

Andrea Luptáková Lucia Kvapilová, Anna Žákovičová  
**Ground water quality monitoring**

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**V.1.12. Ground water quality in the area of the Gabčíkovo hydraulic structures**

Andrea Luptáková, Anna Žákovičová, Lucia Kvapilová

# Groundwater quality monitoring

In accordance with legislation of the Slovak republic and European Union there is a requirement of the groundwater quality monitoring.

Monitoring activities follow the Act of the Slovak National Council 364/2004 Coll. (Water Act) and Regulation of the ME SR 221/2005 Coll. about assessment of water status.

SHMI monitoring activities include sampling, chemical analyses, control, data storing, data processing and availability, accessing the groundwater qualitative characteristics.

Special interest is given to Žitný ostrov area. Groundwater from this area is the most important source of drinking water in the SR.

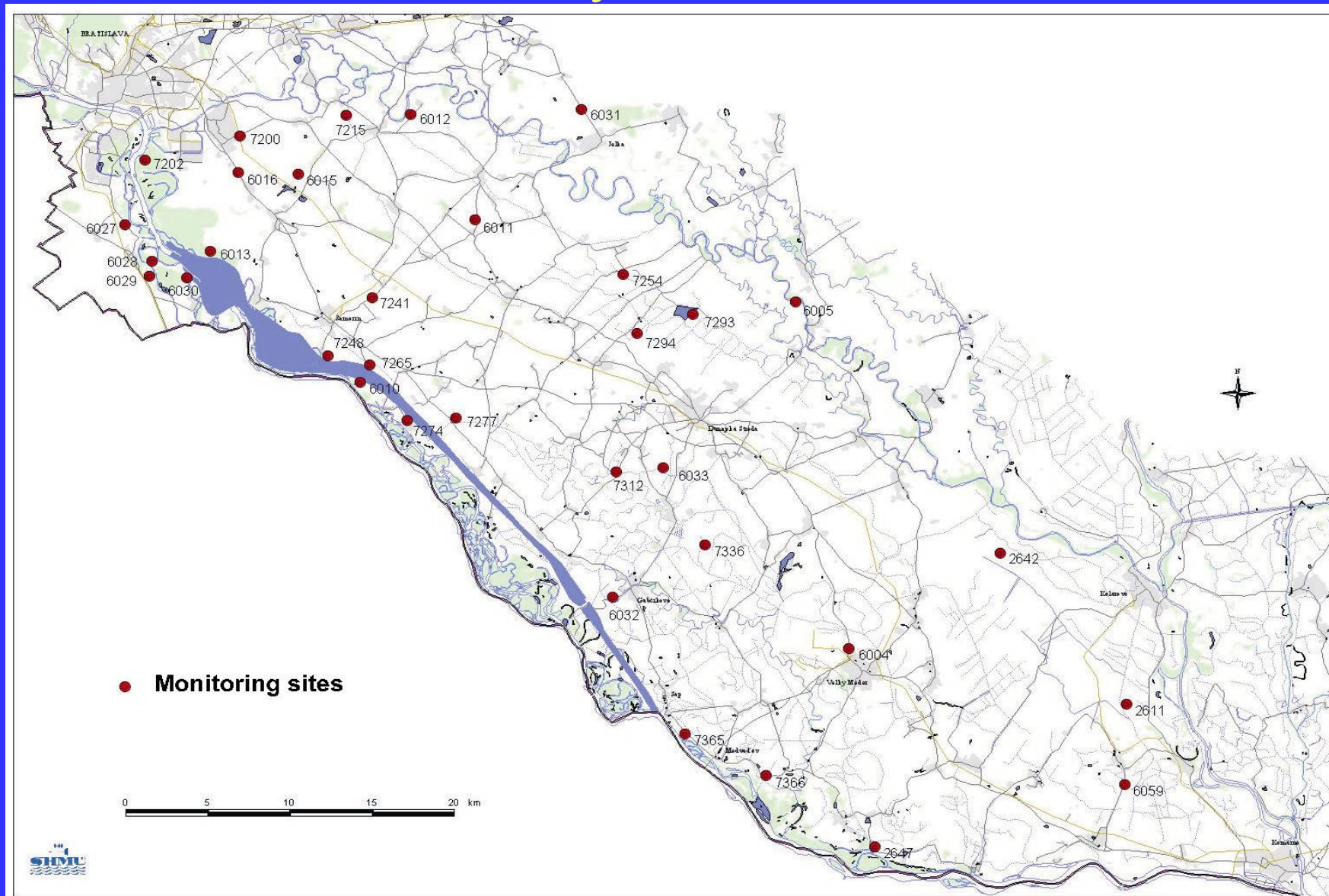
## Groundwater quality monitoring in Žitný Ostrov area

