

EAP Task Force

**GROUP OF SENIOR OFFICIALS
ON THE REFORMS OF THE WATER SUPPLY AND SANITATION SECTOR
IN EASTERN EUROPE, CAUCASUS AND CENTRAL ASIA**

THIRD MEETING

**State Designing Institute
KAZVODOKANALPROEKT**

**Calculation of Operational and Financial Indicators
for Water and Sewerage Utilities in Kazakhstan**

Final analytical report
on Kazakh water and sewerage utility performance
ALMATY, 2003

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INTRODUCTION

This *Calculation of Operational and Financial Indicators for Water and Sewerage Utilities in Kazakhstan* was prepared under a contract with the Organization for Economic Cooperation and Development (OECD).

Indicators were derived to assess the availability of water and sewerage services to the public, the technical and financial condition of water and sewerage utilities, and economic and environmental aspects of water use.

These indicators provide comparable information on utility operations necessary for understanding and controlling deviations in the sector's performance.

An overall description of the current urban water and sewerage systems in the Republic of Kazakhstan is provided in many papers prepared by the *Kazvodokanalproekt* Institute, including:

- The *Potable Water* State Program, Section "Urban Water Services in the Republic of Kazakhstan", 2000;
- Technical Condition of Water and Sewerage Systems and Facilities in Regional Centers and in the City of Almaty. Analytical Memorandum, 2001.

These papers predominantly focused on assessing the scope of water and sewerage coverage as measured by average unit consumption per capita (in liters per day, annualized) and the technical condition of networks and facilities.

The papers showed that the critical situation in the urban water sector primarily stems from the poor financial condition of water and sewerage utilities driven by non-payments.

The decentralization of the water and sewerage utility network in Kazakhstan has brought about a major reduction in the scope of reporting and accountability to central authorities, making water utility operations isolated and disjointed.

The removal of the centralized supply and funding system further aggravated the difficulties faced by most water and sewerage utilities.

The indicative survey of water and sewerage utilities based on indicators developed and commonly used by the World Bank (see Appendix 1) had the following objectives:

- collect information on the condition and operating results of water and sewerage utilities;
- analyze the operating results of utilities;
- perform a comparative analysis of the findings for Kazakhstan's water and sewerage utilities and other countries' utility performance;
- provide reliable information on investment requirements to national, regional and local authorities;

- assist potential investors in obtaining information on the quality of management and potential viability of utilities.

Indicators can be grouped as follows:

- technical and technological;
- economic;
- service quality;
- service availability to consumers;
- environmental.

The list of utilities covered by the Survey is presented in Appendix 2.

To compare the indicative survey findings for Kazakh utilities with foreign utility performance indicators, we used the EAP Task Force report on performance indicators for water and sewerage utilities in three countries (Moldova, Russia and Ukraine) released in Paris in 2003.

The survey covers main oblast centers (10 of 14, including two capitals), small places in Karaganda, Almaty and North Kazakhstan oblast, and also main industrial medium cities,

The *Kazvodokanalproekt* Institute would like to thank Alexander Danilenko, member of the Urban Water Sector Reform Team of the Organization for Economic Cooperation and Development for assistance in the arrangement and completion of the Survey, and the management of water and sewerage utilities who provided information for indicator calculations.

OPERATIONAL AND FINANCIAL PERFORMANCE INDICATORS

A. Coverage**1. Water coverage**

According to census data, as at January 1, 1999 the population of Kazakhstan totaled 14.96 million persons, including 8.38 million in towns and urban settlements and 6.58 million in rural localities. Centralized water supply is available in 82 of the 84 towns and 186 of the 214 urban settlements.

The water and sewerage utilities covered by this paper serve 99.2% of residents in the two capital cities (Astana and Almaty, the central city of the Southern part of the country), and up to 90% and 80% in major cities and small towns, respectively.

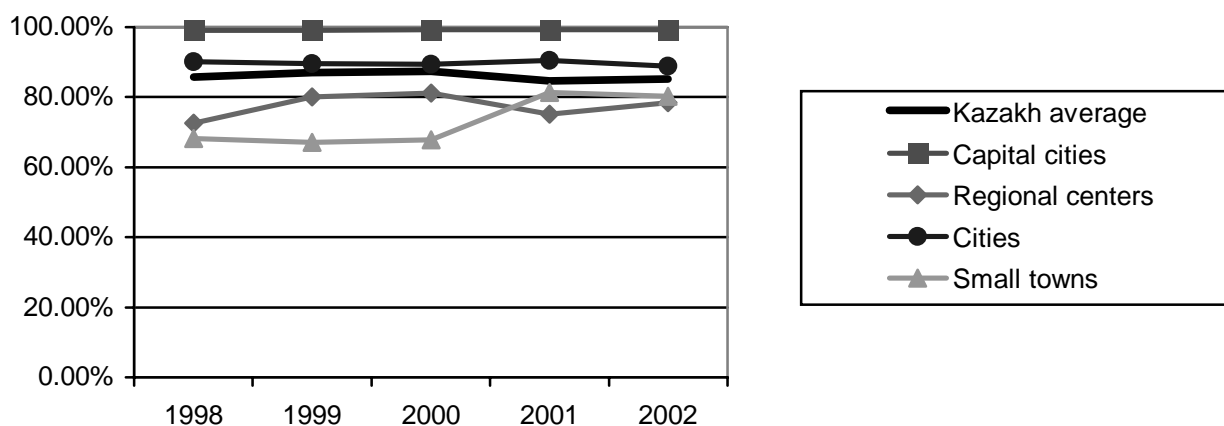
Slight fluctuations in coverage over 1998-2002 are conditioned by the insignificant volumes of new construction by some utilities and the retirement of facilities at other utilities due to their inability to adequately maintain them in operational condition.

Average water coverage in Kazakhstan is on par with that in the Russian Federation and exceeds the performance of Ukraine and Moldova.

As will be shown below, the quality of service does not always match the high level of water coverage.

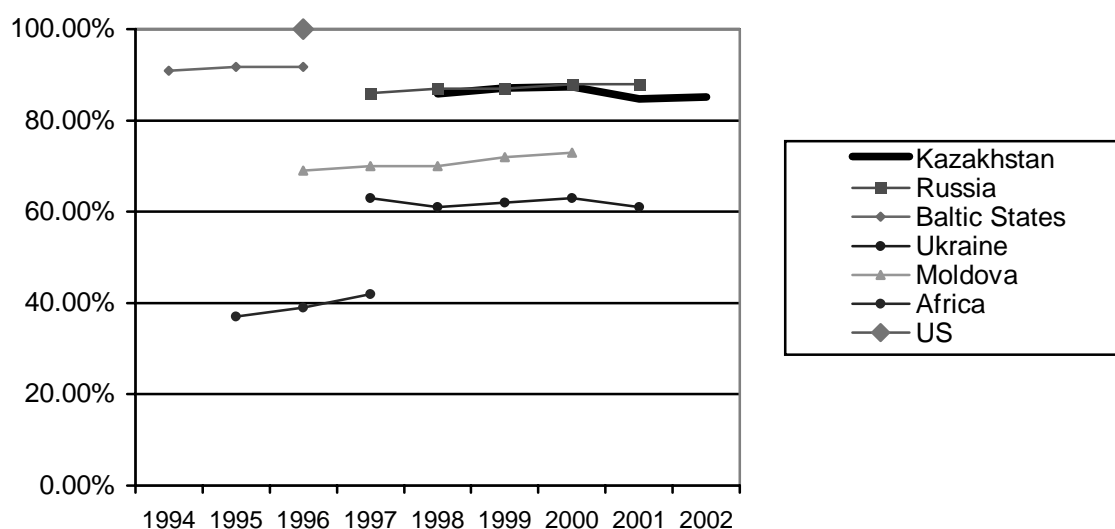
Water coverage

<i>Year</i>	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	85.83%	99.15%	72.55%	90.06%	68.10%
1999	87.04%	99.17%	80.08%	89.55%	67.15%
2000	87.34%	99.18%	81.09%	89.34%	67.74%
2001	84.66%	99.18%	75.21%	90.50%	81.30%
2002	85.13%	99.19%	78.36%	88.83%	80.22%



Water coverage

Year	Kazakhstan	Russia	Baltic States	Ukraine	Moldova	Africa	US
1994			90.9%				
1995			91.7%			37%	
1996			91.7%		69%	39%	100%
1997		86%		63%	70%	42%	
1998	85.83%	87%		61%	70%		
1999	87.04%	87%		62%	72%		
2000	87.34%	88%		63%	73%		
2001	84.66%	88%		61%			
2002	85.13%						



2. Sewerage coverage

Sewerage coverage is rather high, but does not match the level of water coverage as residential areas in all types of localities in Kazakhstan include individual private houses without sewerage.

Commensurate with improvements in the economic situation and private income growth, service coverage should increase over time.

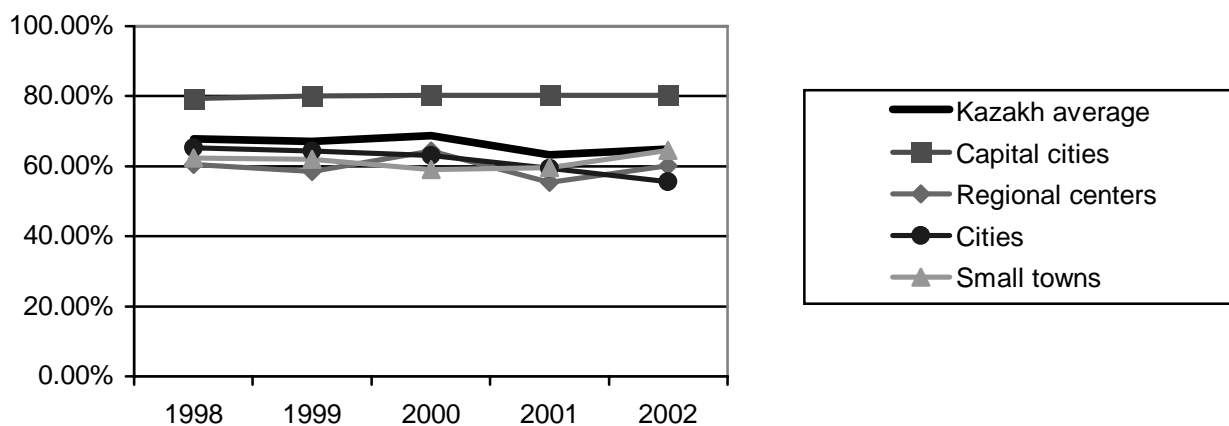
The trends in sewerage coverage are similar to those in the water supply segment.

Despite a rather high level of coverage, the quality of services as at the beginning of 2003 was declining due to poor technical condition of networks and facilities.

