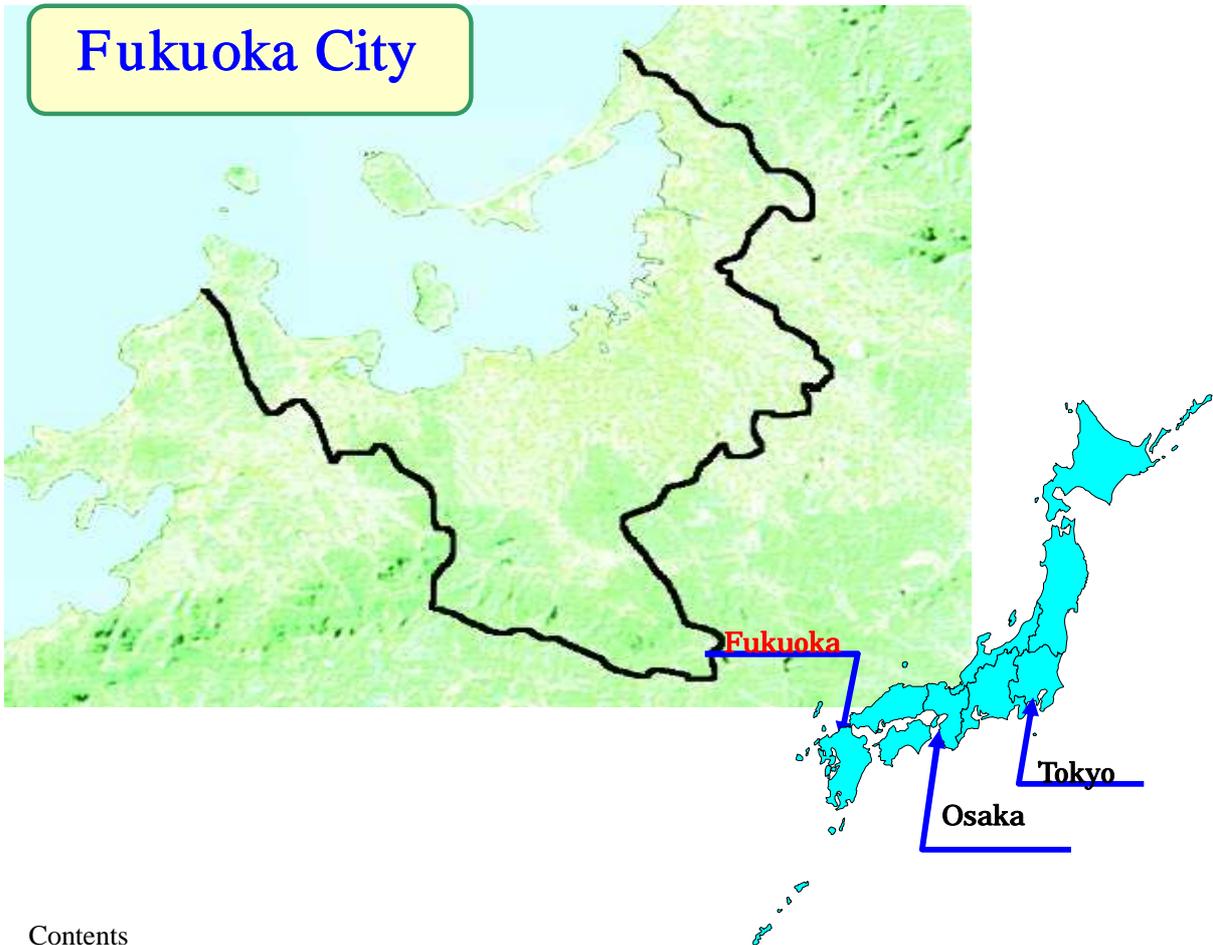


Fukuoka City Waterworks (Outline)



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Separate Data

Data 1...Fukuoka City's Water Resources and Waterworks Facilities

Data 2...Fukuoka City Waterworks Statistics

My name is "Fukuchan", the mascot of the Fukuoka Waterworks Bureau.

Please access the following URL if you want to know more information about Fukuoka:

<http://www.city.fukuoka.lg.jp/suidou/>



Issued on April 2008 by the General Affairs Division

1. Outline of Fukuoka City

(1) Location and geographical features

Fukuoka City is located in the north of Kyushu Island in southwestern Japan, at a latitude of 33°35'13" degrees north and a longitude of 130°24'15" degrees east. The city stretches 28 km east to west and about 32 km north to south, and its overall area is about 341 km². Urban districts are formed mainly in the semicircular Fukuoka Plain nestled alongside the mountains of Sefuri, Sangun, and Inunaki. Small and medium-sized rivers originating in these mountains, such as the Tatara, the Mikasa, the Naka, the Muromi, and the Zuibaiji, run through the city and into Hakata Bay. Uminonakamichi and Shikanoshima Island, which determine the form of Hakata Bay, face the Sea of Genkai, beyond which lie the Korean Peninsula, and the Asian Continent.