The groundwater quality in the Žitný ostrov area has been systematically monitored since 1982.

At the beginning, the monitoring network included 16 objects, from which the samples were taken 12 times a year. Gradually the network was enlarged, and at present the water quality is monitored 2 and 4 times a year at 34 multilevel piezometric boreholes.

The extent of groundwater quality parameters has been established in accordance with the Regulation of Ministry of Health 151/2004 Coll. on Drinking Water Requirements and Drinking Water Quality Control, except for microbiological and biological parameters.

# Groundwater monitoring network in Žitný ostrov area



# Groundwater quality determinants

<p><b>Measurement in situ</b></p>	<p>Depth of object, Temperature of air/water, Level of water before/during sampling, Strength of sampling pump, pH - value, Standardised conductivity, Oxygen content/saturation, Acid neutralisation capacity, Base neutralization capacity, Colour, Odour, Sediment content</p>	
<p><b>Group of determinants</b></p>		<p><b>Frequency of sampling/year</b></p>
<p><b>1/ Basic physio-chemical substances:</b> Natrium, Potassium, Calcium, Magnesium, Manganese, Iron, Chlorides, Sulphates, Phosphates, Silicates, Carbonates, Hydrogencarbonates, COD-Mn, forms of CO<sub>2</sub>, O<sub>2</sub>, pH-value, total cyanides</p>		<p>4x in every monitoring site</p>
<p><b>2/ Nitrogen forms:</b> Nitrates, Nitrites Ammonia ions</p>		<p>4x in every monitoring site</p>
<p><b>3/ Trace elements:</b> Arsenic, Aluminium, Cadmium, Copper, Lead, Mercury, Zinc, Chromium, Nickel</p>		<p>4x in every monitoring site</p>

<b>Group of determinants</b>	<b>Frequency of sampling/year</b>
<b>4/ Organic substances:</b>	
<b>Common Organic Compounds:</b> Nonpolar Extractable Substances (UV, IR), Steam Distillable Phenols, TOC	4x in every monitoring site
<b>Pesticides:</b> DDT, Heptachlorine, Hexachlorobenzene, lindane, Methoxychlorine, atrazine, simazine	1x in chosen monitoring sites
<b>ΣPCB:</b> D 103, D 106	1x in chosen monitoring sites
<b>Aromatic hydrocarbons:</b> 1, 2 - dichlorobenzene, 1, 3 - dichlorobenzene, benzene, chlorobenzene, toluene, xylene	1x in chosen monitoring sites
<b>Chlorinated phenols:</b> dichlorophenol, pentachlorophenol, 2,4,5 - trichlorophenol, 2,4,6 - trichlorophenol	1x in chosen monitoring sites
<b>Chlorinated solvents:</b> 1,1 - dichloroethene, 1,1,2 - trichloroethene (TCE), 1,1,2,2 - tetrachloroethene (PCE), 1,2 - dichloroethane, tetrachloromethane, chloroethene, chlorophorm	1x in chosen monitoring sites
<b>Polyaromatic hydrocarbons:</b> benzo(a)pyrene, fluoranthene, fenantrene	1x in chosen monitoring sites

# Evaluation of groundwater quality in the area of the Gabčíkovo hydraulic structures

In the area of the Žitný ostrov 12 objects in the immediate vicinity of the Gabčíkovo dam were selected for evaluation of groundwater quality, which has been systematically monitored here since 1984.

