Jan Gavurník, Zoltán Hlavatý, Ľubomír Banský

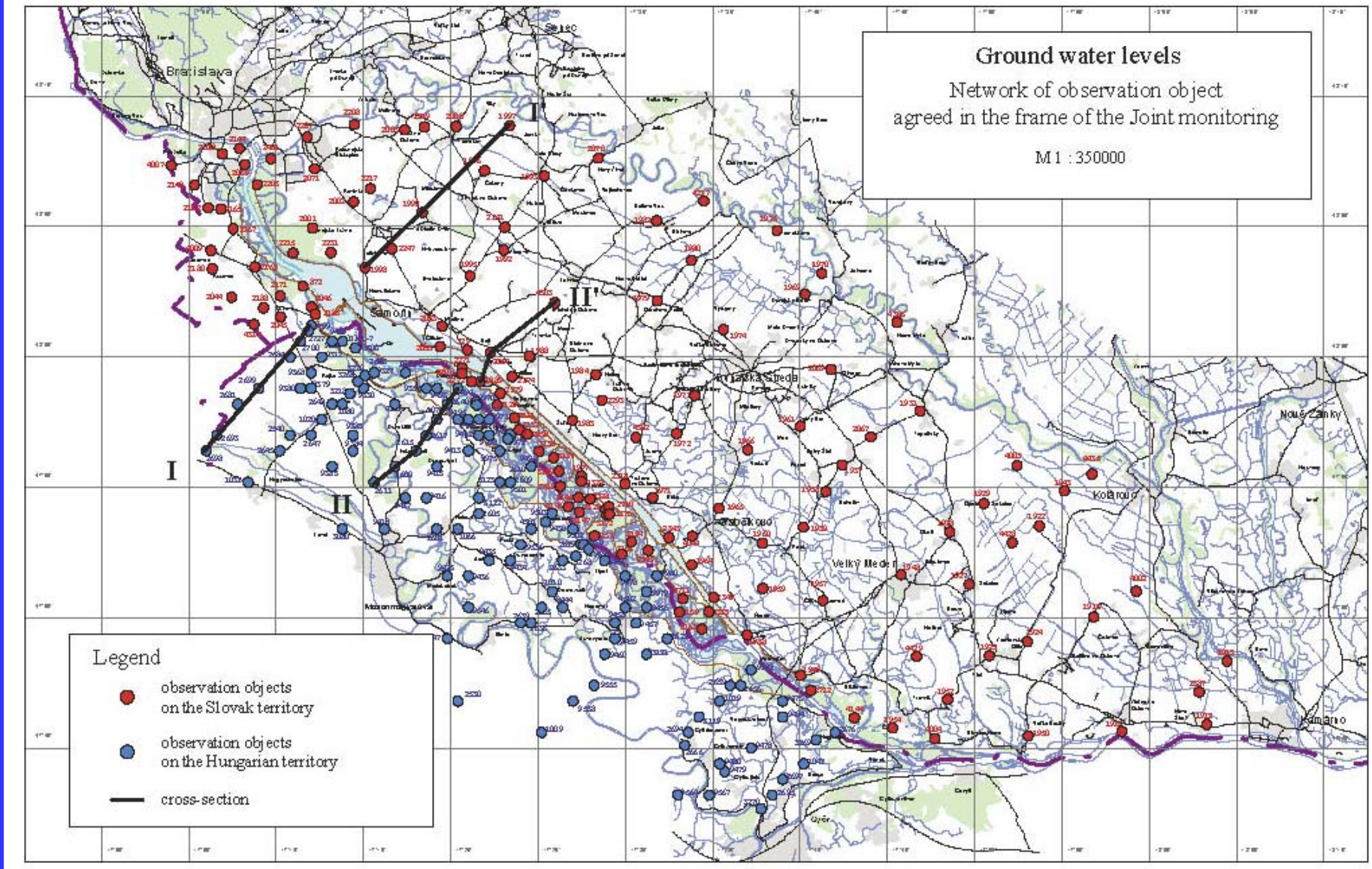
Ground water regime monitoring

Danube Monitoring Scientific Conference Publication, Slovak Section, chapter:

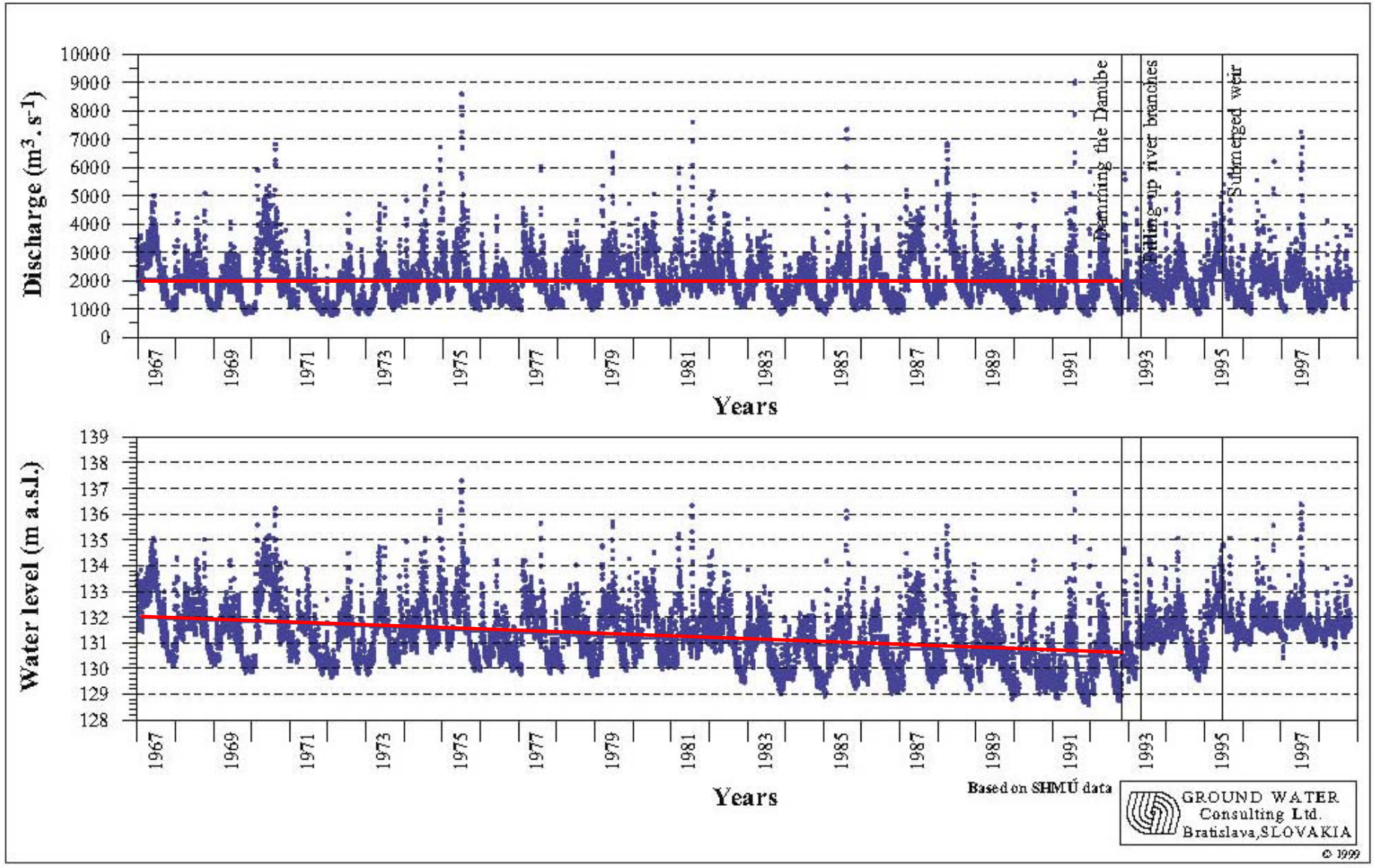
V.1.8. Ground water levels and soil moisture
Zoltán Hlavatý, Ľubomír Banský

V.1.9. Monitoring of ground water regime in the area of the Gabčíkovo Project
Ján Gavurník

