Drinking Water Quality in Hungary

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A Glance into History

1930’ - waterborne outbreaks (typhoid, dysentery) ample exploitation of confined deep wells

1950’ – extension of municipal water supply in the countryside
- 23 big state waterworks operate all supply
- Public Health Stations of complete coverage established
- cheap (free) drinking water for (almost) all

1980’ – arsenic discovered to be contained in DW of many

1990’ – switch to new political-economical system

2000’ – Accession to EU, ratification of PWH
Some words on the new system

New rules

- The duty of drinking water supply goes municipal
  - most specialized companies split others remain
  - water begins to have economical value
  - water (price) is becoming subject of political fight

- Updating legal system is behind schedule

- Differences grow between
  - a small group of powerful and professional state/private companies contracted to supply and
  - a large number of small companies of low-moderate expertise and assets

- New detailed regulation on the supply and providers
Facts and figures

- Population of Hungary: 10.2 M
- Number of settlements: 3165 (Stat Off.)
  - settlements over 5000: 280 (68 % of the population)
  - smallest settlements (with consumption <100 m3/d): 55 % of all with 8.8% of pop.
- Number of water supply „units”: >3700 (variable in reports)
- Water capacity: 900Mm3/y;
- Water production: 500 Mm3/y
- 99.0 % of the population have access to municipal water supply
- average consumption: 112 liter/person/d
Legal background

Water Management Act (1995): governs the frame of supply structure (ownership, economic structure)

Government ordinances of 38/1995 and 21/2002 set the detailed rules of operation and access and the responsibilities of operators

Public Health Act (1991): arranges for the public health authorities’ control functions

Drinking Water Ordinance acc. 98/83/EC sets the rule on water quality

Water Service Utilities Act needed: missing control over economy and service performance
Institutional background

Water and infrastructure is the property of the municipality operated by supply companies. 350 supply companies of which:
- 41 producing >2 Mm3/y provide 89% of all water produced
- 5 state owned
- most is owned by one to >200 municipalities
- some is owned by foreign companies

Authority control

- in terms of environmental resources and technical requirements: regional environmental authorities
- in terms of water quality monitoring and surveillance: local to central public health authorities
Water supply by origin

94 % groundwater; within that
46 % bank filtered water
36 % confined deep well
9 % karstic water
3 % unconfined groundwater
6 % surface water (river, lake and reservoir)
Main water quality issues

1. Geogenic „contaminants” from confined aquifers: As, B, F, NH$_4^+$, Fe, Mn, organics (KMnO$_4$ demand) and consequences

2. Age and inferior fabric of supply infrastructure – lack of reconstruction (issues of economy and regulation)

3. Vulnerability of water resources – low grade water safety – risk of infections and antropogenic contamination

4. Domestic distribution – ignorance of problem sources – communication needs

5. Data acquisition and treatment
General overview of data problems

- Data acquisition and treatment
  - prolonged lack of regulation (partly resolved recently)
  - poor technology of data transfer
  - lack of domain integration (of environmental and health dept. data)
  - no clear outline of water supply zones

- Lack of modern database (hw & sw)
  and consequently
  - inferior data quality and safety
  - variable report outcomes
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Geogenic water contaminants
Five-year data review to enhance reliability (+ expert appraisal)

Arsenic

- Hungary was exempted from EU LV of 10
- Recent convincing epi study outcomes
- Health administration decided to apply EU LV from now to protect public health
- 428 settlement + 46? affected (~ 1,4 M)
- + 132 settlement needs intervention
- Drinking Water Improvement on way but too slow (ignorance and political dispute)
Geogenic water contaminants 2

Boron
• Hungary was exempted from EU LV of 1 settled
• Health admin decided to apply EU LV
• 46 settlement + 7? affected ( ~ 95000)

Fluoride
• 5 settlement + 3? affected ( ~ 7000)
Geogenic water contaminants 2

Ammonium (2007)

- 18% of tests > 0.5 in 711 settlements (~19% of all)

Nitrite (2008) – results of enhanced surveillance included

- by bioconversion from ammonium
  - 1435 non complying test results (3.4%)
  - occurred in 203 settlements (5.6%)
  - more than once in 142 (3.9%)
  - in several samples in 100 (2.8%)

- not a problem in most with high NH4
Geogenic water contaminants 3

Iron (2007)

- 10.5% of tests > 0.2 in 818 settlements
  (~ 21.8% of all)

Manganese (2007)

- 17.7% of tests > 0.05 in 1000 settlements
  (26.7% of all – most those with high Fe)

- KMnO₄ demand as source of (micro)biological proliferation (see next slide)
Microbiological contamination 1
Coliforms (2008)

- Possible consequence of both inferior structural integrity and excess organics
- 6.2% of tests CF positive
- 38.8% of settlements affected
- 2.9% of settlements involved in series of CF occurrences more than once
Microbiological contamination 2

E. coli (2008)

• concern for microbiological safety – risk of infections/outbreak
• 1.1 % of tests positive
• 8.4 % of settlements affected
• 2.8 % of settlements with occurrence more than once and out of them 2.1 % with >10 % frequency
• 1.6 % of settlements involved in series and 0.5 % more than once
Microbiological contamination 3

Enterococci (2008)

- Less frequently tested FIO
- 2.4 % of tests positive
- 11.5 % of settlements affected
- 2.5 % of settlements with occurrence more than once and out of them 2.3 % with >10 % frequency
- 0.6 % of settlements involved in series and 0.1 more than once
Other anthropogenic contamination

Nitrate (2008)

- Widely tested (in almost all settlements)
- 0.3% of tests above LV
- 0.3% of settlements affected (12)
- 0.14% of settlements (5) concerned by several occurrences

Lead

- Rather occasional testing (1/4 of those tested for nitrate)
- 0.6% of tests (9 settlement) over 10 mcg/L
- 0.2% of tests (3 settlement) over 25 mcg/L
Thank You For Your Attention!