Thanks to its proximity to the Asian Continent and the Korean Peninsula, Fukuoka City has long been a gateway for cross-cultural exchange. The city has developed as a commercial city and is now known as one of the most vigorous cities in Japan.

(2) Population

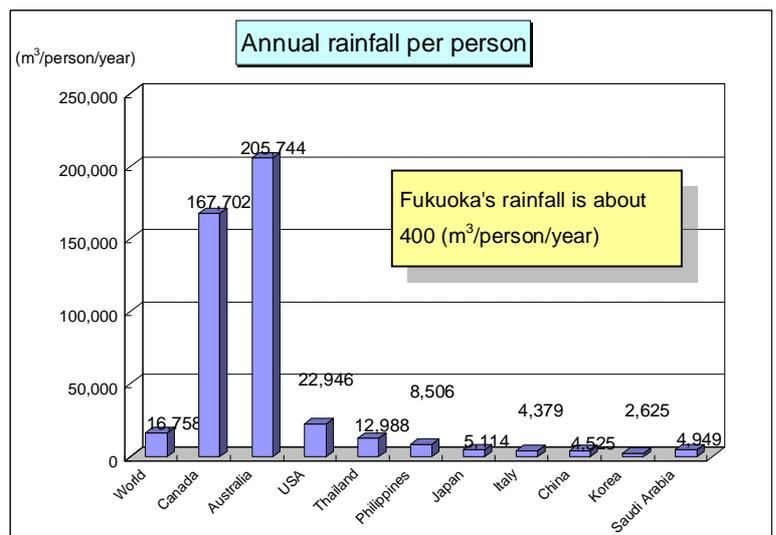
Since 1889, when Fukuoka City was established with approximately 50,000 people, 9,000 households and an area of 5 km², it has expanded significantly and as of April 2007 had a population of 1,414,747, with 664,883 households.

(3) Climate

The city's average annual temperature was 17.2 degrees Celsius as of 2006 and the average annual precipitation was roughly 1,600 mm, with very little snowfall. Due to the influence of the seasonal winds, Fukuoka has a rainy season and a typhoon season, so climatic changes are relatively large.

(4) Annual rainfall

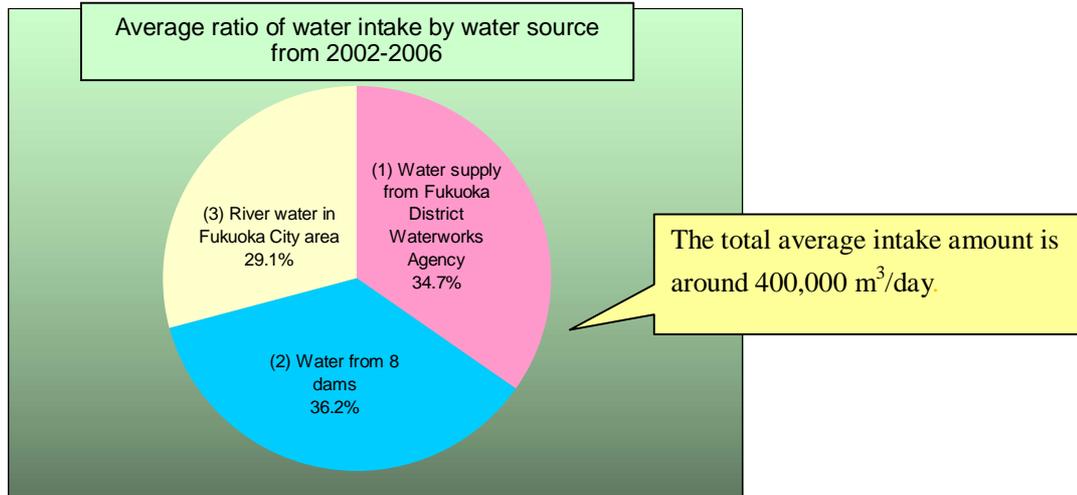
The graph on the right shows annual rainfall per person. The world average annual rainfall is about 17,000 m³/person/ year, and the USA receives around 23,000 m³/person/year. In contrast, the Japanese average is about 5,000 m³/person/ year, and that of Fukuoka City is only 400 m³/person/year. One reason for this is the city's high population density. Considering actual rainfall, the amount of usable water is insufficient.