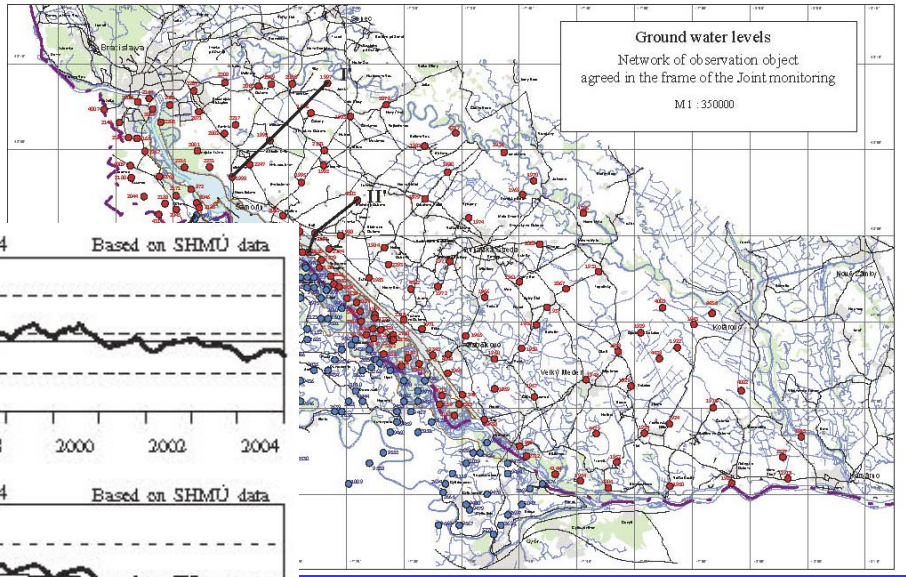
Joint monitoring ground water level observation network