By 2010, the situation should improve considerably, given that the Government appears to be increasingly better positioned to finance new environmental construction.

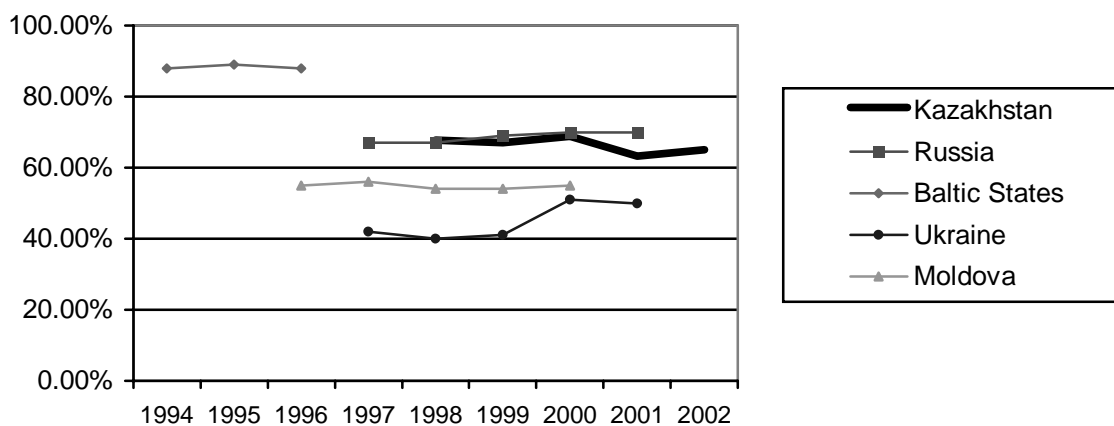
Sewerage coverage

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	67.83%	79.30%	60.44%	65.28%	62.28%
1999	67.07%	80.14%	58.46%	64.26%	61.97%
2000	68.78%	80.17%	64.34%	63.13%	59.06%
2001	63.26%	80.19%	55.46%	59.35%	59.56%
2002	64.99%	80.27%	60.19%	55.56%	64.60%



Sewerage coverage

Year	Kazakhstan	Russia	Baltic States	Ukraine	Moldova		
1994			88%				
1995			89%				
1996			88%		55%		
1997		67%		42%	56%		
1998	67.83%	67%		40%	54%		
1999	67.07%	69%		41%	54%		
2000	68.78%	70%		51%	55%		
2001	63.26%	70%		50%			
2002	64.99%						



B. Drinking water production and consumption

3. Water production

In the five-year period from 1998 to 2002, water production at all of the surveyed utilities significantly reduced due to a number of factors, including the following:

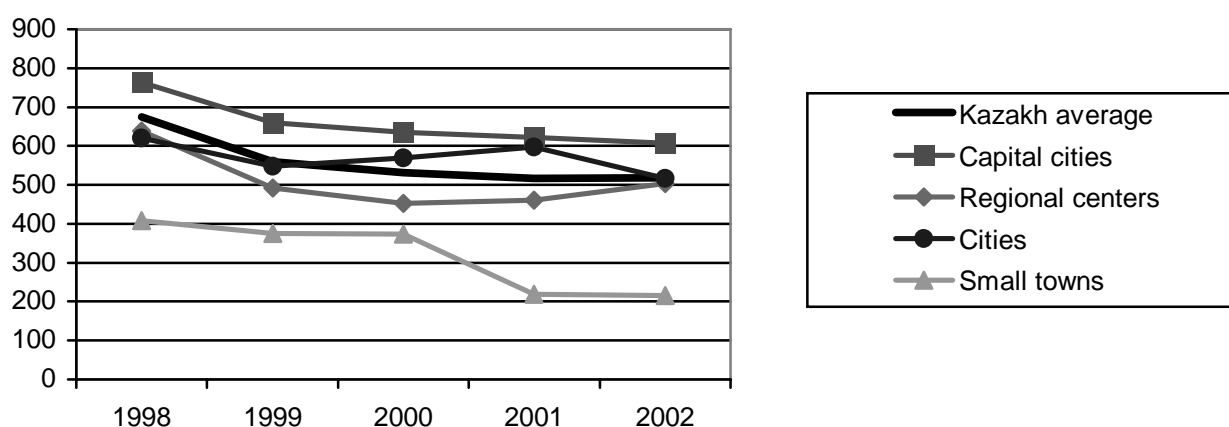
- industrial recession driving water consumption down;
- awareness programs to promote metering practices and installation of meters.

Water production and consumption indicator is daily liters per person representing the production and consumption the best way, as the consumer data bases are based on a police registration system, and not by connections.

Monthly per-connection and per-household rates cannot be regarded as reliable indicators since the information on the number of households and connections supplied by water and sewerage utilities is not altogether accurate, while many operators did not provide any such information.

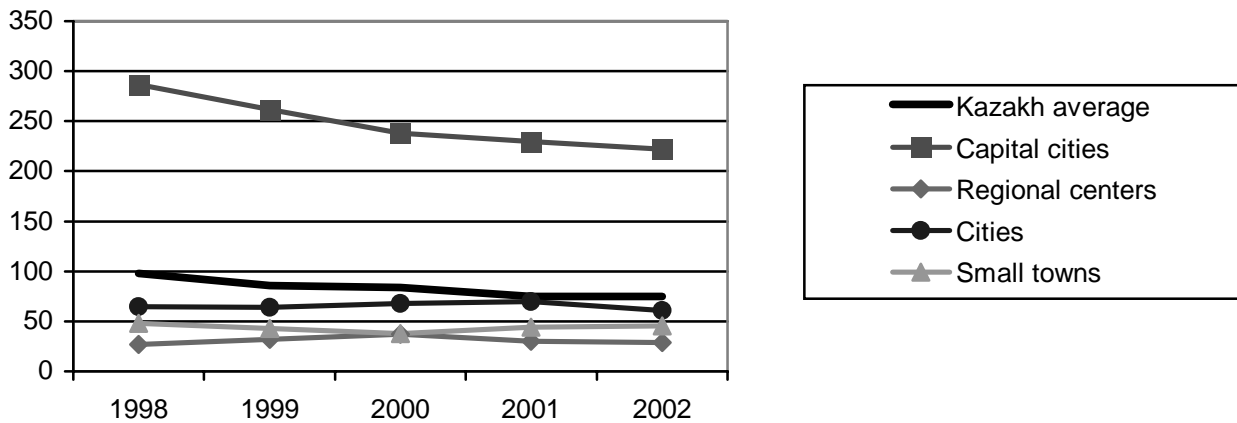
Water production (liters per person daily)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	674.75	763.42	638.24	619.73	407.55
1999	559.39	660.39	491.93	547.48	375.74
2000	531.19	635.44	452.80	569.30	374.00
2001	516.29	622.60	460.39	597.07	218.19
2002	518.42	606.32	503.28	515.85	215.38



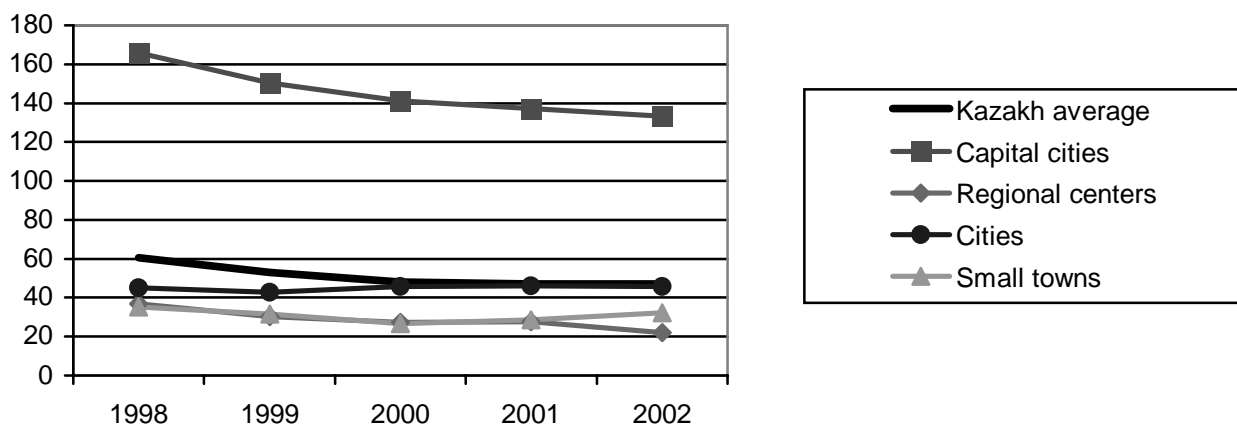
Water production (cubic meters per connection a month)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	98.19	286.70	26.99	64.55	48.01
1999	86.03	262.01	31.96	63.90	42.90
2000	83.90	237.76	37.28	68.00	37.89
2001	74.89	229.46	29.92	69.78	43.99
2002	74.85	222.12	28.56	60.67	45.52



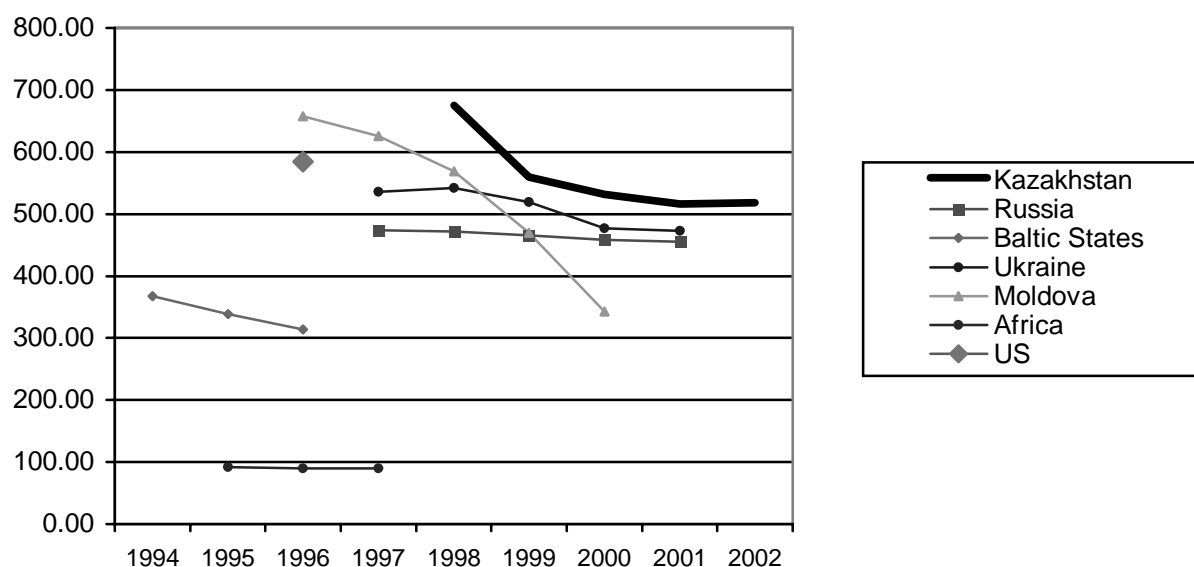
Water production (cubic meters per household a month)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	60.68	165.88	36.88	45.08	35.32
1999	53.04	150.46	30.33	42.69	31.69
2000	48.12	141.09	27.39	45.73	26.62
2001	47.06	137.25	27.68	46.18	28.77
2002	46.91	133.32	21.91	45.81	32.13



Water production (liters per capita daily)

Year	Kazakhstan	Russia	Baltic States	Ukraine	Moldova	Africa	US
1994			367				
1995			339			92	
1996			314		658	90	584
1997		474		536	626	90	
1998	674.75	472		542	569		
1999	559.39	466		519	470		
2000	531.19	458		477	343		
2001	516.29	455		473			
2002	518.42						



4. Water consumption

The dynamics of water consumption in the five years from 1998 to 2002 matches that of changes in water production, due to substantial metering and other demand management actions of vodokanals (see indicator 7.1 below)..