Source: "Water Resources of Japan: 2007 version" issued by the Ministry of Land, Infrastructure, Transport and Tourism

2. Water Resources for Fukuoka Waterworks

Fukuoka City collects roughly equal amounts of water from the following three sources:



(1) Water supply from Fukuoka District Waterworks Agency

The Fukuoka District Waterworks Agency supplies water to the waterworks of nine cities and nine towns. The Agency's main water resource is the water from the Chikugo River, located in the south part of Fukuoka Prefecture, about 25 km away from the Fukuoka metropolitan area. The Chikugo River is the biggest in Kyushu and controlled by the national government. Water intake from the river is sent to the Ushikubi Purification Plant, which is the main plant of the Fukuoka District Waterworks Agency, by the Japan Water Agency (an independent administrative corporation).

Since 1983, Fukuoka City has been receiving water from the Chikugo River through the plant.

(2) Uminonakamichi Nata Sea Water Desalination Center

The second water resource of the Fukuoka District Waterworks Agency is the Uminonakamichi Nata Sea Water Desalination Center, located in the city, where sea water is turned into fresh water.

The center started to operate in 2005, and the total cost of construction was about 40.8 billion yen. The maximum treatment capacity is 50,000 m³/day, making it one of the largest desalination facilities in Japan. The center supplies 16,400 m³ of water every day to the city.



Uminonakamichi Nata Sea Water Desalination Center

(2) Water from eight dams

Fukuoka City has four rivers (the Tatara, Naka, Muromi and Zuibaiji Rivers) used as a waterworks resource, with a watershed area of only 220 km². Seven out of eight dams from which Fukuoka City takes water were constructed along these rivers, including four (Magaribuchi, Sefuri, Kubara and Nagatani Dams) exclusively used for water supply. The last one is Egawa Dam, located along the Chikugo River. The catchment area of the Chikugo River is 2,860 km² and that of Egawa Dam is around 30 km².

The total effective storage capacity of the eight dams is approximately 49.82 million m³.

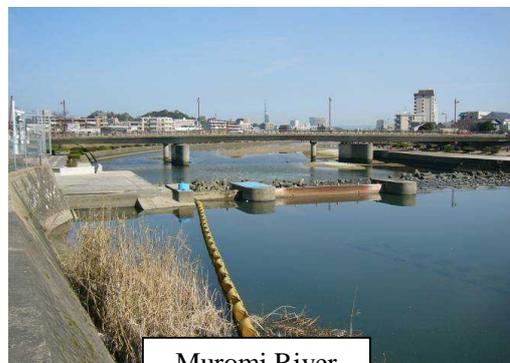


Magaribuchi Dam

(3) Rivers in the Fukuoka City area

The four rivers in the Fukuoka City area are small but valuable water sources for the city. The city tries to take water from these rivers efficiently by monitoring the amount of water stored at dams and the water flow of the rivers.

Keeping the rivers clean and preserving their surrounding environment are important issues for the future life of the people.



Muromi River

3. Supplying Safe and High-Quality Water

< To safeguard our clean tap water culture >

Fukuoka City is engaged in rigorous water quality control so that citizens “can drink water from the tap wherever they are”. The custom of drinking water from the tap is part of our culture to preserve.

(1) Supplying safe and high-quality tap water

In order to ensure that water quality tests are conducted in an appropriate and transparent manner, and to supply “safe water that people can drink without concern”, Fukuoka City has developed a “water quality test plan” and conducts tests accordingly.

The water quality test plan describes test requirements such as items, locations and frequency. It is required by law to design such a plan every year and release its contents to the public. The City incorporates opinions from customers in designing the plan and publicizes it through its website and other media.

(2) Performing water quality tests

- Test items required by law

Rigorous tests are conducted, from water sources to hydrants, on items that could affect human health or hamper the daily use of water, for instance, for washing.

- Test items judged as necessary for water quality control

Tests are also conducted, from water sources to hydrant and on a regular basis, on items that are specified as necessary to supply safe, delicious and high-quality water, as well as to secure the safety of drinking water in future. Stricter standards than national ones are applied to some of these items. In particular, the city scrutinizes areas along the rivers to detect agrichemicals used in these areas.