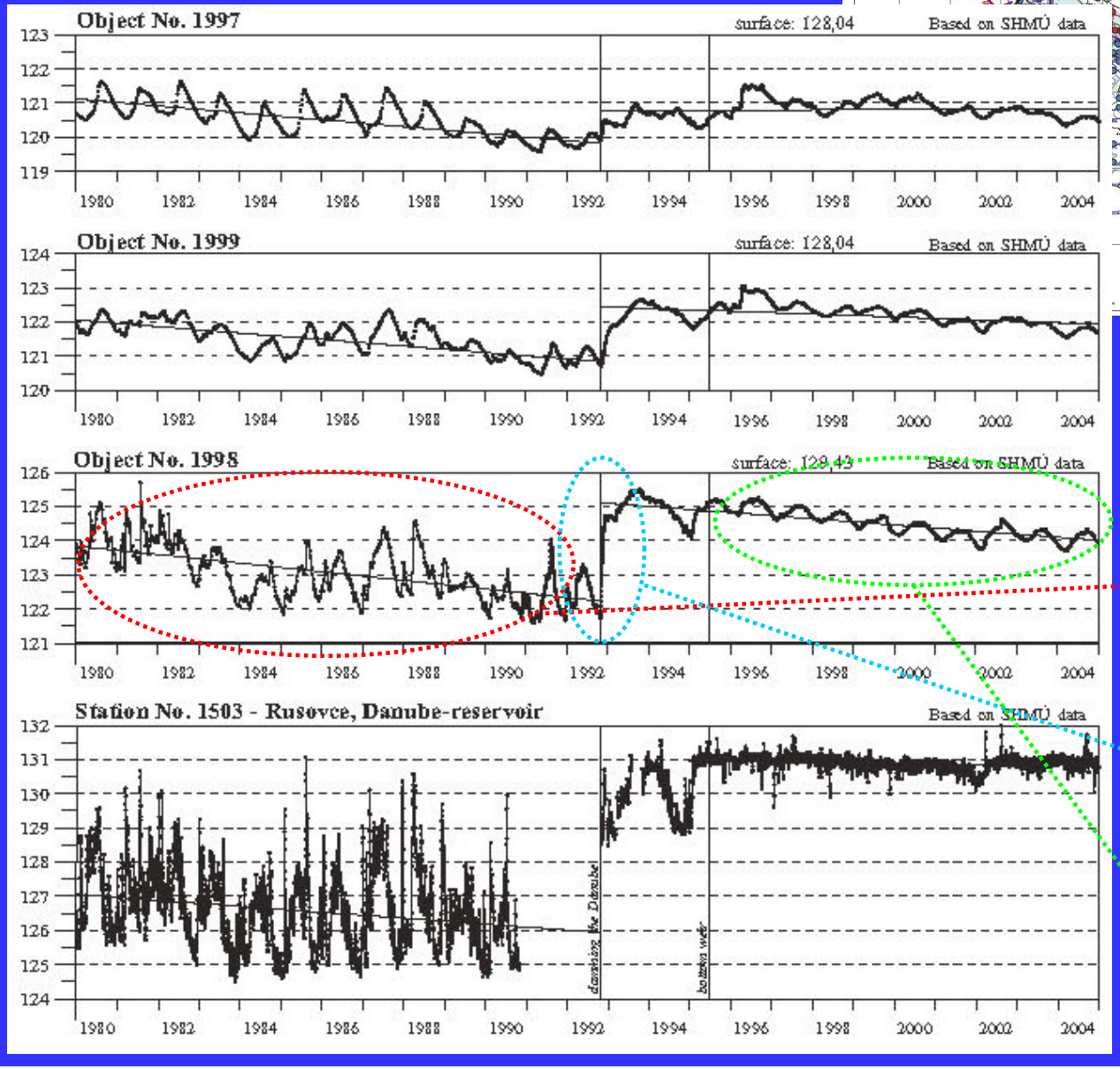


Danube water level and discharge at Bratislava



GROUND WATER LEVEL



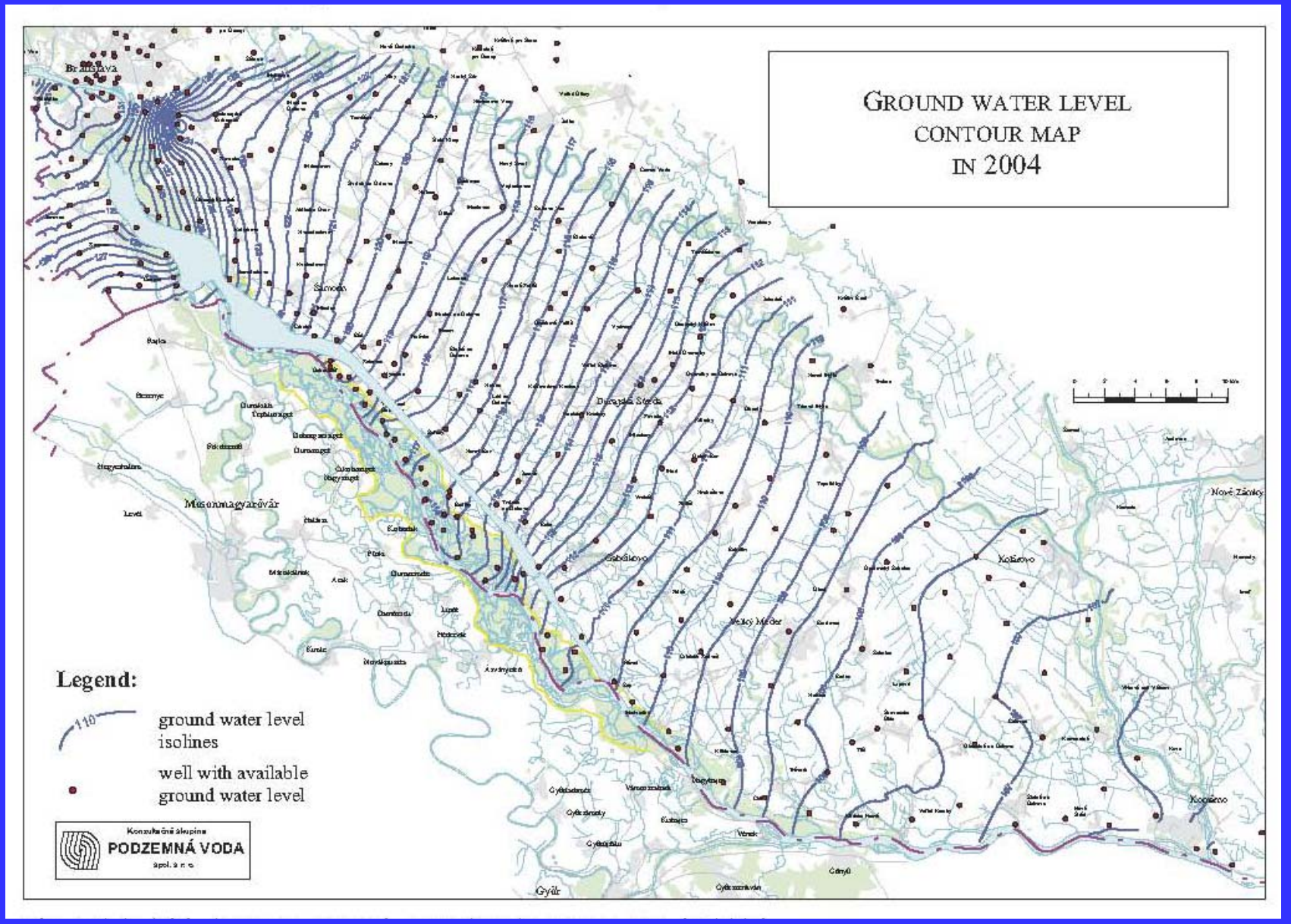


Pre-dam long term continuous decrease

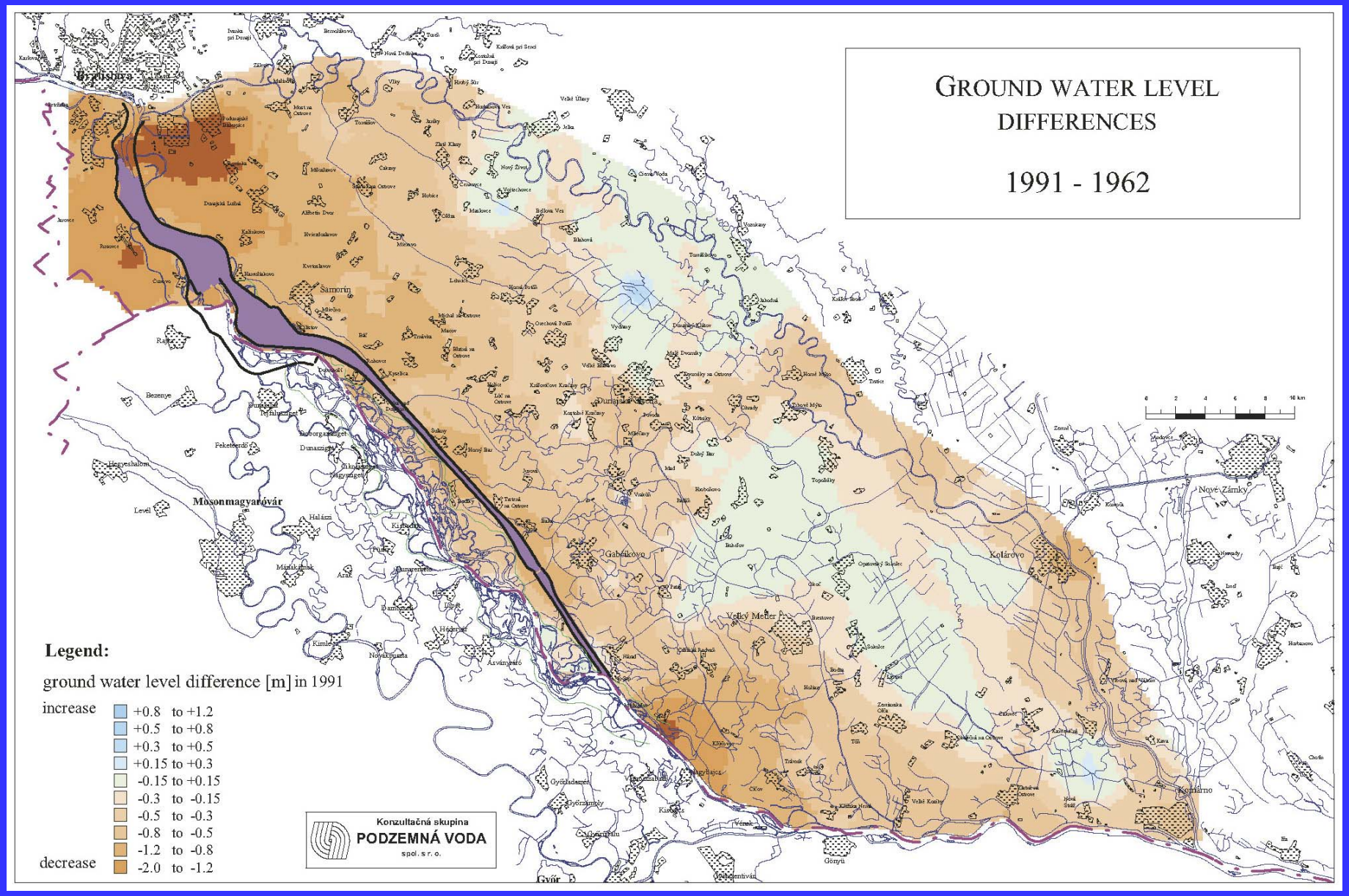
Significant increase after damming

