Access to drinking water and sanitation in Bulgaria

Assoc. Prof. Galia Bardarska, Ph.D.
Bulgarian Academy of Sciences
bardarska@dir.bg

Equitable access to water, Paris, 5-6 July 2007
Bulgaria is part of the 5th EU enlargement - January 1, 2007

Area 110993.6 km²
Population 7 718 750 (2005)
70% of total population in the towns
Total number of settlements in the country 5332 (31.12.2005)

Number of settlements with inhabitants number less then 2000 - 4941 (31.12.2005) of which:

- 19 towns;
- 2 monasteries;
- 4922 villages

Total number of inhabitants living in the settlements with less then 2000 inhabitants 1 881 387 inhabitants or 24.4% of total population
The decline is entirely due to the negative natural increase of the population, i.e. the significantly greater number of deaths compared to that of live births.
After reaching the high level in 1997 - 17.5‰, the rate decrease in the next years and reaches 11.6‰ in 2004. In 2005, 739 children up to the age of 1 year died in Bulgaria, with the infant mortality rate decreasing to 10.4‰.
Educational Status of the Population between 25 and 64 Years of Age in Rural and Urban Areas (2001, NSI)

- **Rural**
  - Illiterate: 16.9%
  - Primary education: 35.9%
  - Lower secondary: 43.4%
  - Secondary education: 5.5%

- **Urban**
  - Illiterate: 16.9%
  - Primary education: 51.9%
  - Lower secondary: 20.6%
  - Secondary education: 20.6%
  - College: 5.5%
  - University: 0%

0% 20% 40% 60% 80% 100%
Bulgaria is the poorest and one of the least economically developed countries in the EU, with monthly wages of €182, or $238. Gross domestic product, measured in dollars, was $3,328 per capita in 2005, compared to the $29,207 average for the then EU-25.
GDP (2005): EC25=100
France=109; Bulgaria = 32
Typical shift in national priorities according to development levels

Environmental Sustainability
Economic Development
Water Supply & Sanitation
Public water supply system in Bulgaria

![Bar chart showing water supply and losses from 2000 to 2005.](image)

- **Water, thousands m³/year**
- **Legend**: Blue for Water supply, Gray for Water losses.
### 2005

**Water-supply network 69043 km**

<table>
<thead>
<tr>
<th>Structure of water-supply network by type of pipes</th>
<th>Water-supply network built in</th>
</tr>
</thead>
<tbody>
<tr>
<td>75.3% Asbestos cement</td>
<td>20.2% By the end of 1960</td>
</tr>
<tr>
<td>14.6% Steel pipes</td>
<td>37.0% From 1961 to 1970</td>
</tr>
<tr>
<td>2.9% Zinc-coated</td>
<td>22.5% From 1971 to 1980</td>
</tr>
<tr>
<td>3.6% PE</td>
<td>13.4% From 1981 to 2000</td>
</tr>
<tr>
<td>0.4% PVC</td>
<td>5.0% From 1991 to 2000</td>
</tr>
<tr>
<td>3.2% Others</td>
<td>1.9% From 2001 to 2005</td>
</tr>
</tbody>
</table>
Public water supply - 98.9% of total population:
- 100% urban areas
- 84% in rural areas

4% of total population don’t have tapped water in villages
There are some villages with 40 l/cap/day (WHO limit is 50 l/cap/day)

Households consumption in Bulgaria
## Prices of drinking water (households)

**PRICE OF DRINKING WATER SWITZERLAND**

<table>
<thead>
<tr>
<th>City</th>
<th>€/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sion</td>
<td>0.18</td>
</tr>
<tr>
<td>Martigny</td>
<td>0.19</td>
</tr>
<tr>
<td>Neuchâtel</td>
<td>0.78</td>
</tr>
<tr>
<td>Genève</td>
<td>0.79</td>
</tr>
<tr>
<td>La Chaux de Fonds</td>
<td>1.24</td>
</tr>
<tr>
<td>Lausanne</td>
<td>1.31</td>
</tr>
</tbody>
</table>

**PRICE OF DRINKING WATER BULGARIA 2005**

<table>
<thead>
<tr>
<th>Water supply &amp; sewerage company</th>
<th>€/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rakitovo</td>
<td>0.16</td>
</tr>
<tr>
<td>Plovdiv</td>
<td>0.30</td>
</tr>
<tr>
<td>Sofia</td>
<td>0.31</td>
</tr>
<tr>
<td>Veliko Tarnovo</td>
<td>0.55</td>
</tr>
<tr>
<td>Dobrich</td>
<td>0.74</td>
</tr>
<tr>
<td>Razgrad</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Source: Géographie romande des prix de l’eau -HES
Costs of water supply in € (2005) Bulgaria