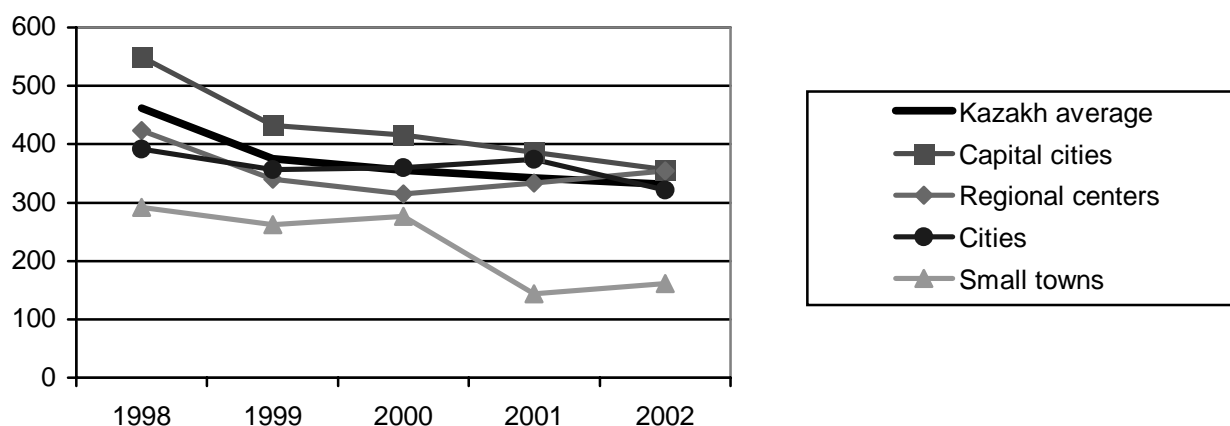
Capital cities, regional centers and major cities showed virtually identical rates of consumption in 2002.

In small cities, daily per capita consumption is much lower.

Water consumption (liters per person daily)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	462.29	549.77	423.75	391.22	292.02
1999	374.72	432.03	339.79	356.63	262.26
2000	355.86	415.80	314.99	359.68	276.28
2001	342.68	386.44	333.32	374.03	143.92

2002	331.77	355.96	353.82	321.21	160.70
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5. Metered water consumption

In recent years, water and sewerage utilities have stepped up their efforts to introduce water meters.

Against the backdrop of declining consumption in absolute terms, the proportion of metered water use over the five year has increased considerably.

Changes in metered consumption match the dynamics of indicator 7 (see below).

C. Unaccounted-for water

6. Unaccounted-for water

Unaccounted-for water represents the difference between water produced and water consumed, i.e. 'lost' water.

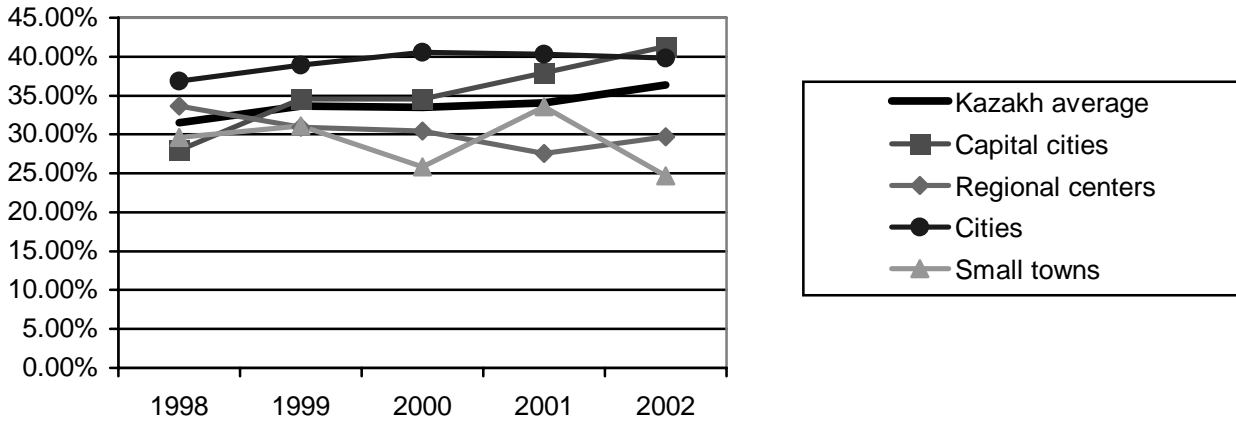
Average water losses in Kazakhstan are quite significant (in excess of 30%), with some water and sewerage utilities showing an increase in losses over the five years. This is due to the extremely poor condition of water networks.

At large water and sewerage utilities with water conditioning stations, 'lost water' also includes in-house water consumption, and the proportion of losses exceeds that at smaller utilities.

Some increase in losses is necessary to adjust to the actual reduction in demand. The volumes in percentage increased, however, the actual volumes decreased substantially (correlating with the reduction in production).

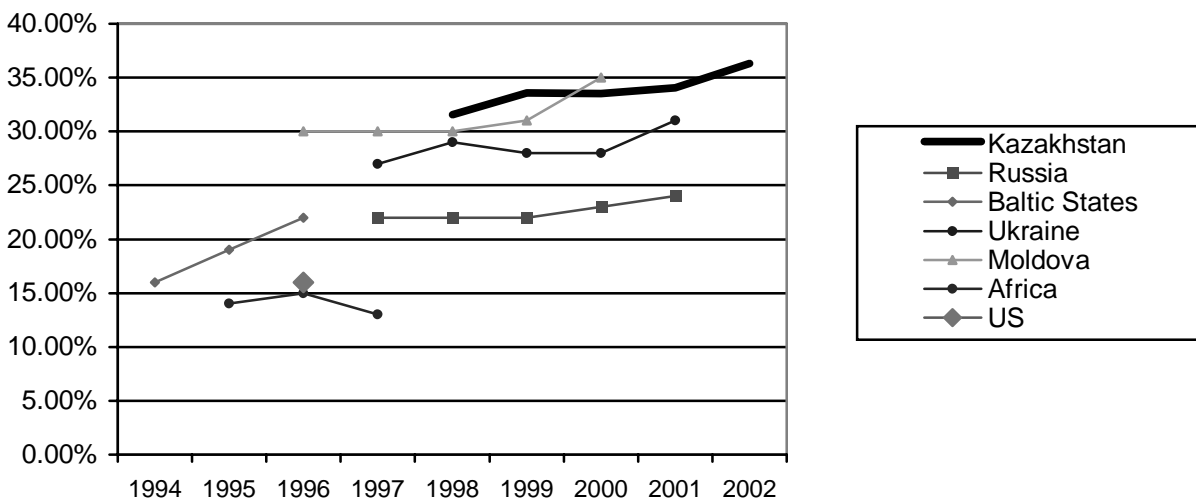
Unaccounted-for water (%)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	31.54%	27.99%	33.61%	36.87%	29.64%
1999	33.61%	34.58%	30.93%	38.92%	31.10%
2000	33.51%	34.56%	30.43%	40.58%	25.87%
2001	34.05%	37.93%	27.60%	40.31%	33.53%
2002	36.33%	41.29%	29.70%	39.85%	24.68%



Percentage of unaccounted water

Year	Kazakhstan	Russia	Baltic States	Ukraine	Moldova	Africa	US
1994			16%				
1995			19%			14%	
1996			22%		30%	15%	16%
1997		22%		27%	30%	13%	
1998	31.54%	22%		29%	30%		
1999	33.61%	22%		28%	31%		
2000	33.51%	23%		28%	35%		
2001	34.05%	24%		31%			
2002	36.33%						



C. Metering practices

7. Proportion of metered connections

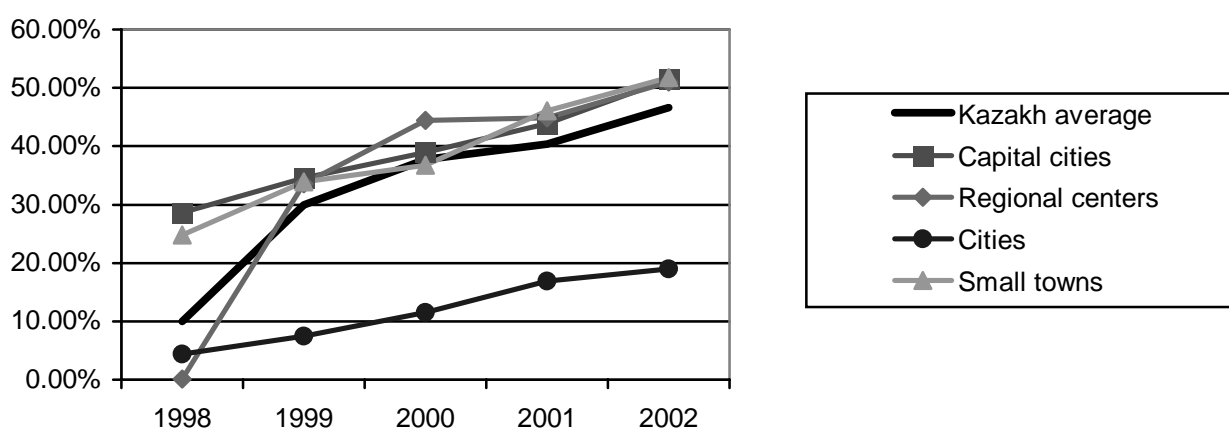
The proportion of metered connection has increased across all utility groups.