Recent general decrease

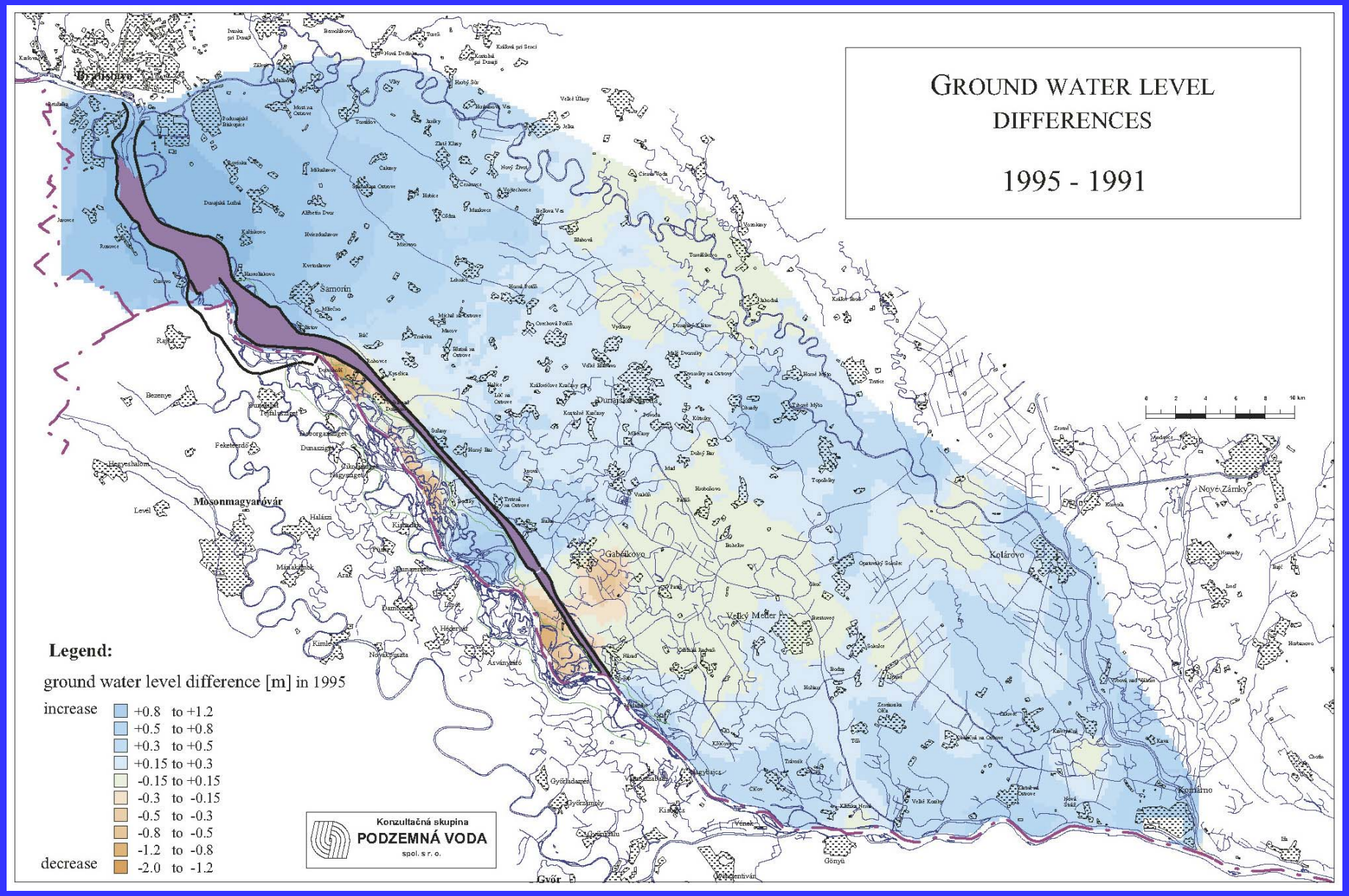
GROUND WATER LEVEL CONTOURS



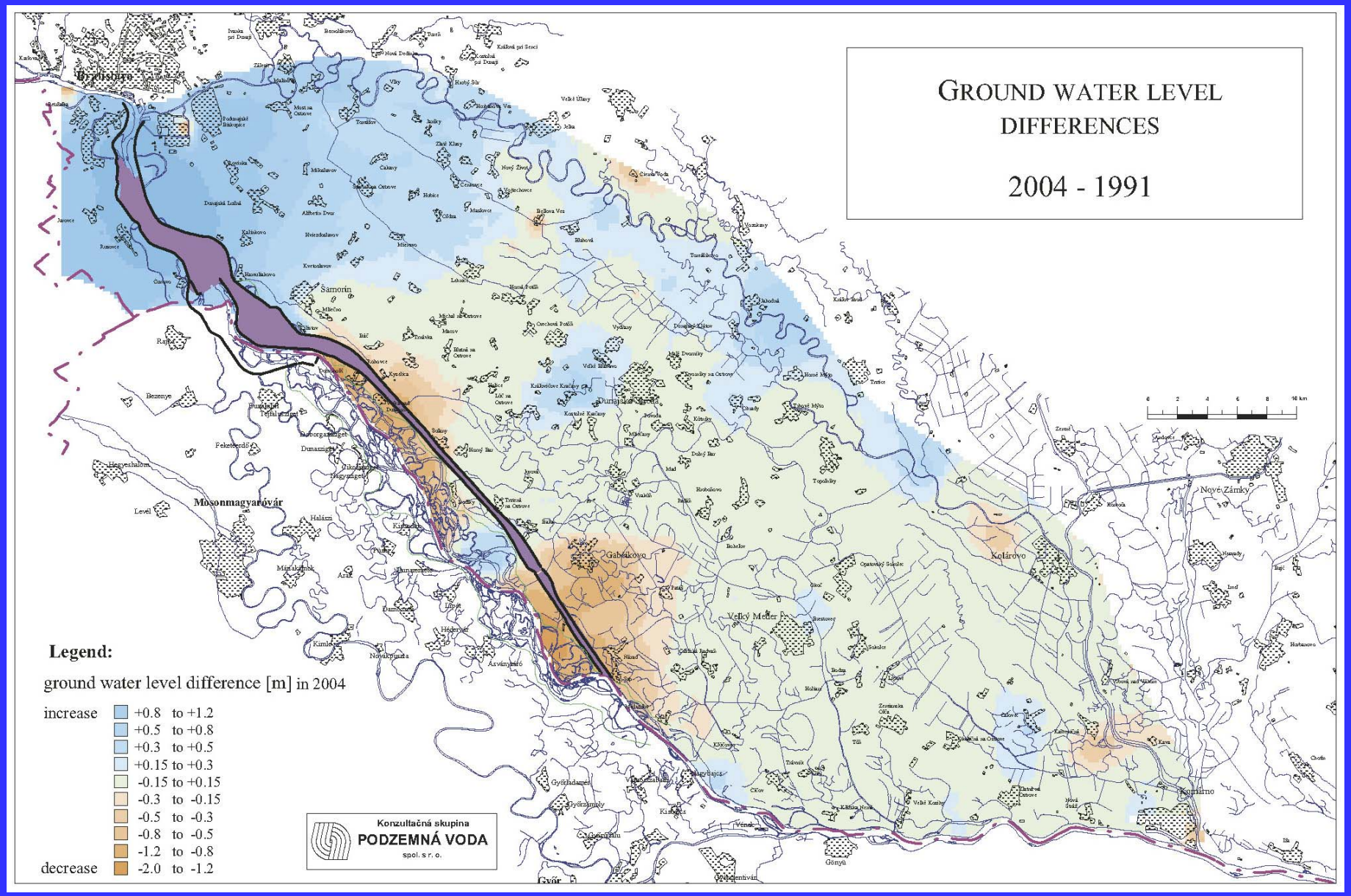
GROUND WATER LEVEL DIFFERENCES



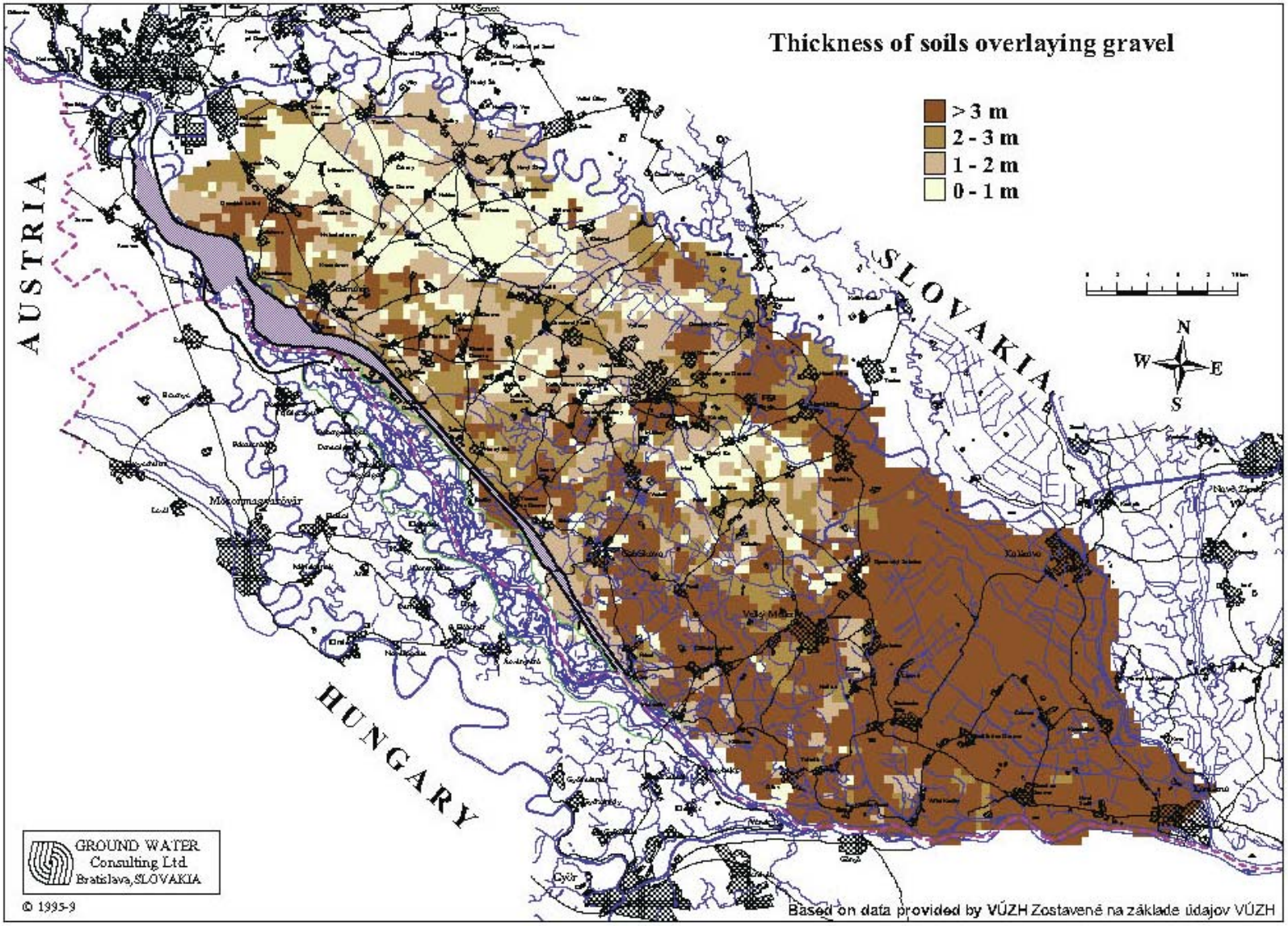
GROUND WATER LEVEL DIFFERENCES



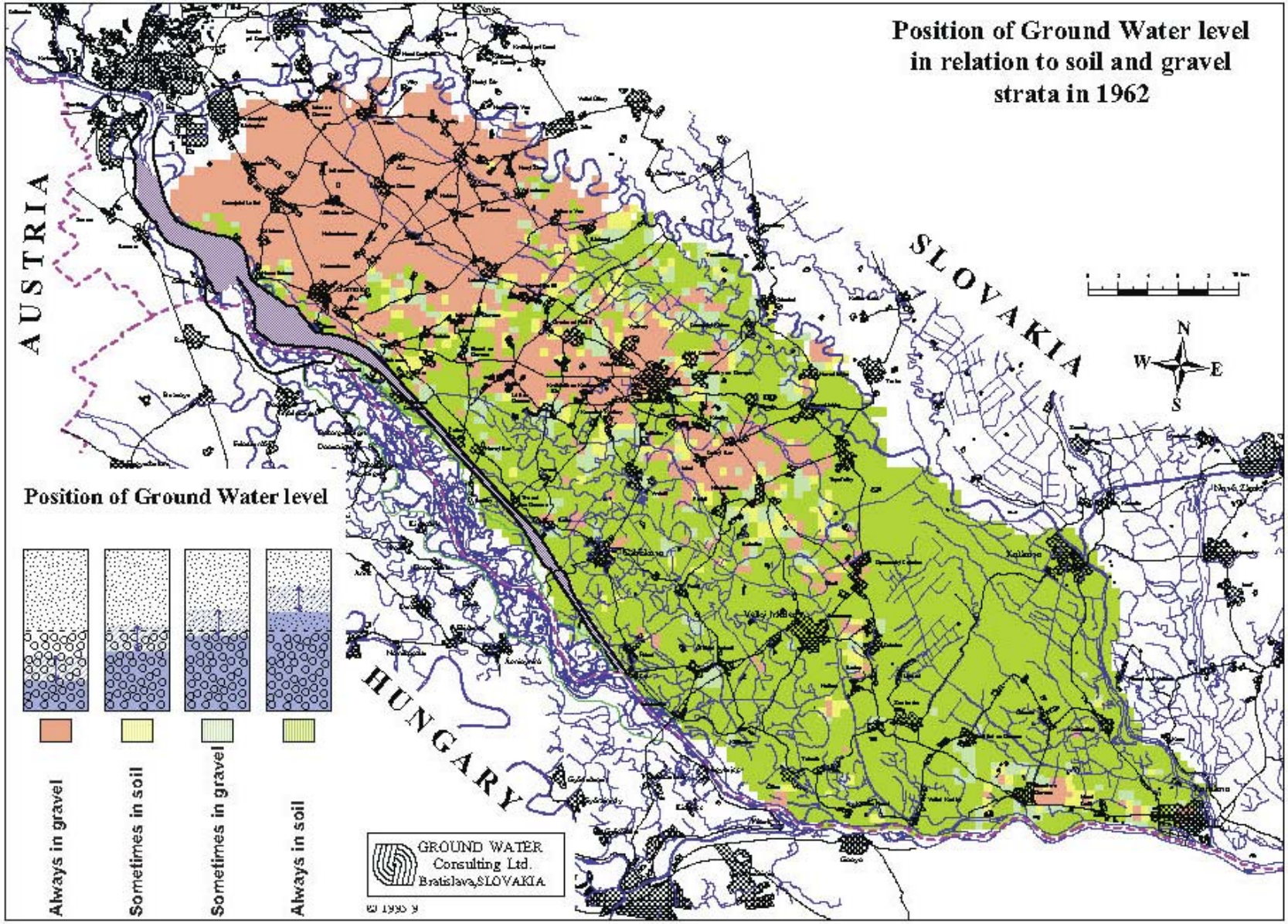