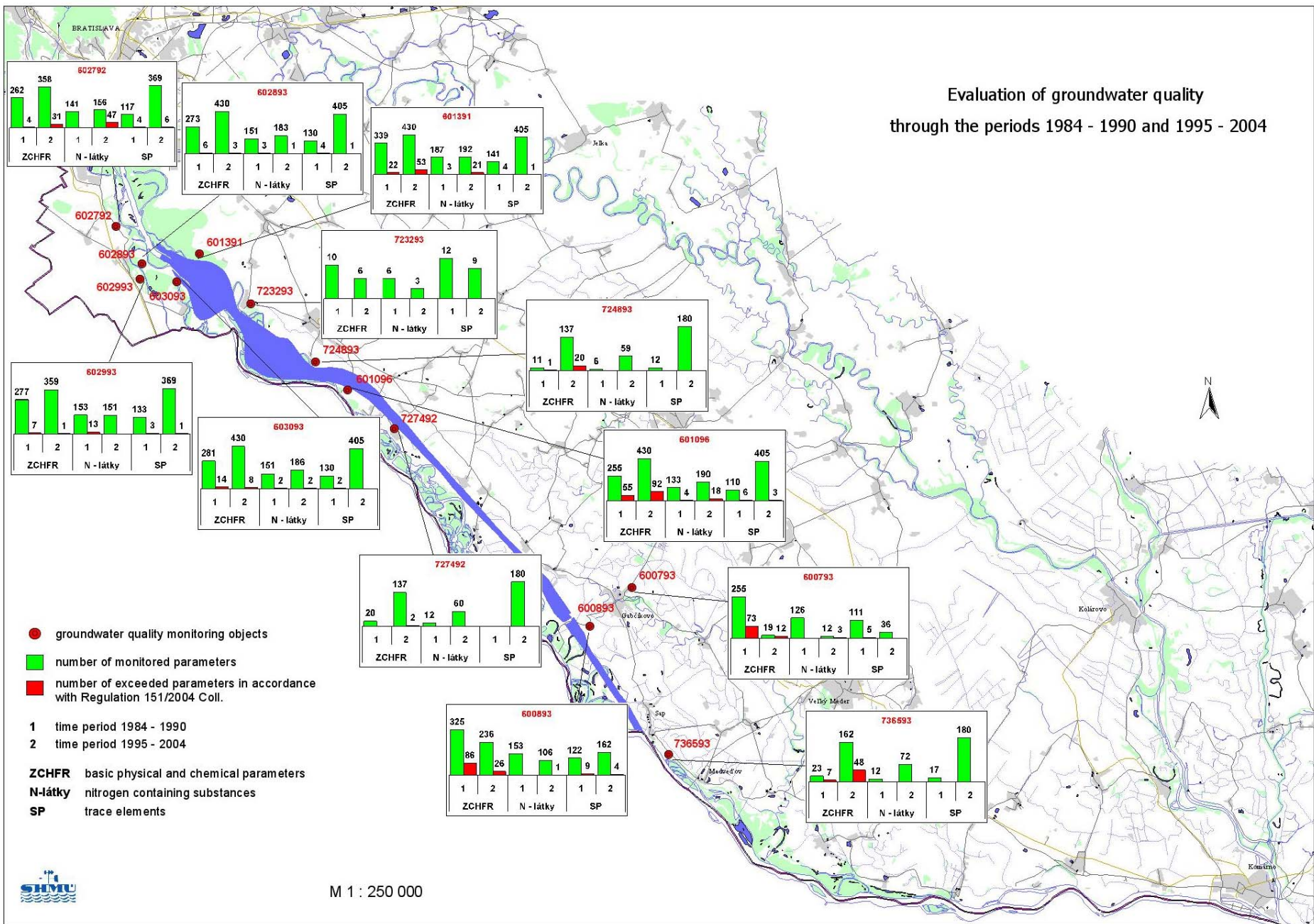
Groundwater quality was compared in the pre-dam situation (1984-1990) and after the Danube damming (1995-2004).