For example, the average share of metered connections among the surveyed utilities increased from 9.99% in 1998 to as much as 46.6% in 2002, and over 50% in the two capital cities.

This is largely due to high water charges and public awareness programs undertaken by utilities.

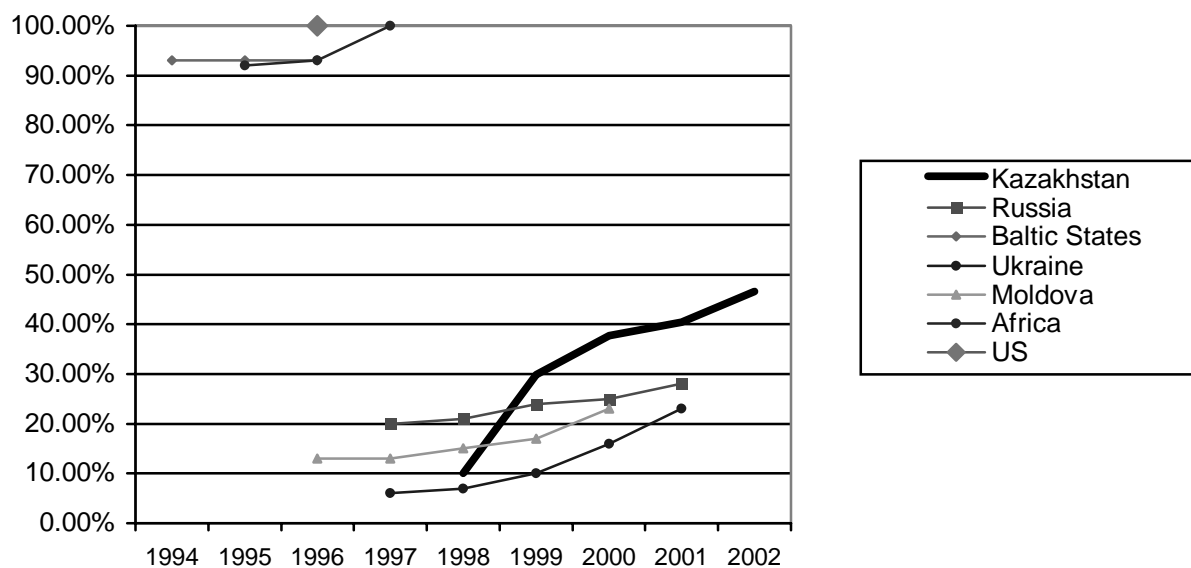
Proportion of metered connections

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	9.99%	28.64%	0.16%	4.34%	24.83%
1999	29.92%	34.54%	33.60%	7.42%	33.85%
2000	37.73%	38.99%	44.47%	11.50%	36.70%
2001	40.42%	43.88%	44.85%	16.94%	46.06%
2002	46.60%	51.39%	51.04%	19.00%	51.75%



Proportion of connections with active meters

Year	Kazakhstan	Russia	Baltic States	Ukraine	Moldova	Africa	US
1994			93%				
1995			93%			92%	
1996			93%		13%	93%	100%
1997		20%		6%	13%	100%	
1998	9.99%	21%		7%	15%		
1999	29.92%	24%		10%	17%		
2000	37.73%	25%		16%	23%		
2001	40.42%	28%		23%			
2002	46.60%						



8. Proportion of water billed per meter readings

The proportion of water billed per meter readings exhibits an upward trend in line with indicator 7, while slightly lagging behind in quantitative terms.

It may be expected that in the future the share of metered connections and the proportion of metered billings will show virtually identical values.

E. Water and sewerage utility operational indicators

9. Pipe breaks

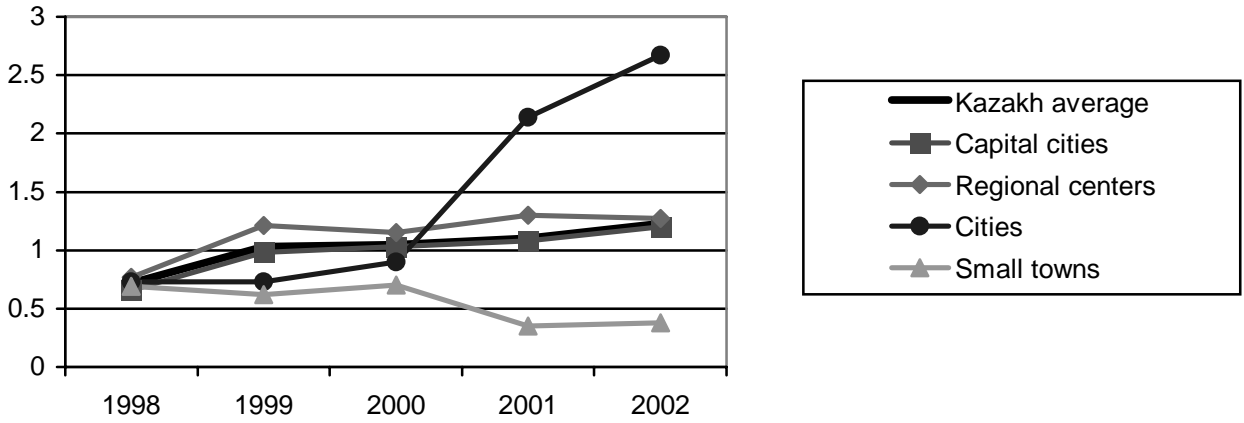
This indicator shows that over the five years the situation has deteriorated further.

All water and sewerage utilities, except those serving small communities, report larger numbers of breaks per km a year, a clear proof of an extremely poor condition of networks.

The failure incidence is worryingly high, much above that reported by Anglian Waters utilities (0.15-0.16 breaks per km a year).

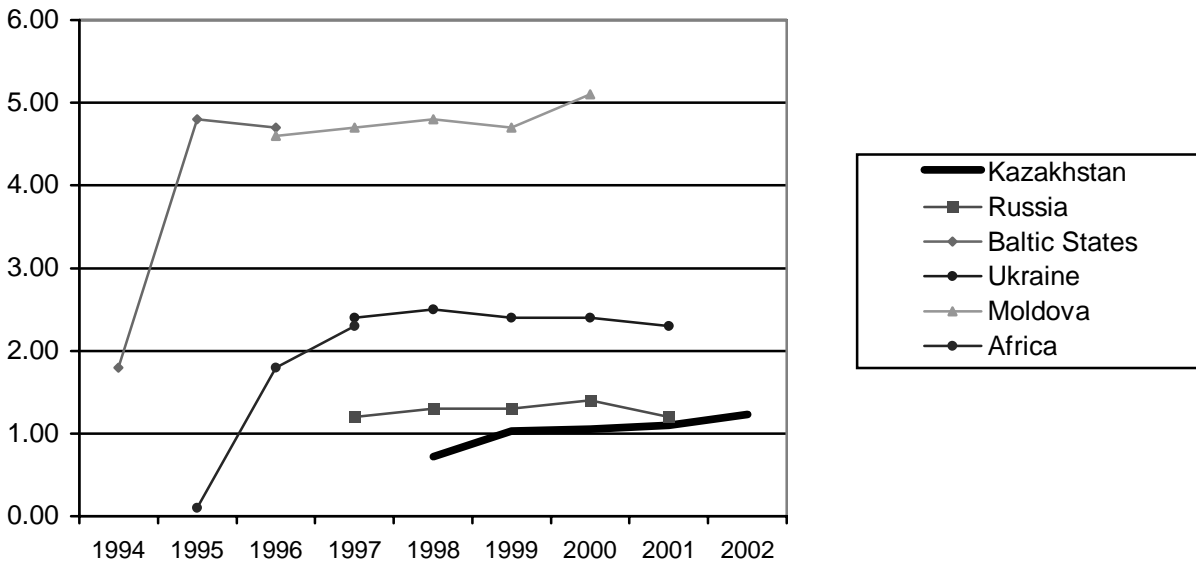
Pipe breaks (per km a year)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	0.72	0.66	0.77	0.73	0.69
1999	1.03	0.98	1.21	0.73	0.62
2000	1.05	1.03	1.15	0.90	0.70
2001	1.10	1.08	1.30	2.14	0.35
2002	1.23	1.20	1.27	2.67	0.38



Annual number of pipe breaks per km of water networks

Year	Kazakhstan	Russia	Baltic States	Ukraine	Moldova	Africa
1994			1.8			
1995			4.8			0.1
1996			4.7		4.6	1.8
1997		1.2		2.4	4.7	2.3
1998	0.72	1.3		2.5	4.8	
1999	1.03	1.3		2.4	4.7	
2000	1.05	1.4		2.4	5.1	
2001	1.10	1.2		2.3		
2002	1.23					



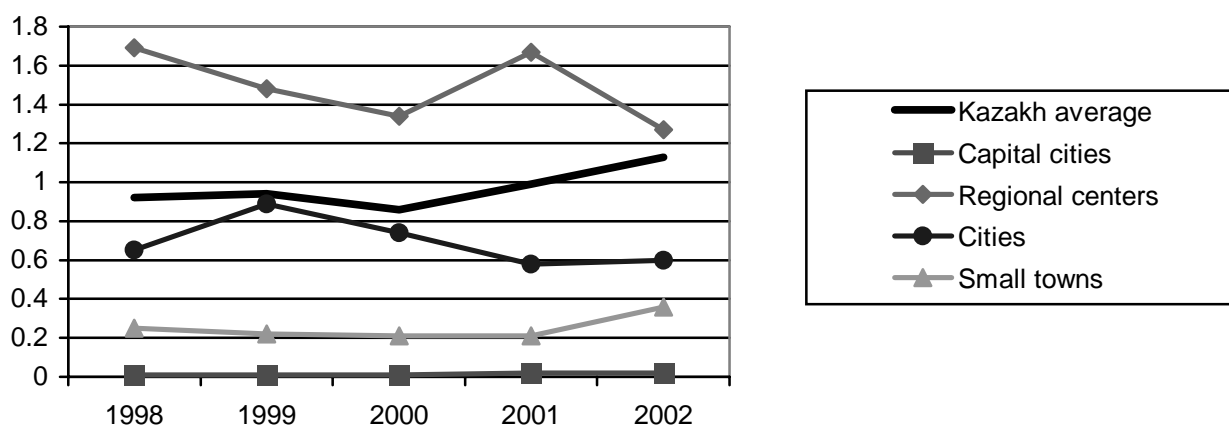
10. Sewerage blockages

The rate of blockages over 1998-2000 remained virtually unchanged and is somewhat lower than in Russia.