GROUND WATER LEVEL DIFFERENCES



THICKNESS OF SOILS OVERLAYING GRAVEL

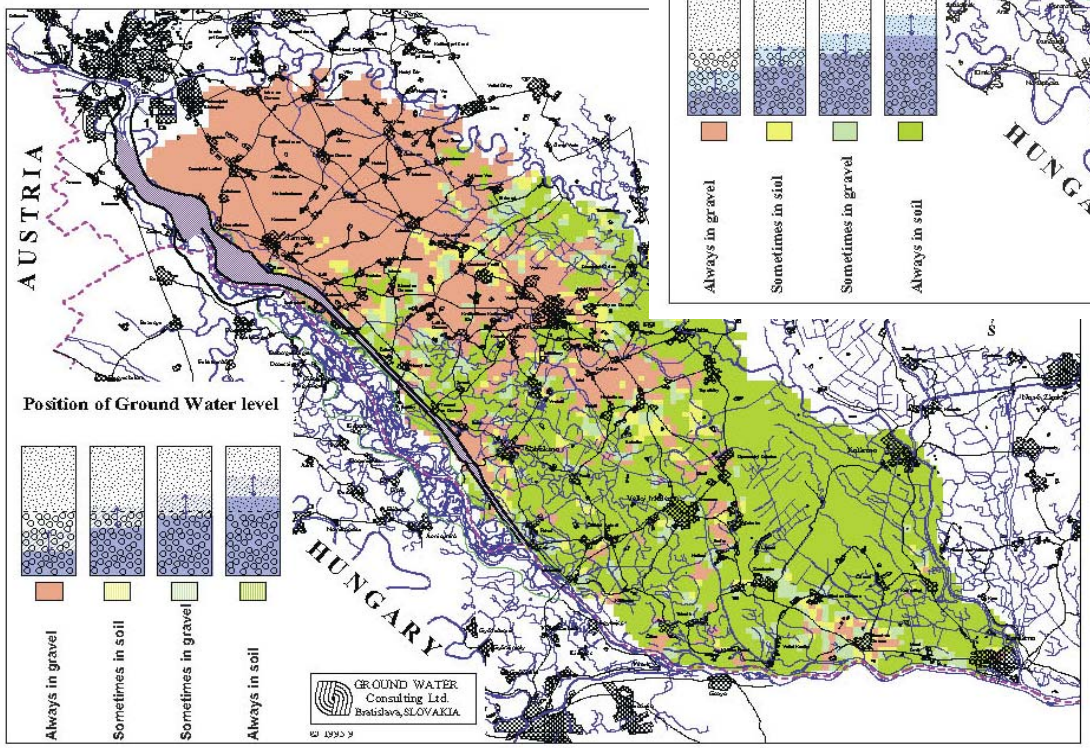


POSITION OF GROUND WATER LEVEL

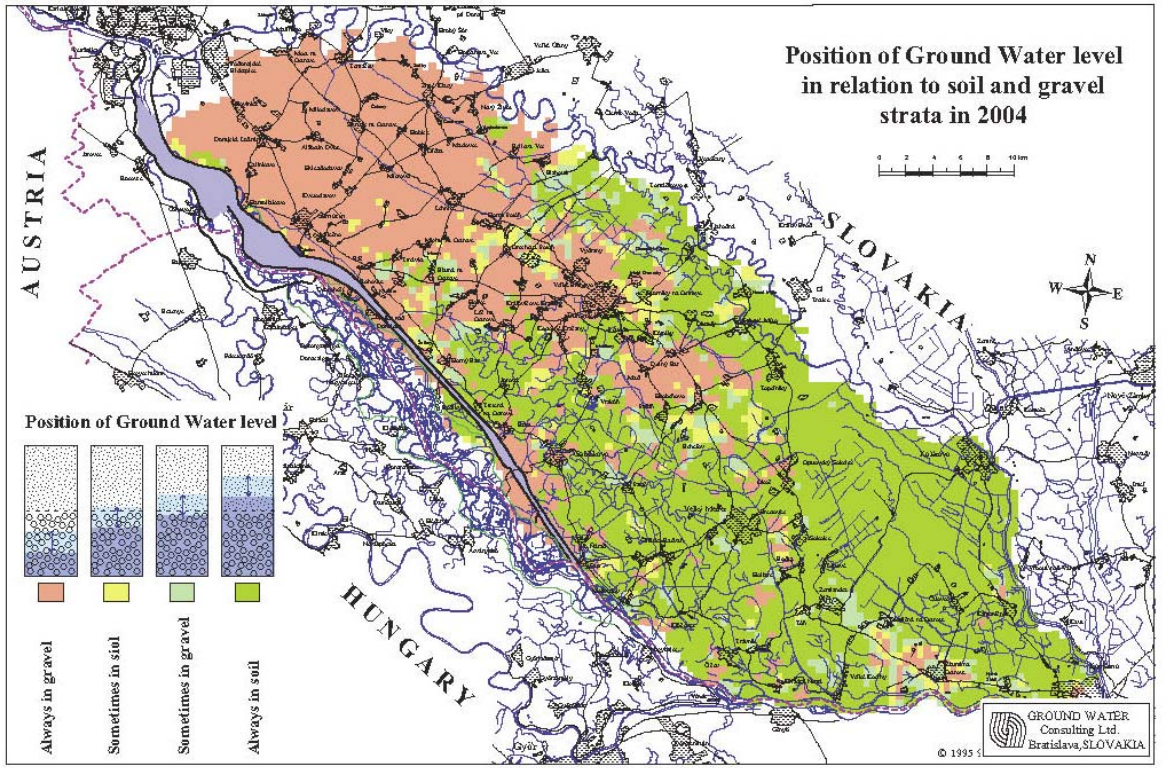


POSITION OF GROUND WATER LEVEL

Year 1992



Year 2004



CONCLUSIONS:

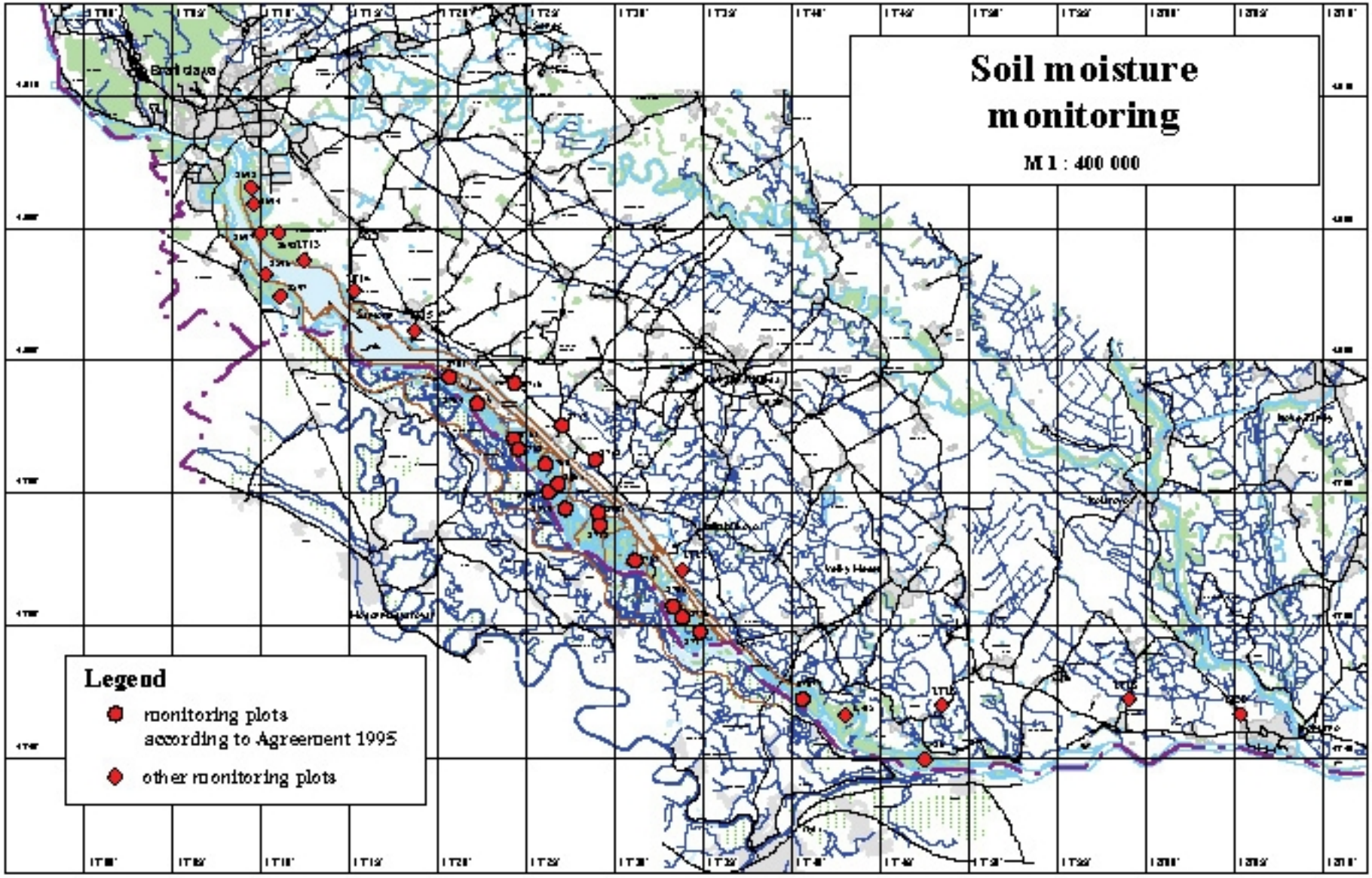
- **Increased groundwater levels** in the **upper part of the Žitný ostrov**
- **Decreases** of **ground water level** in between the entrance into the bypass canal and mouthing of the tailrace canal into the Danube
- **Reduction of amplitudes** of ground water level fluctuation along the Danube, Čunovo reservoir and bypass canal
- **Increase of amplitudes** appeared **along the tailrace canal** and the Danube downstream up to Čičov
- **Recent** general **ground water level decrease** is important in **the upper part of the Žitný Ostrov** (Šamorín), **where the largest increases of ground water levels occurred** after putting the Gabčíkovo hydraulic structures in operations.

Soil moisture monitoring

Danube Monitoring Scientific Conference Publication, Slovak Section, chapter:

V.1.8. Ground water levels and soil moisture

Zoltán Hlavatý, Ľubomír Banský


Soil moisture monitoring
M 1 : 400 000
Legend
monitoring plots according to Agreement 1995
other monitoring plots

Changes in soil moisture have deciding role at transfer of impact of water regime towards terrestrial biota

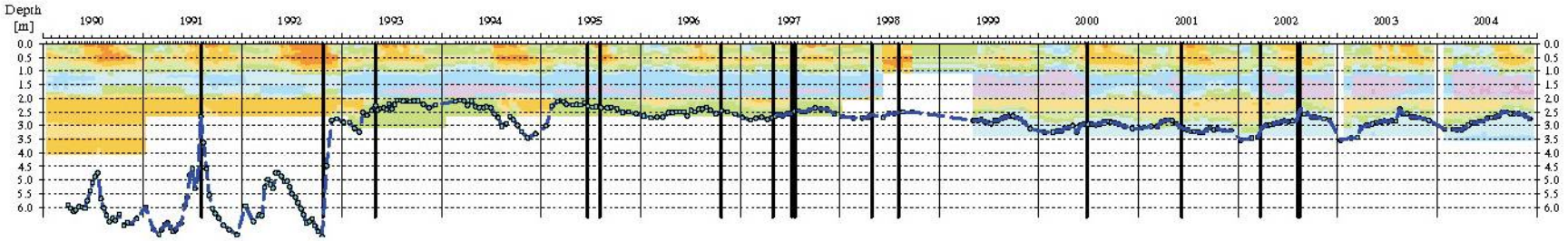
- ground water level fluctuation
- precipitation, evapotranspiration