The monitored parameters are divided:

- 1/ basic physical and chemical parameters
- 2/ nitrogen containing substances
- 3/ trace elements
- 4/ organic substances

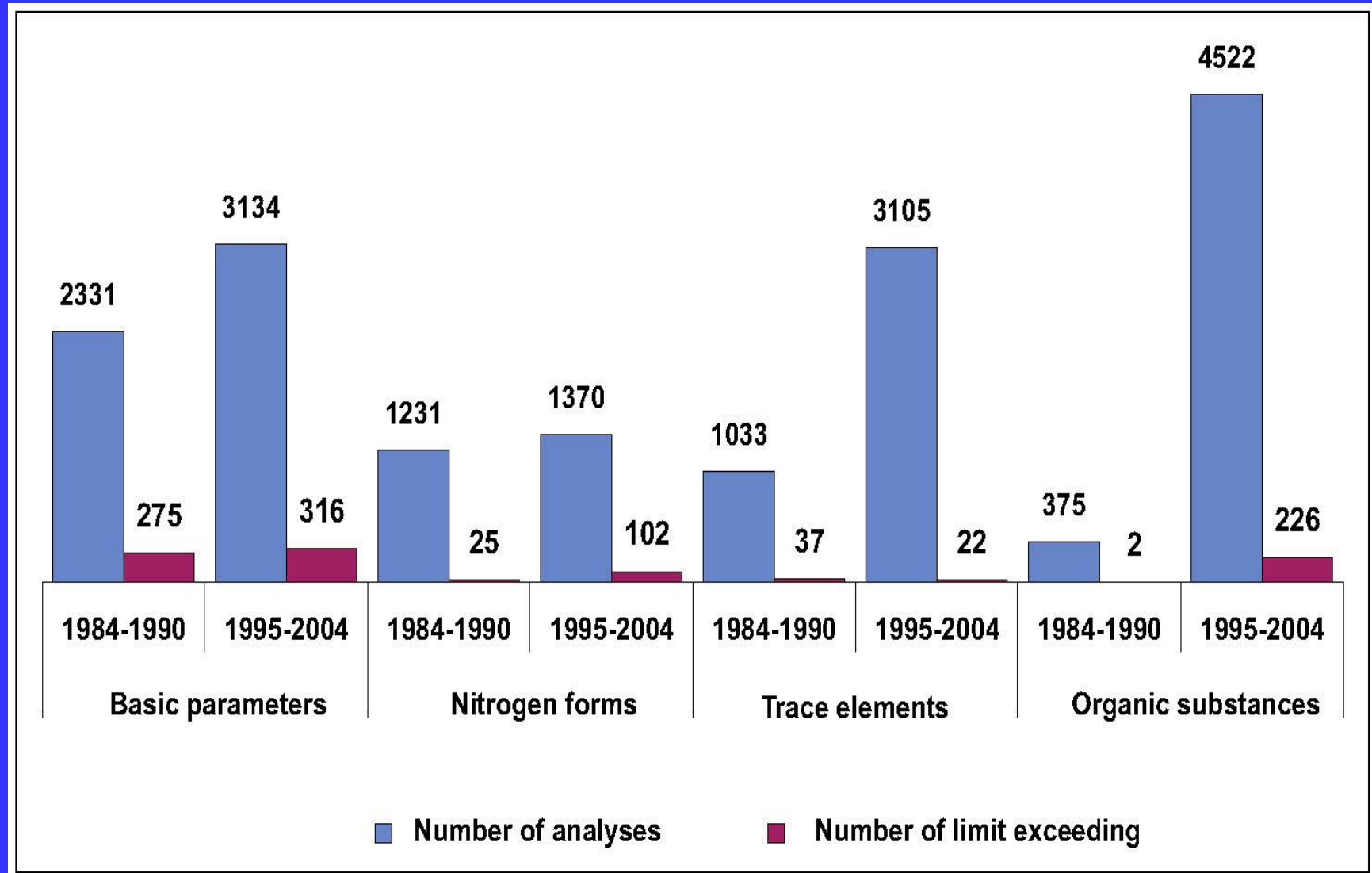


## Evaluation of groundwater quality through the periods 1984 - 1990 and 1995 - 2004





# Comparison of the total number of cases of detected pollutants and limit violations in individual parameter groups



## Conclusion

In the framework of all chemical analyses of groundwater, an over-limit concentration was recorded in 7% of the cases in 1984-1990, while only 5% in 1995-2004, which indicates a moderate improvement of ground water quality.

Based on an evaluation of the monitoring results it can be stated that construction of the Gabčíkovo project has not caused any significant changes in the chemical composition of groundwater.