Notwithstanding a rather stable indicator value, the incidence is quite high, which indicates an unsatisfactory state of sewerage networks.

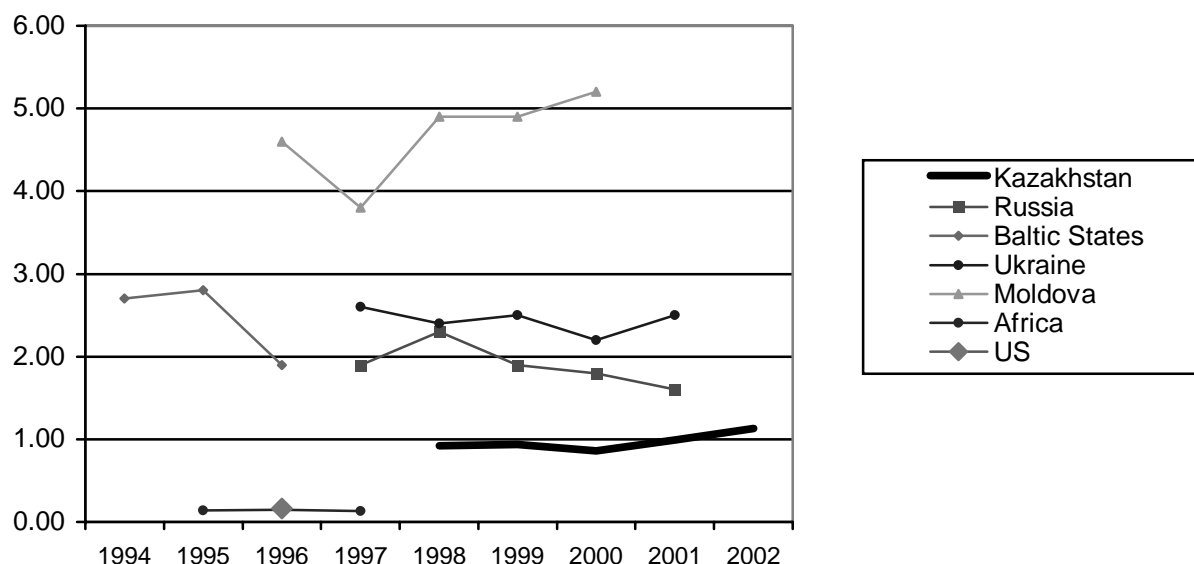
Sewerage blockages (per km a year)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	0.92	0.01	1.69	0.65	0.25
1999	0.94	0.01	1.48	0.89	0.22
2000	0.86	0.01	1.34	0.74	0.21
2001	0.99	0.02	1.67	0.58	0.21
2002	1.13	0.02	1.27	0.60	0.36



Annual number of sewerage blockages per km

Year	Kazakhstan	Russia	Baltic States	Ukraine	Moldova		
1994			2.7				
1995			2.8				
1996			1.9		4.6		
1997		1.9		2.6	3.8		
1998	0.92	2.3		2.4	4.9		
1999	0.94	1.9		2.5	4.9		
2000	0.86	1.8		2.2	5.2		
2001	0.99	1.6		2.5			
2002	1.13						



F. Costs and staffing

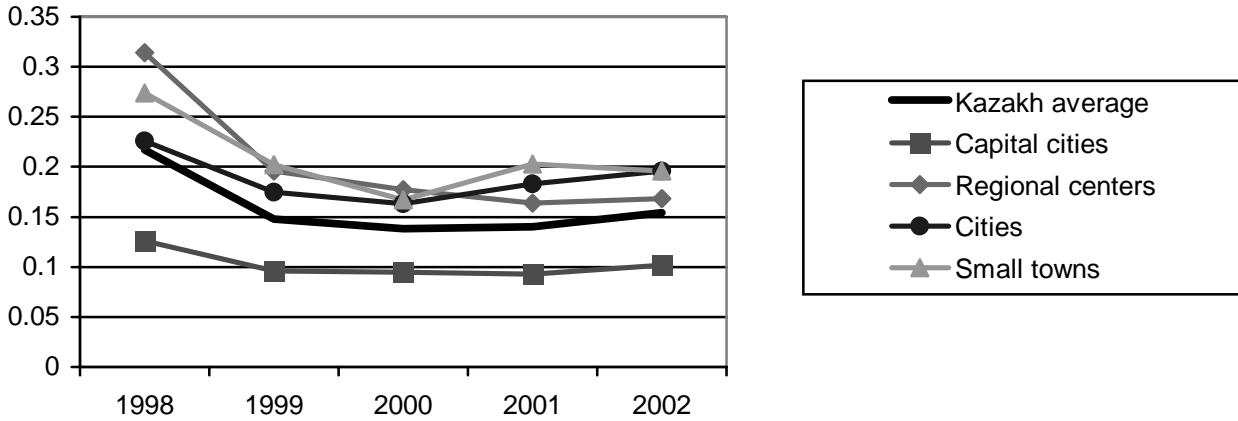
11. Unit operational costs

Operational costs in the period from 1998 to 2002 slightly reduced reflecting the inflation of KZT versus US dollar. In KZT terms the costs grew somewhat slower than inflation. The lowest costs per cubic meter of produced water are in the capital cities which source water locally.

Due to the use of remote water sources to maintain supplies to Karaganda, Ekibastuz (the Irtysh-Karaganda Canal), Aktau and Zhanaozen (desalination of Caspian seawater for Aktau and the Astrakhan-Mangyshlak Water Pipeline for Zhanaozen), national average operational costs exceed those in the two capital cities.

Unit operational costs (\$ per cubic meter of water produced)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	0.217	0.126	0.314	0.226	0.274
1999	0.148	0.096	0.196	0.175	0.202
2000	0.138	0.095	0.177	0.163	0.167
2001	0.140	0.093	0.164	0.183	0.203
2002	0.154	0.102	0.168	0.196	0.196

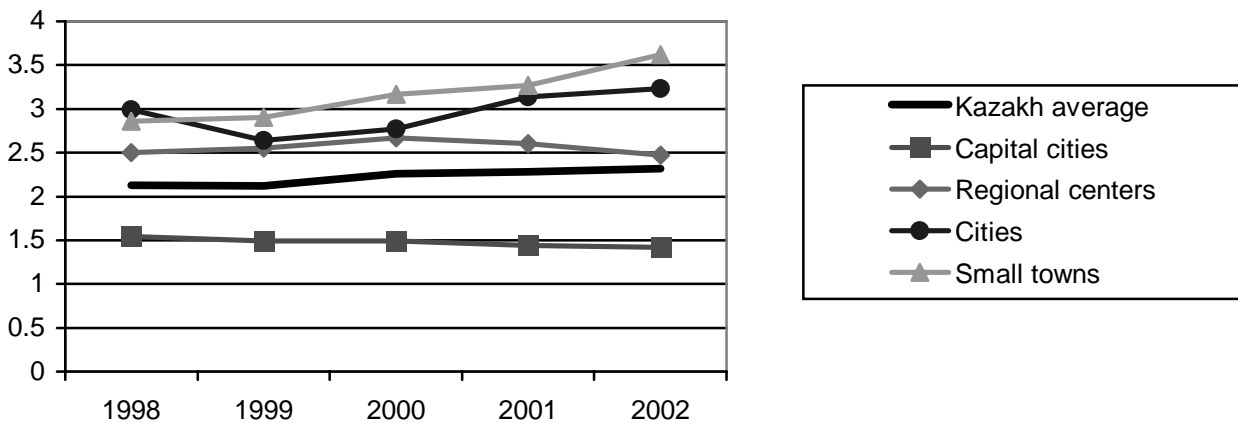


12. Number of staff

The number of personnel remained virtually unchanged and is rather high, which indicates overstaffing and a low level of process automation.

Staff per thousand water and sewerage service population

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	2.13	1.54	2.50	2.99	2.86
1999	2.12	1.49	2.55	2.64	2.90
2000	2.26	1.49	2.67	2.77	3.17
2001	2.28	1.44	2.60	3.14	3.27
2002	2.32	1.42	2.47	3.23	3.62



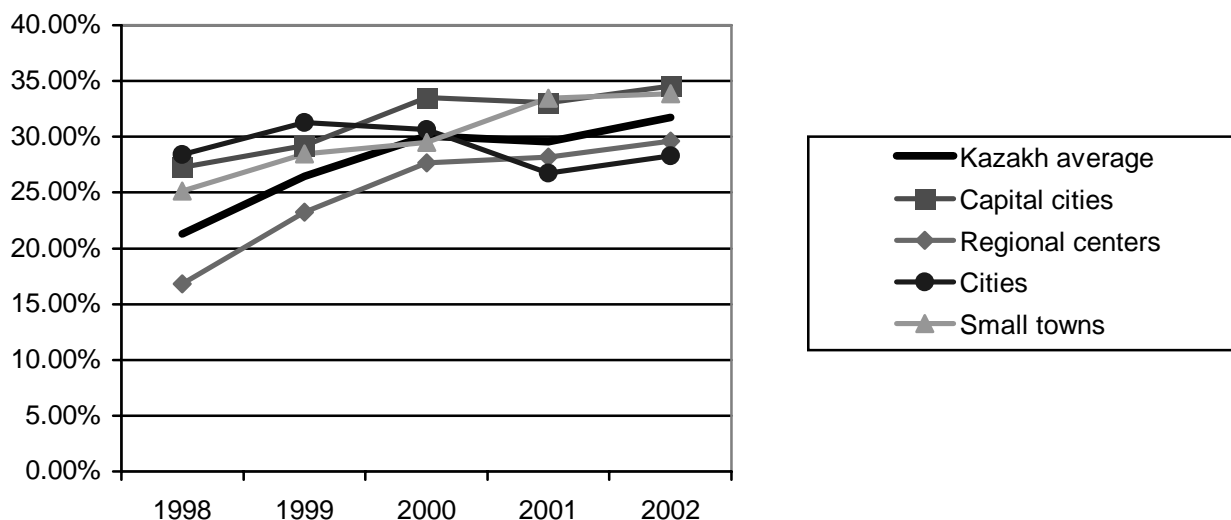
13. Labor costs as a proportion of operational costs

Payroll costs over 1998-2002 increased and averaged 31.7% in 2002 against 21.3% in 1998.

This exceeds labor costs in Russia and Ukraine.

