—that is 29% of the total water production; more than 83% of that represents losses in the distribution network (24% of produced water). Measures should be adopted and taken to decrease the losses in the piping system to an acceptable rate, corresponding to European standards.

Compared with 1999, the overall length of water piping in Slovakia increased by 369 km, reaching a total length of 23,328 km. In 2000, the total length of water connections increased by 86 km to a total of 3,386 km. For the data on water use and development of water systems administered by WSWs see Table 4 & Figure 6.

LEGISLATION AND STANDARDIZATION

The most important legislation regulating water management is Act No. 184/2002 Coll. On Waters which was enacted on 16 April 2002, and its complementary regulations. It entrenches fundamental rules of water handling and protection, administration of watercourses and water construction works, flood prevention, compensation and fines in the relevant field. Water management conforms to the rules of additional laws, decrees and regulations related to overall water management activities.

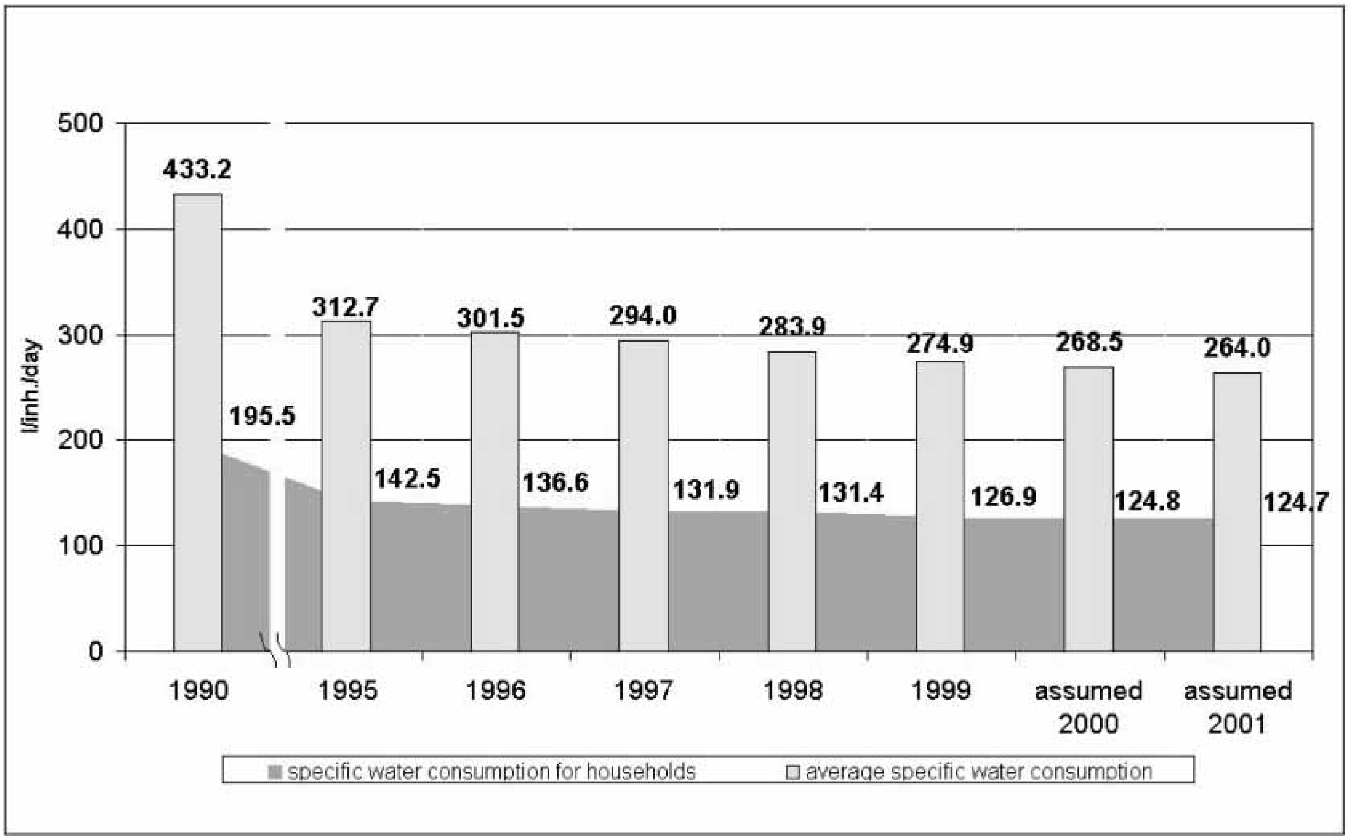

Figure 5 | Specific water consumption in Water Sewage Waterworks (WSW) administration. Source: Water Research Institute.