- **Household**: Minimum 0.05, Average 0.42, Maximum 0.92
- **Public**: Minimum 0.05, Average 0.44, Maximum 0.92
- **Industry**: Minimum 0.05, Average 0.51, Maximum 0.92
- **Not drinking water**: Minimum 0.02, Average 0.28, Maximum 0.57
Directive 98/83/EC on the quality of water intended for human consumption

Regulation No. 9 of 16 March 2001 on the Quality of Water Intended for Human Consumption (State Gazette No. 30 of 28 May 2001)
Ministry of Health,
28 Regional Inspectorate for Protection and Control of Public Health

• 5892 sources of central drinking water supply were monitored, 315 of which being surface water sources.
• Only 109 surface water sources have treatment installations
• 24890 samples have been tested in check monitoring and 3332 samples have been tested in audit monitoring by the State Health Control
• 97.7% of drinking water in the country meets the standards in 2006
Regions – 6, Districts - 28
Municipalities - 264
Percentage of the value of quality indices according to drinking standards, %

Year

- 2000
- 2001
- 2002
- 2003
- 2004
- 2005

- Full (complete) analysis
- Shortened analysis
- Chemical, organoleptic and radiological indices
Drinking water treatment plants (43 DWTP) - 43.2% of total population

Treatment of drinking water in Bulgaria

- Desinfection: 43%
- Precipitation and desinfection: 2%
- Drinking water treatment plant: 55%
Turbidity of drinking water after drinking water treatment plant in Kardjaly town.
Main drinking water quality problems

- Deviations from the microbiological indicators
- Nitrates
- Organoleptic indicators (colour, odour, taste, turbidity)
- Manganese
- Heavy metals indicators (mainly chromium)

Main reasons: shortages of drinking water (drought), floods, bad water supply systems condition and lack of treatment facilities
Impacts of drought on drinking water quality

The study for the drought period 1982-1993 confirmed that rates of Hepatitis A virus and Shigellosis morbidity had been consistently higher among large population who live in regions with insufficient amounts of drinking water.

Percentage of the population with regular water supply regimes during the drought

<table>
<thead>
<tr>
<th>Area</th>
<th>1993</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lovech</td>
<td>83.8%</td>
</tr>
<tr>
<td>Dobrich</td>
<td>82.7%</td>
</tr>
<tr>
<td>Montana</td>
<td>77.1%</td>
</tr>
<tr>
<td>Vratsa</td>
<td>57.7%</td>
</tr>
<tr>
<td>Targovishte</td>
<td>50.7%</td>
</tr>
</tbody>
</table>
Percentage of samples with nitrates concentrates above 50 mg/l

Процент на нестандартните анализи за нитрати по области
Number of control sample for microbiological indices according to drinking water standards, %
Percentage of sample with microbiological indices above limits

Процент на нестандартните анализи по микробиологични показатели по области
Percentage of samples with concentrations of E. coli and Enterococi above limits (Vidin and Burgas above WHO limits)
EU Urban Waste Water Directive

commits the collection, treatment and discharge of wastewater from urban agglomerations of more than 2000 p.e.

Recent review carried out by the Country Water Partnerships of GWP CEE indicates that small and dispersed communities (less than 2,000 p.e.) are inhabited to 40 percent of the total population of the CEE countries, which represents to 40 millions of inhabitants. They constitute large but usually economically less successful segment of our societies.
In Bulgaria all national programs and strategies refer to construction of collecting system and WWTPs for agglomerations with above 2 000 p.e.

4765 rural settlements are out of the range of the program. They include around 1.8 mln. inhabitants, which is around 24% of the population of the country and represent around 2.2 mln. p.e. (around 18% of the total p.e.).