Labor costs as a proportion of operational costs

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	21.27%	27.28%	16.83%	28.41%	25.11%
1999	26.46%	29.22%	23.26%	31.29%	28.47%
2000	30.08%	33.52%	27.66%	30.63%	29.52%
2001	29.54%	33.05%	28.19%	26.74%	33.43%
2002	31.73%	34.53%	29.64%	28.28%	33.85%

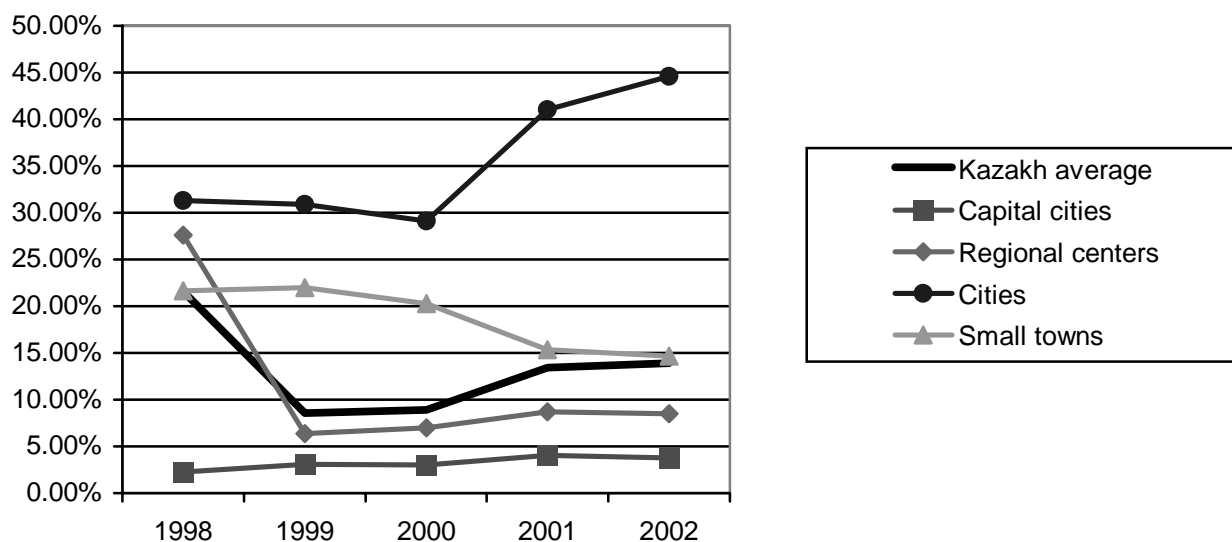


14. Proportion of contracted-out services

The proportion of contracted-out services is considerable at 44.5% among the Karaganda, Ekibastuz, Aktau and Zhanaozen water utilities that receive water from third party operators of the Irtys-Karaganda Canal, the Astrakhan-Mangyshlak Water Pipeline and the Aktau desalination plant. Other utilities report minor scopes of contracted-out services.

Proportion of contracted-out services

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	21.58%	2.28%	27.63%	31.32%	21.66%
1999	8.55%	3.05%	6.34%	30.86%	22.02%
2000	8.87%	2.98%	7.00%	29.14%	20.24%
2001	13.44%	4.04%	8.71%	41.00%	15.31%
2002	13.88%	3.80%	8.51%	44.58%	14.67%



G. Service quality

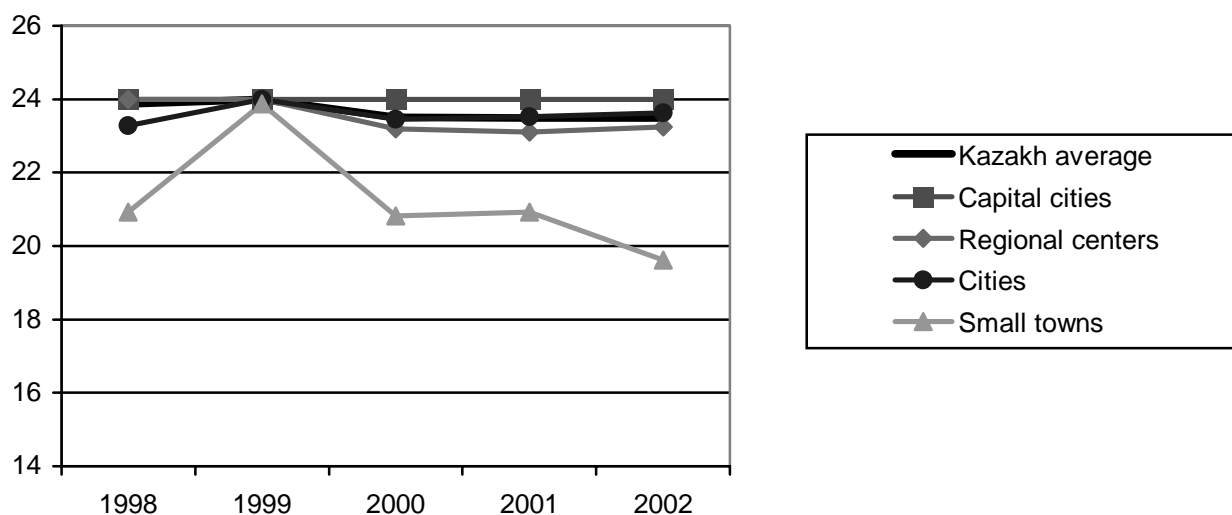
15. Uninterrupted service

On average, the surveyed water utilities report nearly round-the-clock service, although this raises certain doubts given the high network breakdown incidence.

Small utilities provide services for the major part of the day.

Uninterrupted service (hours per day)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	23.88	24.00	24.00	23.28	20.92
1999	24.00	24.00	24.00	24.00	23.88
2000	23.51	24.00	23.20	23.45	20.82
2001	23.48	24.00	23.11	23.53	20.92
2002	23.48	24.00	23.24	23.62	19.62



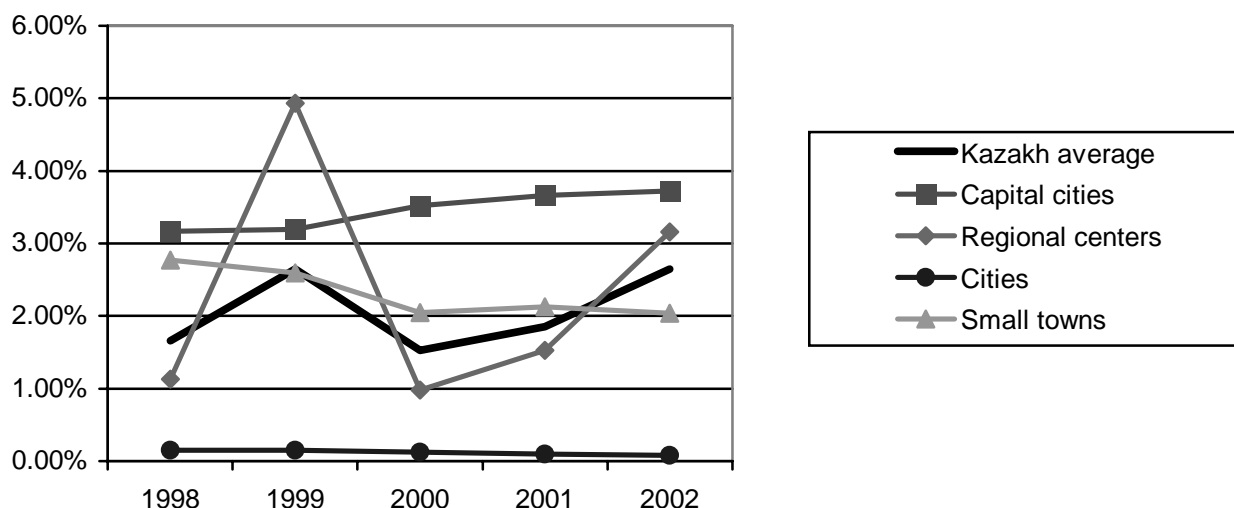
16. Number of water and sewerage complaints

The average number of complaints over 1998-2002 slightly increased while remaining insignificant, which appears somewhat surprising given the high failure rate.

This may be explained by the passive attitude of consumers and their disinclination to lodge complaints.

Number of water and sewerage complaints (%)

<i>Year</i>	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	1.66%	3.17%	1.13%	0.15%	2.77%
1999	2.65%	3.19%	4.93%	0.15%	2.59%
2000	1.53%	3.52%	0.98%	0.12%	2.05%
2001	1.85%	3.66%	1.53%	0.10%	2.13%
2002	2.65%	3.72%	3.16%	0.08%	2.04%



17. Wastewater treatment

All water and sewerage utilities without wastewater treatment facilities predominantly direct wastewater to sewage ponds for evaporation.

Accordingly, all utilities report 100% treatment.

H. Billing and collection

18. Average tariff

There are no surges in charge rates in Kazakhstan as any new tariff must be agreed in advance with the national Agency for Regulation of Natural Monopolies and Safeguarding of Competition.

Given the low paying capacity of residential consumers, tariffs fail to fully cover costs and do not provide funds for utility development.

Average tariff (\$ per cubic meter a year)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	0.217	0.148	0.310	0.155	0.136
1999	0.139	0.110	0.179	0.105	0.091
2000	0.122	0.106	0.146	0.093	0.076
2001	0.131	0.101	0.161	0.120	0.065
2002	0.144	0.114	0.169	0.134	0.062

19. Water charges as a proportion of monthly per capita income

Water charges as a proportion of monthly per capita income have remained at a steadily low level.

20. Regular monthly fees

Kazakhstan does not operate monthly fees as such. Bills are paid based on standard rates for water consumed or meter readings.

21. Ratio of industrial to residential revenues

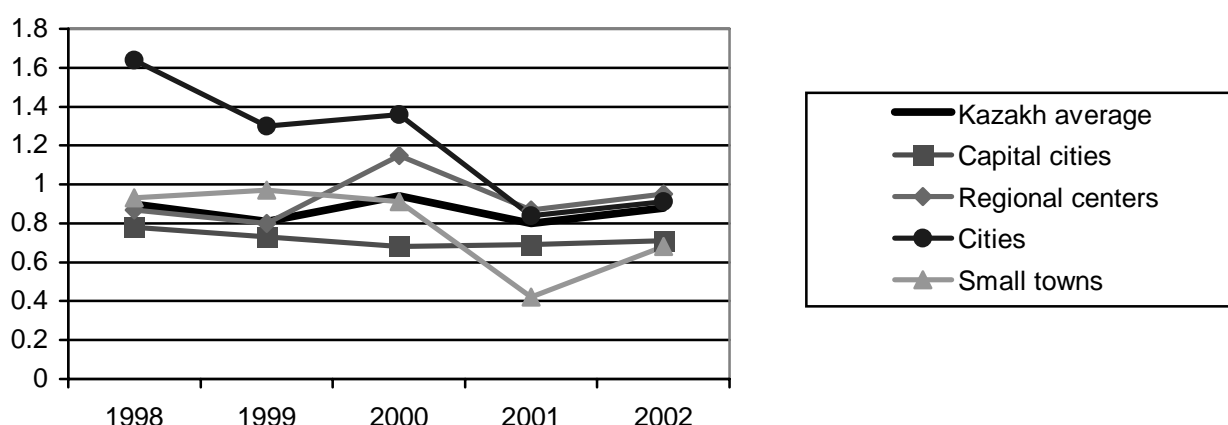
Industrial and residential charges in Kazakhstan are now nearly identical, which implies a drastic reduction in cross-subsidizing of residential consumers by industrial users.