- **Water tests in an emergency**

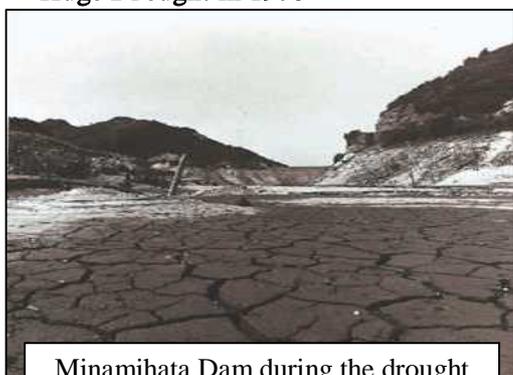
Preparing for an emergency such as a disaster or an accident that can pollute any water source, Fukuoka City deploys water testing vehicles equipped with various testing instruments to check the safety of water promptly on the spot.

(3) Publication of test results

The results of water quality tests on items required to meet water quality standards are publicized on Fukuoka City's website.

4. Toward a Water Conservation-Conscious City

< Huge Drought in 1978 >



Minamihata Dam during the drought



Citizens drawing water from a water truck

These photos show the situation of a serious drought in 1978 in Fukuoka. The city had only 70% of average rainfall and, furthermore, did not have enough reservoirs or dams. As a result, the city's water supply had to be restricted for 287 days.

It was the first time in Japan that a city with a population of more than one million suffered such a long drought. The drought made Fukuoka City notorious for its serious water resources problem.

Having learned valuable lessons from this severe drought, Fukuoka City initiated efforts toward a "water conservation-conscious city".

< Steps toward a water conservation-conscious city >

(1) Ordinance on the Promotion of Water Conservation

Having undergone the severe drought in 1978, Fukuoka City prepared the "Fukuoka City's Outline of Measures for Economical Water Use" and has been striving to build a water conservation-conscious city. Considering tendencies of unstable precipitation and increasing population over the following years, the City saw the need to redouble its efforts, and thus enacted an "Ordinance on the Promotion of Water Conservation" in 2003.

This is the first ordinance regarding water conservation enacted in Japan. It is designed to build an environment-friendly and drought-resistant city, while facilitating stable water supply with the cooperation of citizens. Under the ordinance, new buildings with a floor area of over 5,000 m² (or

3,000 m² in the downtown area) are required to have a water recycling facility to use rainwater and/or reclaimed water.

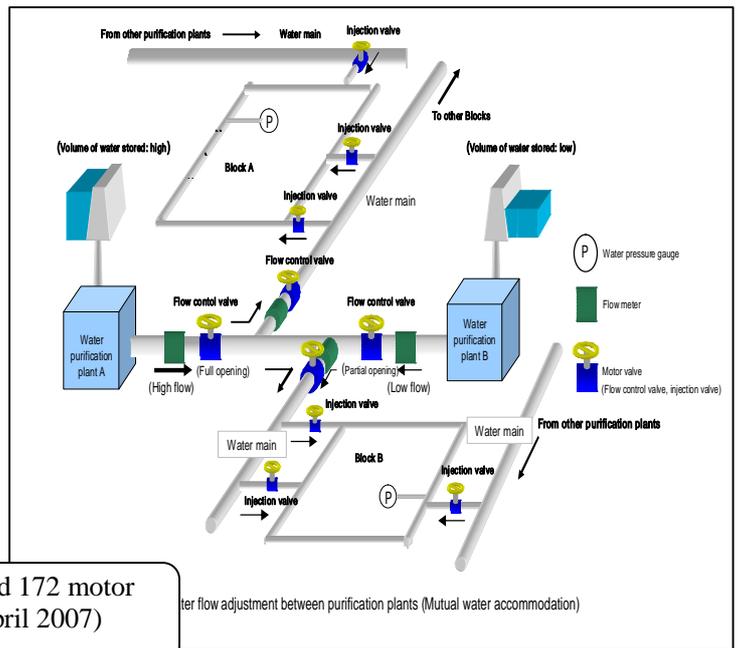
(2) Water recycling facilities

Fukuoka City is promoting the installation of water recycling facilities to treat rainwater or wastewater, and use the reclaimed water for flushing the toilet and other purposes.

There are three types of such facilities: 1) “individual circulation type” using water reclaimed from wastewater that is generated inside of a building, 2) “wide-area circulation type” using reclaimed water supplied from a wastewater treatment plant, and 3) “non-circulation type” using treated rainwater.

(3) Water Distribution Control Center

Having learned lessons from the serious drought in 1978, Fukuoka City established a water control center in 1981, with the aim of becoming a “water conservation-conscious city”, and for the purpose of adjusting “water flow between water purification plants” and “water pressure inside distribution pipes in the city”. Constant monitoring of flow meters and water-pressure gauges, along with remote-controlled motor valves, enables smooth flow adjustment and precise water pressure adjustment, making a great contribution to the effective use of water.