Supposition

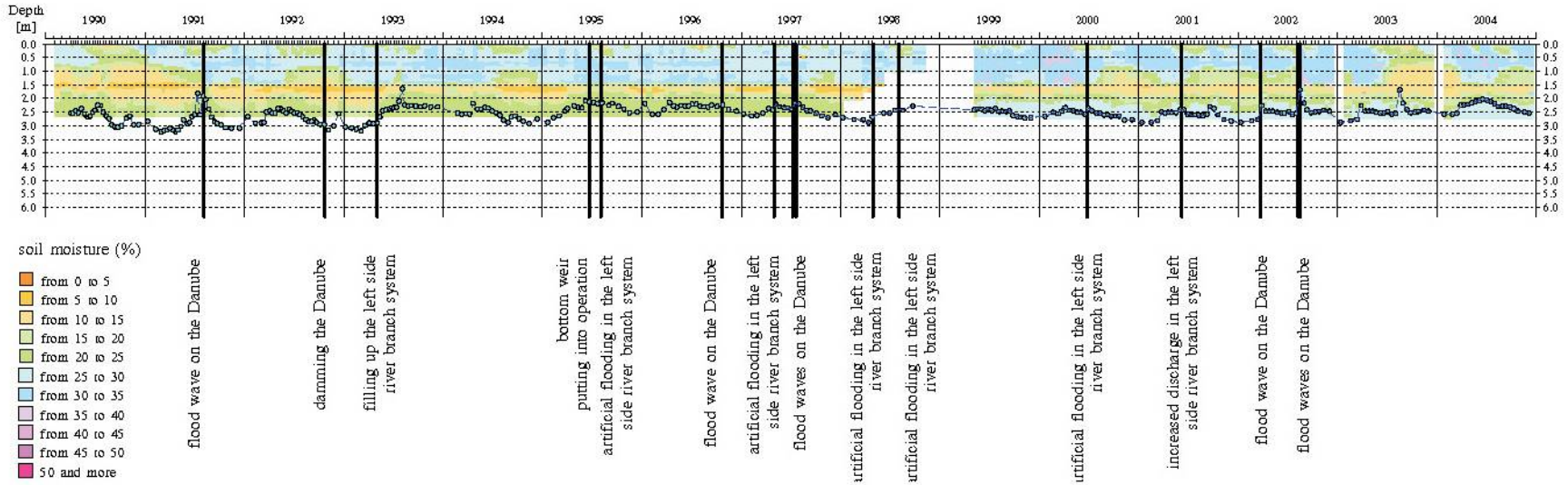
If there is a rise in the ground water level, than there is also an increase in soil moisture or occasionally the moisture may remain unchanged, while other conditions remain unchanged, but in no case a decrease of soil moisture can occur because of rising of ground water level. The same is valid vice versa.

Soil moisture monitoring

Monitoring site: 2621 - Dunajská Lužná, P-1



Monitoring site: 2626 - Horný Bar, MP-6



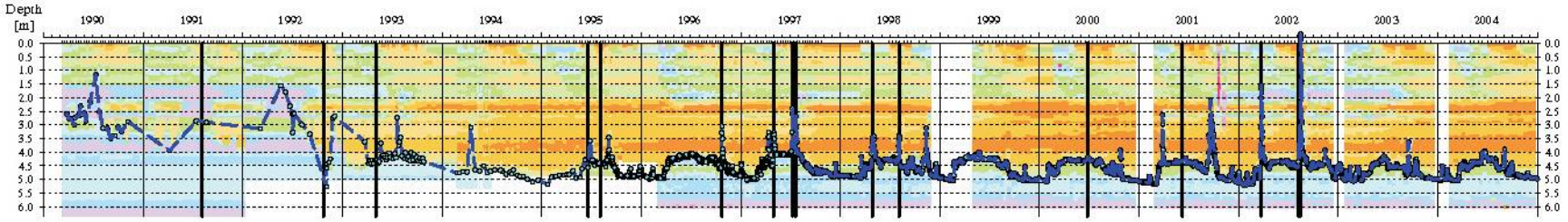
ground water level observed on monitoring plots

Based on VÚPOP data

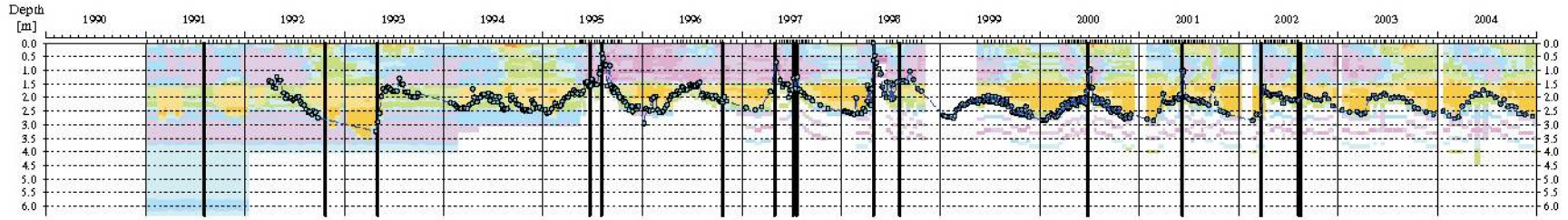
GROUND WATER
Consulting Ltd.
Bratislava,SLOVAKIA

Soil moisture monitoring

Monitoring site: 2600- Dobrohošť, Dunajské kriviny, MP-1



Monitoring site: 2760 - Horný Bar - Šuľany, L-8



soil moisture (%)

- from 0 to 5
- from 5 to 10
- from 10 to 15
- from 15 to 20
- from 20 to 25
- from 25 to 30
- from 30 to 35
- from 35 to 40
- from 40 to 45
- from 45 to 50
- 50 and more

flood wave on the Danube

damming the Danube

filling up the left side river branch system

bottom weir putting into operation artificial flooding in the left side river branch system