On average, industrial proceeds are somewhat lower than residential revenues.

Cross-subsidizing has remained only in a number of heavily industrial cities and has little impact on nation-wide performance.

Ratio of industrial to residential revenues

<i>Year</i>	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	0.90	0.78	0.87	1.64	0.93
1999	0.81	0.73	0.80	1.30	0.97
2000	0.94	0.68	1.15	1.36	0.91
2001	0.80	0.69	0.87	0.84	0.42
2002	0.88	0.71	0.95	0.91	0.68



22. Connection charges

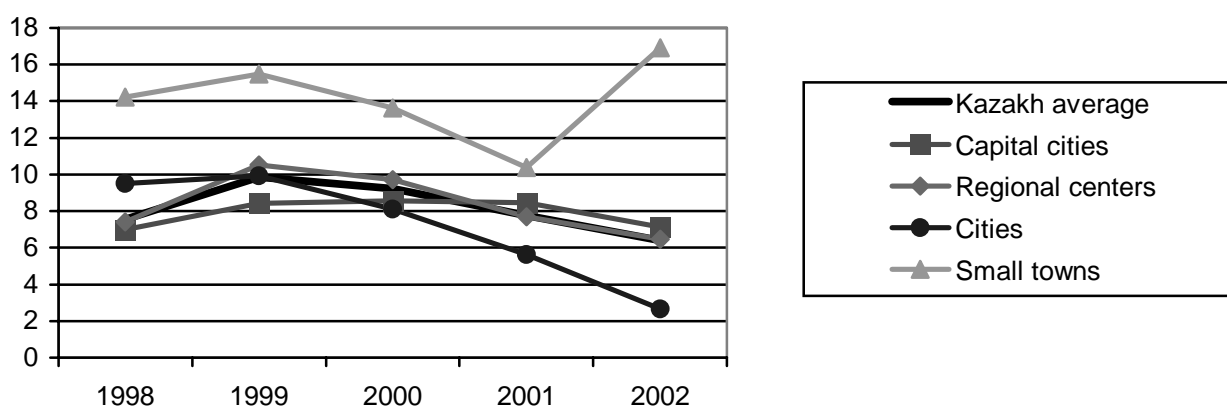
Virtually all water and sewerage utilities use single-rate tariffs with no segregation of connection charges, hence this indicator has a modest value.

23. Collection

On average, water and sewerage utilities exhibit a slight trend towards shorter collection time, however it is still much above the internationally accepted standard of 90 days maximum. In smaller towns, collection time is considerably above average.

Collection (months)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	7.54	6.98	7.40	9.50	14.22
1999	9.84	8.42	10.53	9.93	15.47
2000	9.23	8.55	9.72	8.11	13.63
2001	7.75	8.45	7.69	5.62	10.37
2002	6.38	7.12	6.47	2.66	16.93



The state of the water and sewerage system is aggravated by the problem of non-payments.

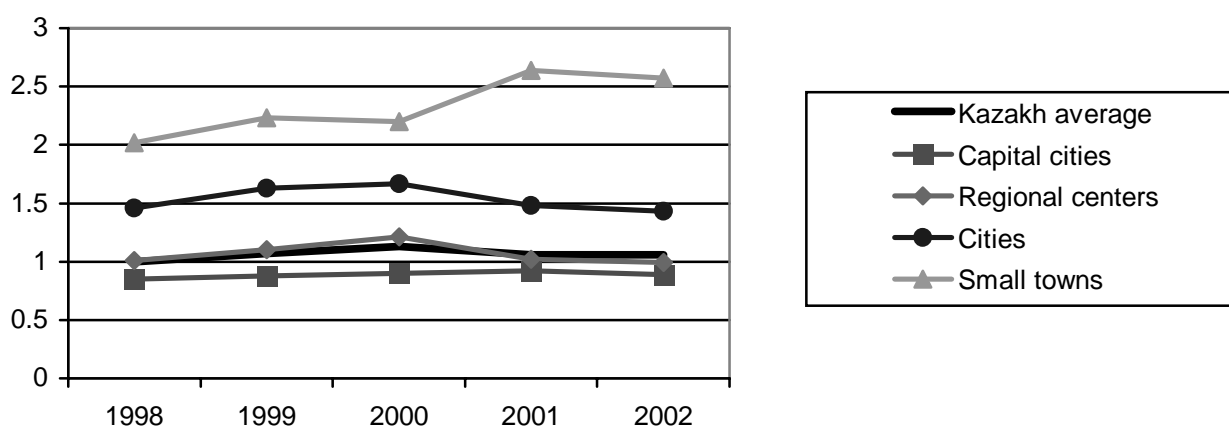
I. Financial performance indicators

24. Costs to revenues

The average ratio of costs to revenues (operating balance) approximates 1. In the capital cities, revenues exceed costs, while indicator values for small towns are worrisome, demonstrating that utilities are balancing on the verge of bankruptcy. Low payment discipline renders this indicator artificial.

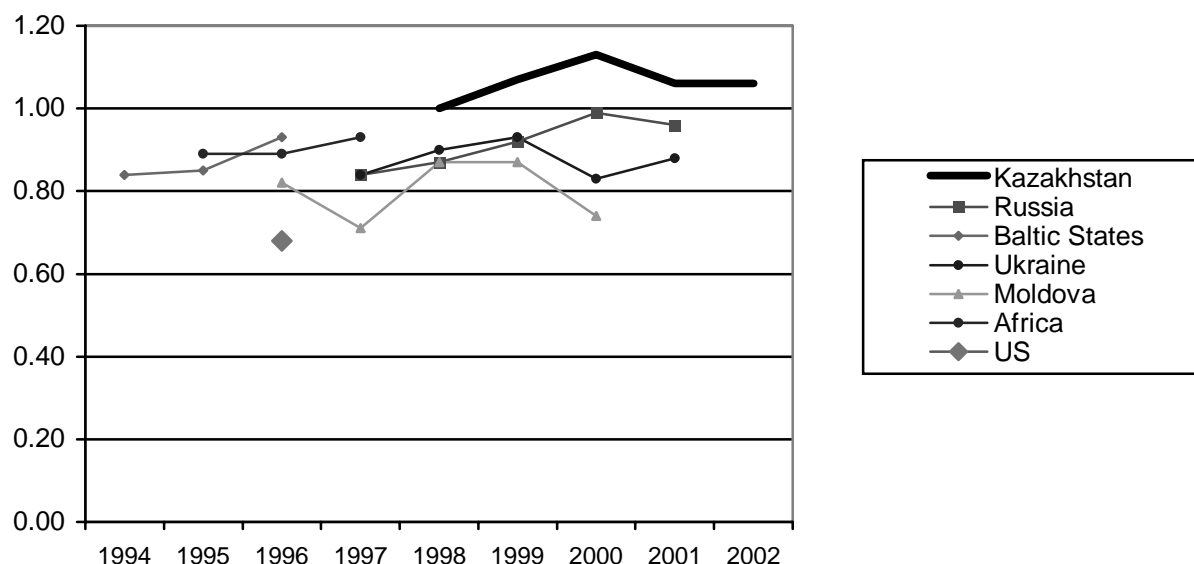
Costs to revenues

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	1.00	0.85	1.01	1.46	2.02
1999	1.07	0.88	1.10	1.63	2.23
2000	1.13	0.90	1.21	1.67	2.20
2001	1.06	0.92	1.02	1.48	2.64
2002	1.06	0.89	0.99	1.43	2.57



Operating balance (Total annual operating costs / total annual operating revenues)

Year	Kazakhstan	Russia	Baltic States	Ukraine	Moldova	Africa	US
1994			0.84				
1995			0.85			0.89	
1996			0.93		0.82	0.89	0.68
1997		0.84		0.84	0.71	0.93	
1998	1.00	0.87		0.90	0.87		
1999	1.07	0.92		0.93	0.87		
2000	1.13	0.99		0.83	0.74		
2001	1.06	0.96		0.88			
2002	1.06						



25. Proportion of debt service costs

This indicator has a minor value and reflects the utilities' reluctance to borrow because of their poor financial condition resulting from non-payments and low charges.

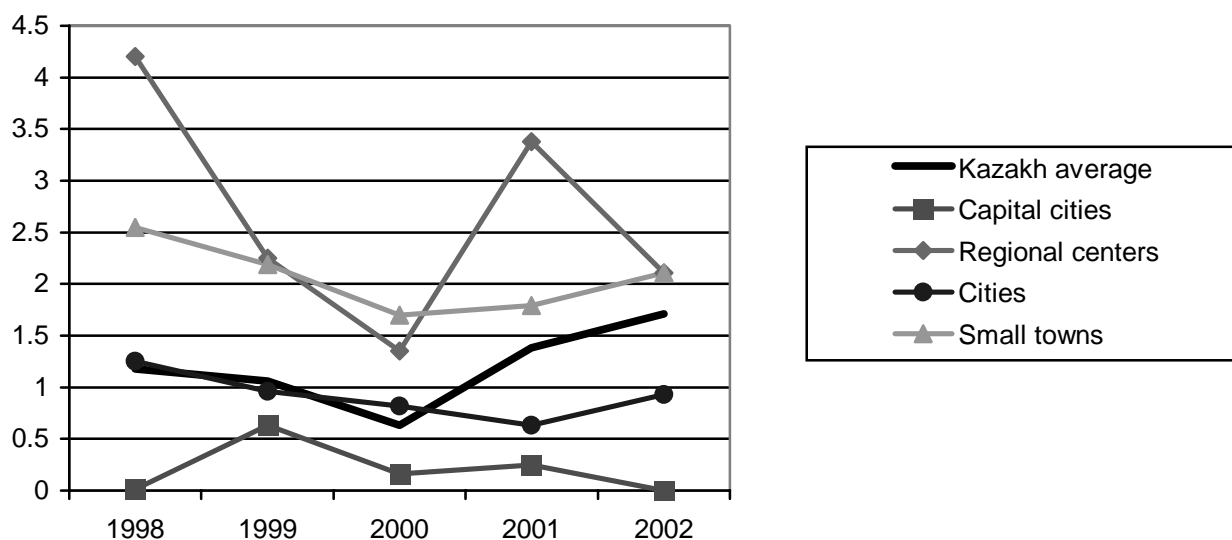
J. Capital expenditure (investments)

26. Investments

The investment indicator is low due to the poor financial standing of utilities.