Harmonization of the Slovak technical law with the EU technical law results from the European Accession Agreement, which includes not only harmonization with EU legal regulations, but also harmonization with European standards (ES); this is considered a precondition of eliminating technical barriers in trading of goods and services. Acceptance of Slovakia in European Union Standardization as an affiliated member will indicate that the ES system has been incorporated in the Slovak technical standard (STS) system, and that the same rules apply to both systems. European standardization in water management covers the following areas: water quality, sludge, water supply systems and sewerage. The current progress in adopting European standards in these areas is good; 92% of ES regulating water quality have been issued or are under development, in the field of water management it is 67%, in sewerage 82% and in sludge specification 66%.

The Slovak Republic is fully focused on legal, institutional, financial and economic preparation for admittance to the EU and on the time schedule of preparatory measures.

TRANSFORMATION OF WATER AND SEWERAGE WORKS (WSW)

The concept of transformation of WSW was designed as a continuation of the previous stage of the water and sewerage works transformation, that is a free transfer of state property administered by public water and sewerage works to municipalities. This transformation will enable their public-benefit roles and responsibilities to be fulfilled, and will be implemented in conformity with existing legislation.

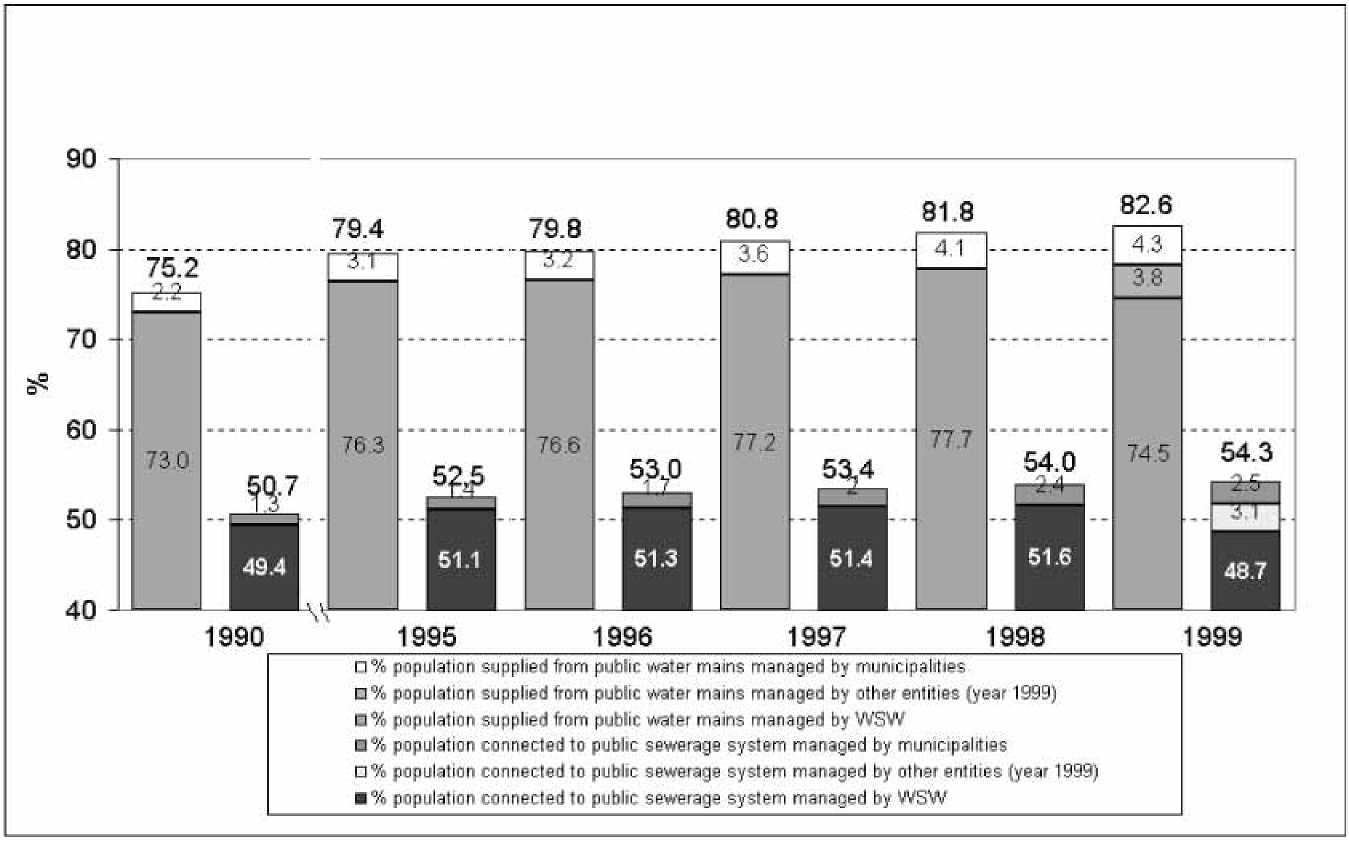

Figure 6 | Comparison of percentage of population supplied by the public water supply system and percentage of population connected to the public sewerage system. Source: Water Research Institute.

The 'Concept for the Transformation of Water and Sewerage Works', state enterprises, is being developed with the aim to (Ministry of Soil Management of the SR 2000*a*,*b*):

- ensure transfer of state property, which is currently administered by the Water and Sewerage Works and state authorities, to municipalities;
- make it possible for the municipalities to competently tackle problems concerning the water supply, the sewage system and waste water treatment;
- distribute the financial burden between the state and municipalities in accordance with the implementation of development programmes;
- promote the entry of foreign capital in order to ensure development programmes;
- ensure sufficient funds for the reconstruction and renewal of the existing property in order to improve the quality of water supplies and to reduce water losses;