At present, there is no working sustainable sanitation system in the country.
BULGARIA
70.5% of total number of towns and
2.1% of total number of villages with sewerage systems
(167 towns and 100 villages with sewerage systems)

68.9% inhabitants connected to sewerage systems (2005)

40.7% inhabitants
connected to wastewater
treatment plants

71 population areas with
3 342 075 inhabitants with
WWTPs
Population connected to public sewerage and to wastewater treatment plant in Bulgaria

Year | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
Part of population connected to public sewerage | 35.6 | 35.9 | 36.2 | 36.7 | 38.1 | 38.6 | 39.9 | 40.3 | 40.7 |
Part of population connected to WWTP | 66.5 | 66.7 | 66.7 | 66.5 | 67.4 | 68.0 | 68.5 | 68.5 | 68.9 |

Population connected to public sewerage and to wastewater treatment plant in Bulgaria.
2005
Sewage network 8244 km
Very old collectors

sewage network in 70.5% of the towns covering 48.5% of the streets length

sewage network in 2.1% of the villages covering 0.6% of the streets length

13.4% By the end of 1960
19.8% From 1961 to 1970
30.3% From 1971 to 1980
26.9% From 1981 to 2000
8.4% From 1991 to 2000
1.2% From 2001 to 2005
2005
Actual working WWTP capacity 54% of design capacity

thousands m³/day

1999 Design capacity of which:

162 Mechanical treatment
1837 Biological treatment

56 - total number of WWTP of which:

14 Mechanical treatment
42 Biological treatment
METHODOLOGICAL STUDY OF SANITATION SOLUTIONS FOR A BULGARIAN VILLAGE: DRAGOMIR

Scheme 1: Decision tree for Dragomir's sanitation

Credit: T. Trenkova
### Costs of wastewater collection in € (2005) Bulgaria

<table>
<thead>
<tr>
<th></th>
<th>Household</th>
<th>Public</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>0.01</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>Average</td>
<td>0.06</td>
<td>0.07</td>
<td>0.10</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.66</td>
<td>0.66</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>Household</td>
<td>LP 1</td>
<td>LP 2</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Average</td>
<td>0.12</td>
<td>0.2</td>
<td>0.26</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.28</td>
<td>0.43</td>
<td>0.55</td>
</tr>
</tbody>
</table>

**Costs of wastewater treatment in € (2005)**

Bulgaria
SECTOR FINANCING

Medium term: increased tariffs and investment surcharges

Affordable (Source: S. Sarkar-World Bank, 2004)
### SWOT Analysis

#### Development Leverages

<table>
<thead>
<tr>
<th>Strong sides</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>✷ The provided services are of primary importance to all consumers.</td>
<td>✷ There is a potential for the absorption of a great amount of financial resources for infrastructure improvement.</td>
</tr>
<tr>
<td>✷ Activities in water supply and sewerage belong to the “natural monopolies”</td>
<td>✷ Financial interest is shown by international financial institutions.</td>
</tr>
<tr>
<td>✷ There are established management structures and the related facilities.</td>
<td>✷ Some internationally recognized operators have expressed interest to participate in services management, and they are ready to make significant investments for improvement of the quality of water supply and sewerage services via concession or other forms of public-private partnership.</td>
</tr>
<tr>
<td>✷ Over 98.5% of the population uses water from water supply systems.</td>
<td></td>
</tr>
<tr>
<td>✷ The sector is considered a priority and it will receive significant funds from the EU.</td>
<td></td>
</tr>
<tr>
<td>✷ The country has available enough water resources so that to meet the needs of the population for drinking water.</td>
<td></td>
</tr>
<tr>
<td>✷ In the sector work experienced and competent professionals in the field of water supply and sewerage.</td>
<td></td>
</tr>
</tbody>
</table>
### SWOT Analysis

**Obstacles to overcome**

<table>
<thead>
<tr>
<th>Weak sides</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Depreciated water supply networks.</td>
<td>- High economic loses due to high level of water loses.</td>
</tr>
<tr>
<td>- High level of water loses – over 60%.</td>
<td>- Low potential of municipalities and the state to invest in infrastructure.</td>
</tr>
<tr>
<td>- Low level of collection of the owned payments.</td>
<td>- Legislation developing slowly and in a complex way.</td>
</tr>
<tr>
<td>- Low level of construction of the sewerage networks.</td>
<td>- Lack of training and re-training programs designed for the professionals employed in the sector.</td>
</tr>
<tr>
<td>- Necessity of construction of a large number of Waste Water Treatment Plants.</td>
<td>- Demographic problems related with the reduction of consumption.</td>
</tr>
<tr>
<td>- Necessity of significant investments.</td>
<td>- Restructuring of economy related with the reduction of water consumption.</td>
</tr>
<tr>
<td>- Low level of income if the population.</td>
<td></td>
</tr>
</tbody>
</table>
Thank you for attention