Investments (\$ per capita)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	1.18	0.01	4.20	1.25	2.55
1999	1.06	0.63	2.25	0.96	2.19
2000	0.63	0.16	1.35	0.82	1.70
2001	1.38	0.25	3.38	0.63	1.79
2002	1.71	0.00	2.11	0.93	2.11

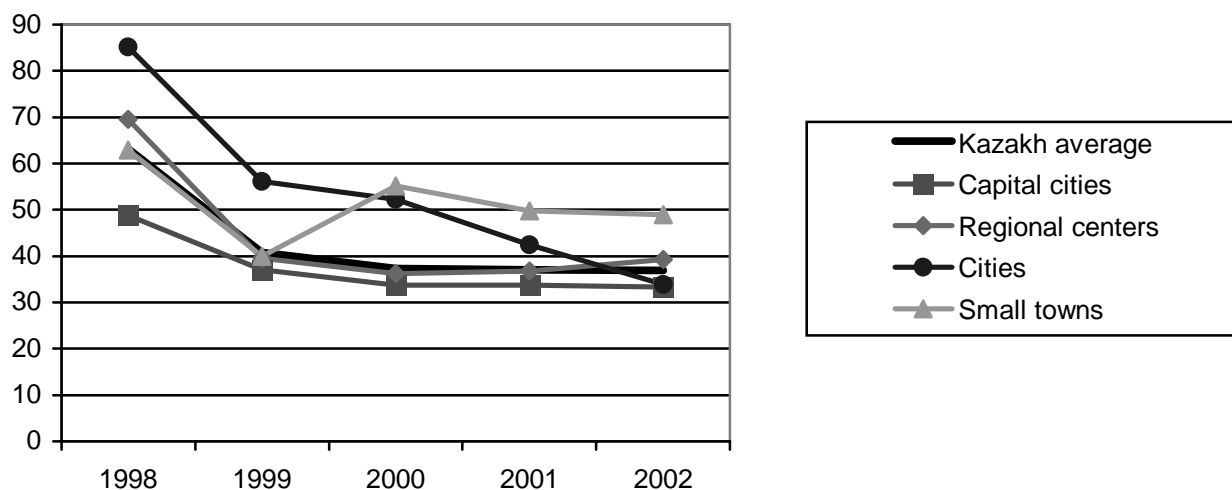


27. Fixed assets per capita

In the period from 1998 to 2002, fixed assets per capita reduced commensurate with the aging (depreciation) of fixed assets. Any improvements are unviable without Government support.

Fixed assets (\$ per capita)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	63.17	48.77	69.52	85.19	62.88
1999	40.74	37.07	39.49	56.10	39.96
2000	37.27	33.69	36.22	52.31	55.15
2001	37.09	33.80	36.80	42.50	49.82
2002	36.96	33.37	39.20	33.83	49.00



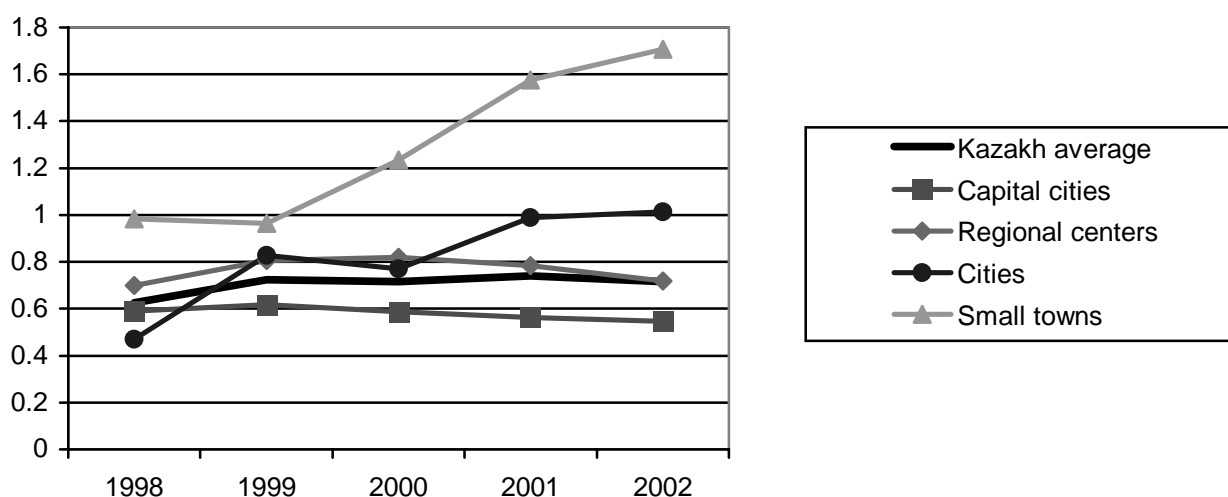
Energy costs

Average energy costs per cubic meter of water produced across the surveyed water and sewerage utilities in 1998-2002 totaled 0.6–0.72 kWh per cubic meter (against the 0.6 kWh maximum in Western Europe), and in smaller towns increased from 0.98 to 1.7 kWh per cubic meter. Higher energy consumption results from the use of existing and readily available equipment rather than that required because of the utilities' lack of funds.

Energy costs per cubic meter of disposed sewage over the analyzed period changed only slightly and averaged 0.43–0.55 kWh per cubic meter, going down from 1.53 to 0.97 kWh per cubic meter in small towns.

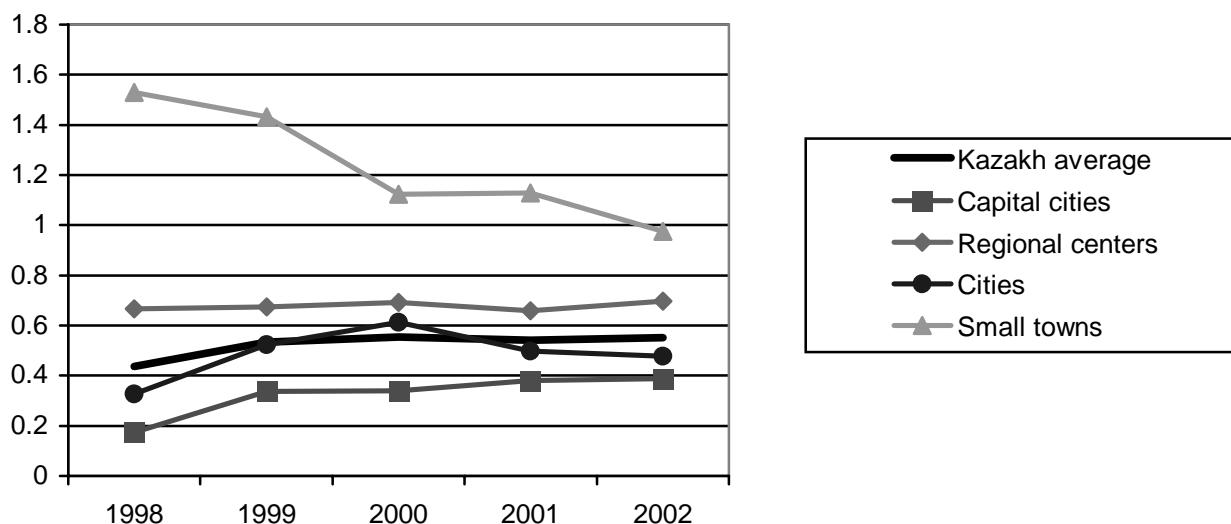
Energy consumption per cubic meter of water produced (kWh/m³)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	0.626	0.588	0.699	0.470	0.982
1999	0.724	0.618	0.804	0.827	0.964
2000	0.714	0.587	0.818	0.770	1.235
2001	0.741	0.562	0.783	0.989	1.575
2002	0.716	0.545	0.718	1.013	1.707



Energy consumption per cubic meter of wastewater (kWh/m³)

Year	Kazakh average	Capital cities	Regional centers	Cities	Small towns
1998	0.435	0.173	0.667	0.325	1.530
1999	0.533	0.338	0.673	0.523	1.432
2000	0.553	0.338	0.691	0.613	1.124
2001	0.542	0.379	0.657	0.496	1.128
2002	0.552	0.387	0.696	0.477	0.975



Environmental activities

Given the nature of their operations, water and sewerage utilities necessarily deal with environmental matters.

The introduction of the water metering system made it possible to limit water draw from underground and surface sources and reduce wastewater volumes over 1998-2002.

This significantly alleviated the utilities' environmental impact in terms of both the use of resources and the disposal of waste.

High wear and tear of fixed assets affected the quality of wastewater treatment, however there have been no major discharges of BOD₅ pollutants, suspended solids etc. due to the following factors:

- the volumes of wastewater have reduced considerably;
- treatment facilities are equipped with wastewater ponds designed for accumulating wastewater for further use in irrigation, but currently used as evaporators, i.e. there is no discharge affecting the surface or water bodies.

The extremely poor technical condition of networks and the resulting above-norm leakages provoke groundwater upwelling, which adversely affects the environment.

The improving economic situation in Kazakhstan gives reason to hope that water and sewerage utilities will receive the allocations necessary to overhaul their networks and facilities, with the ultimate positive impact on the environment.

CONCLUSIONS

1. In terms of urban water and sewerage coverage (in towns and other urban settlements), Kazakhstan ranks high among the FSU countries, second only to the Baltic States. The country's impressive water and sewerage coverage is due to the fact that already in 1990 Kazakhstan implemented the initiatives necessary to secure future water supplies, including the engagement of remote water sources through construction of:

- the Irtysh-Karaganda Canal;
- the Astrakhan-Mangyshlak Water Pipeline.

2. Service quality is declining, driven down by high network breakdown incidence and deteriorating facilities.

The primary cause of the deteriorating technical condition of the water and sewerage networks and facilities operated by utilities is their poor financial condition.

Recently this issue has been subject to increased attention of both the general public (as shown by discussions in the mass media) and the Government, which endorsed the *Potable Water* industry program for 2002-2010 (adopted by Resolution No. 93 of the Government of Kazakhstan on January 23, 2002).

3. Water and sewerage utilities are carrying out an extensive program to install meters, which has also helped in reducing water consumption and wastewater disposal.

4. The non-payments problem erodes the operating and financial results of water and sewerage utilities. The management of water utilities, acting jointly with the *akimats* (district authorities) and the mass media, ought to step up efforts to enhance collection.

5. Given the current economic growth in Kazakhstan and a greater focus on water supply and environmental protection, the situation in the water and sewerage sector in Kazakhstan may be expected to improve.