- make the price of drinking water and sewage treatment more realistic in such a way so as to avoid an enormous increase in the costs of living;
- increase the efficiency of entities ensuring drinking water supplies and sewerage discharge;
- support the modernization and development of plants and equipment.

CONCLUSION

Streams, groundwater, mineral water and natural curative springs are in the ownership of the Slovak Republic.

Therefore, in harmony with the needs of society and with the principles of the European Water Charter, the more intensive the water utilization and the higher the level of 'civilization' of society, the more responsibly and diligently the waters have to be protected, regulated and replenished. Therefore, it is of primary importance that both the surface water and groundwater are administered by organizations fully ensuring the direct application of state interests, in particular in the rational utilization of water, water protection and the fair distribution of these irreplaceable natural resources.

The Slovak state water management policy for the future has to be based on the state water management objectives, which include (Ministry of Soil Management of the SR 2000*a*,*b*):

- Providing sufficient volume and quality of drinking water for inhabitants and all consumers.
- Providing sufficient volume of water of adequate quality for industry, agriculture, power generation and other purposes, and with a high level of service.
- Overall treatment of the volume of utilized and polluted water before discharging it back to its natural environment.
- Achieving a high level of environmental protection within the context of sustainable development.
- Achieving an adequate level of flood prevention in residential and industrial zones and areas of transport infrastructure and intensive agricultural production.
- Achieving water resources and facilities protecting against damage caused by drought.

The ultimate goal of Slovakia is harmonization of its water management policy with that set by the European Union legislation, in which it is enforced as an inseparable part of the right to a healthy and clean environment.

Nevertheless, the scope and implementation of the concept of water management policy has to take into consideration the following developmental trends in society:

- The ongoing transformation to a social and environmental type market economy.
- Transformation to an information-oriented society.
- Transformation to a learning and cultural society.
- Increasing participation and responsibility of citizens in resolving public issues, in particular those of the various regions and municipalities.

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