flood wave on the Danube

artificial flooding in the left side river branch system

flood waves on the Danube

artificial flooding in the left side river branch system

artificial flooding in the left side river branch system

artificial flooding in the left side river branch system

increased discharge in the left side river branch system

flood wave on the Danube

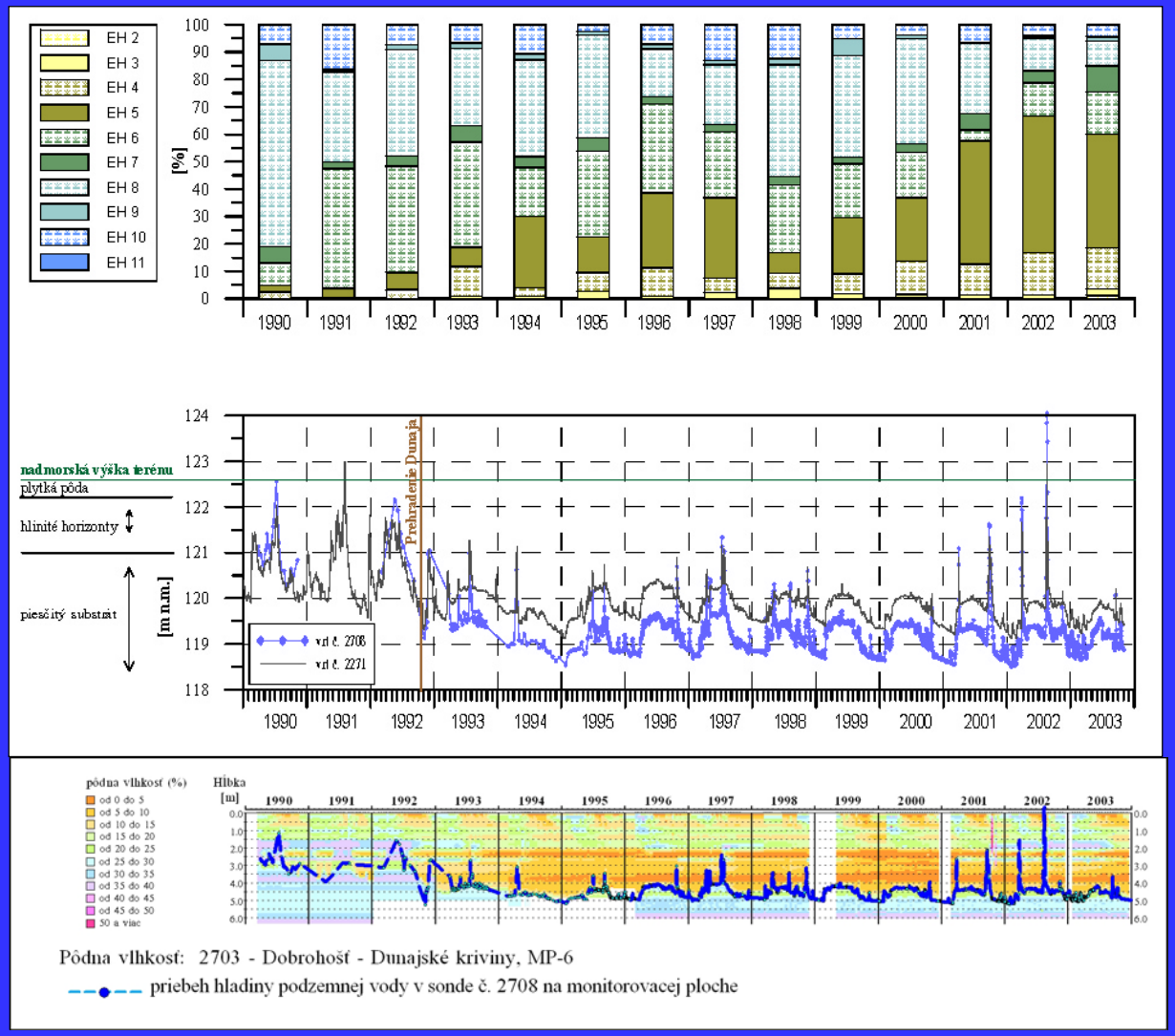
flood waves on the Danube

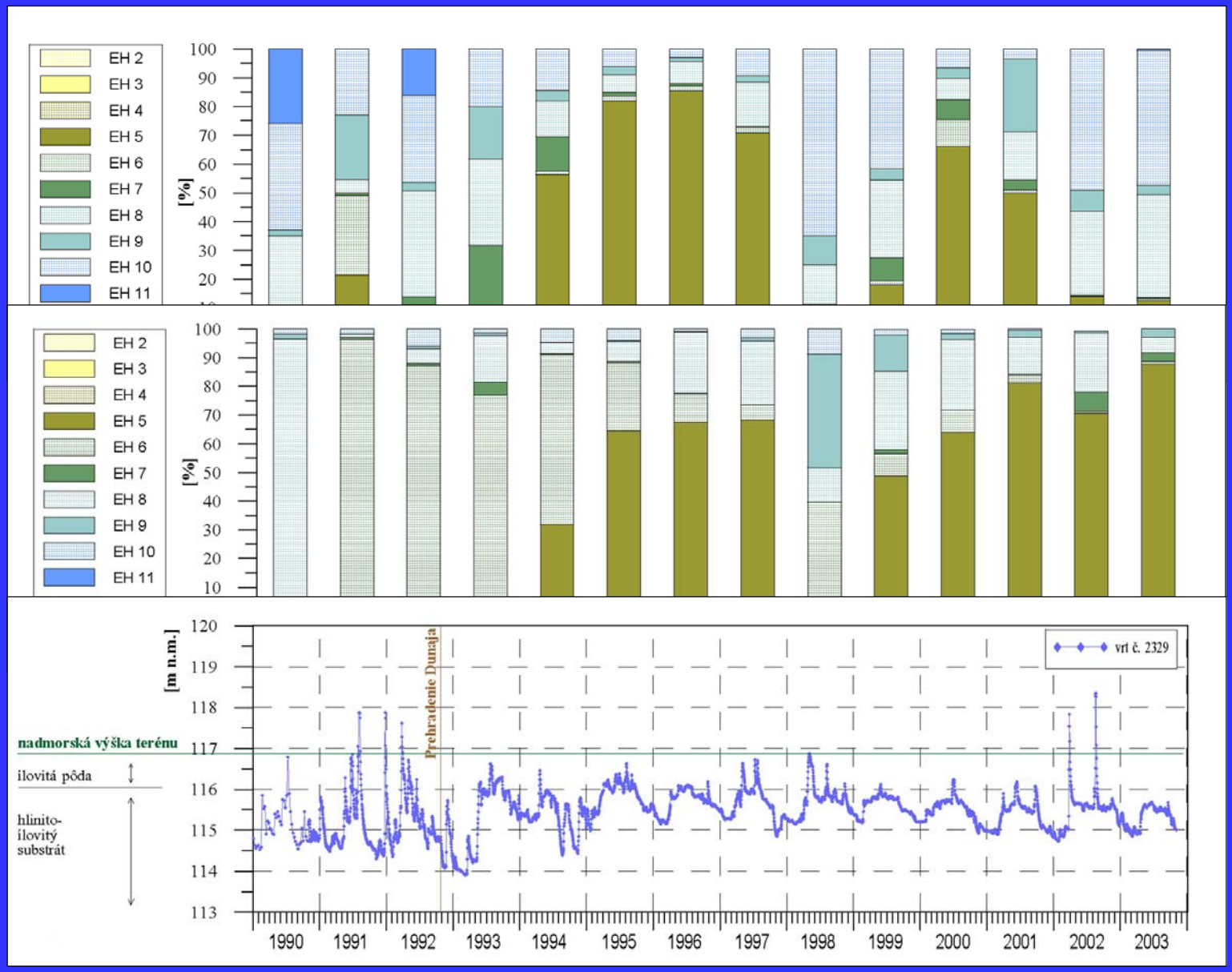
ground water level observed on monitoring plots

Based on PriF UK and NLC data

GROUND WATER
Consulting Ltd.
Bratislava,SLOVAKIA

Soil moisture monitoring and biota




EH 2
EH 3
EH 4
EH 5
EH 6
EH 7
EH 8
EH 9
EH 10
EH 11
[%]
100
90
80
70
60
50
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30
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[m n.m.]
120
119
118
117
116
115
114
113
nadmorská výška terénu
ílovitá pôda
hlinito-
ílovitý
substrát
Prehradenie Dunaja
vrt č. 2329
1990
1991
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2003

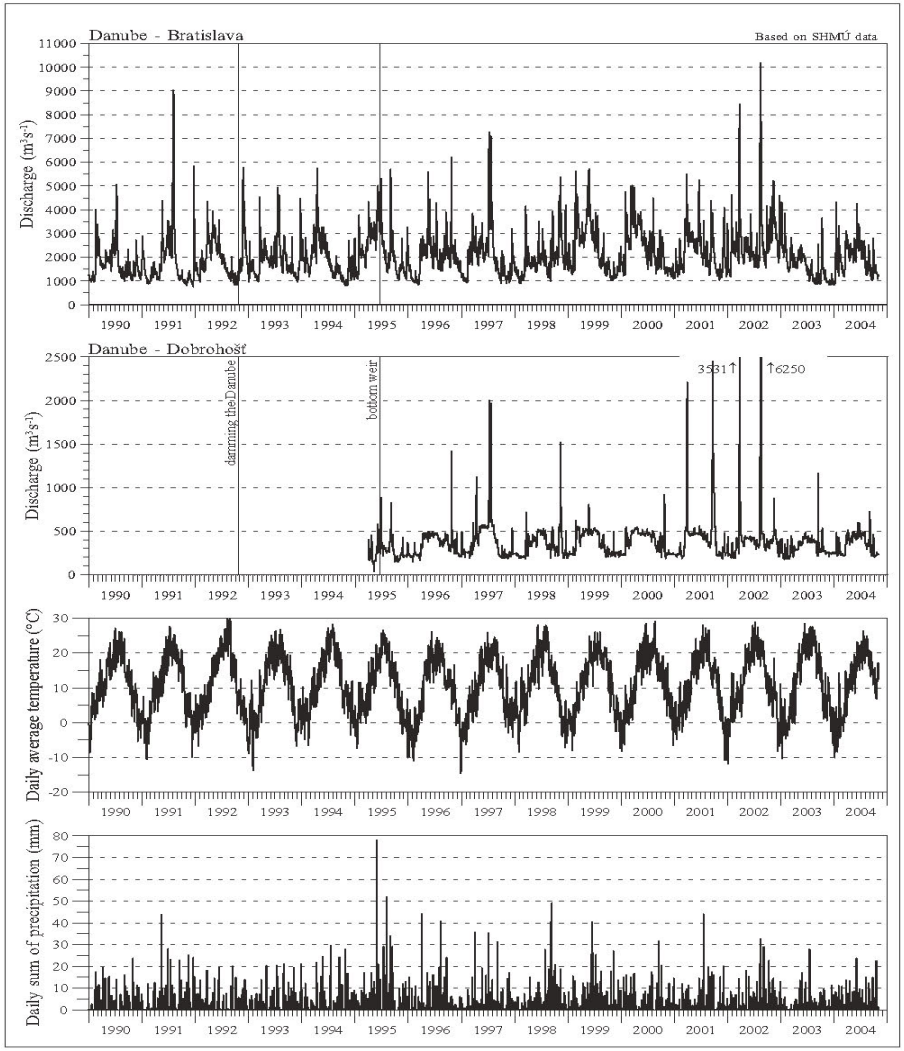

Fig. V.1.8. / 12 Discharge in the Danube (Bratislava and Dobrohošť), average temperature and precipitation (Bratislava)