80 flow meters, 122 water pressure gauges, and 172 motor valves are installed in Fukuoka City. (As of April 2007)

(4) Leakage detection



Leakage patrol at night

A large increase in the number of automobiles has severely damaged distribution pipes underground, causing water leakages hard to detect. To minimize the loss of valuable water resources and use them effectively, Fukuoka City has introduced leak detection programs systematically since 1956. Now leakage detection is conducted while setting the detection areas and circulation years, and “risk assessment” is implemented by analyzing past leakage detection data.

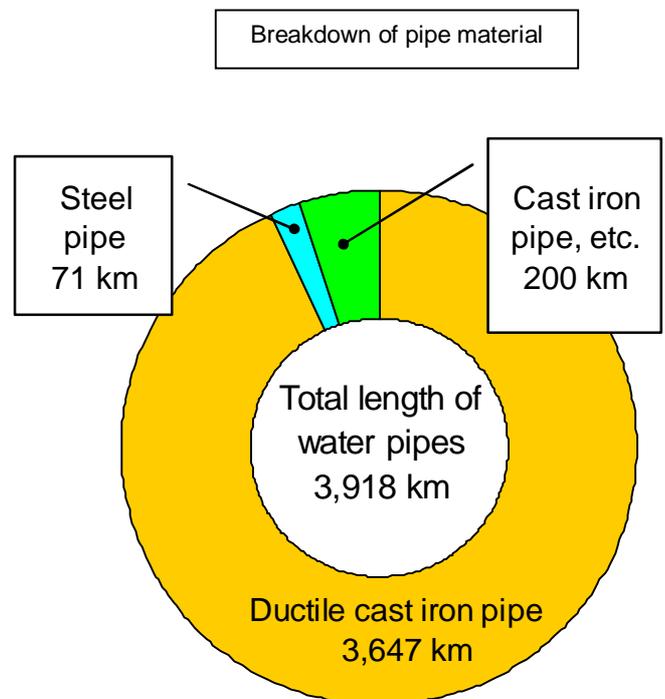
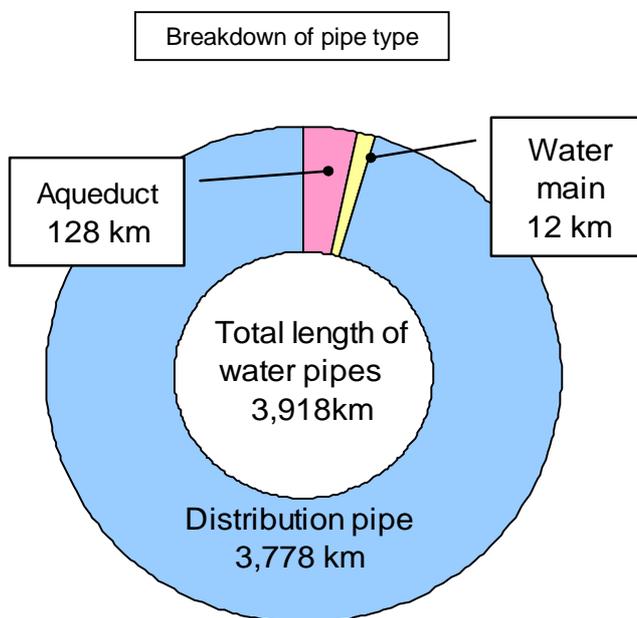
(5) Replacement of distribution pipes

The total length of water pipes installed in Fukuoka City, as of 2007, was 3,918 km. Distribution pipes account for 3,778 km or 96% of the total.

Since old distribution pipes can cause turbid water and a higher leakage rate, the city usually replaces distribution pipes every 40 years. The annual length of replacement is about 20 km in recent years. For replacement, ductile iron pipes that have high durability are mainly used.

In addition, the city aims to extend the life of these pipes by covering them with soft polyethylene sleeves that are extremely durable and highly resistant to corrosion.

Fukuoka City has been engaged in enhancing earthquake-resistance in its distribution pipes since 2005. Earthquake-proof joints are used in areas requiring higher resistance to earthquakes. The city will assign a high priority to enhancing the earthquake-resistance of distribution routes to hospitals and places designated as evacuation centers.



(6) Public Relations

In order not to forget the lessons of the drought in 1978, Fukuoka City designated June 1 as “Water Saving Day” and also designed a symbol mark to promote water saving (shown on the right), modeled on an image of water circulation for the following year.



Every year from June to August, during which people tend to use much more water, the city undertakes a “water saving campaign”. In addition, through PR activities carried out throughout the year, including the distribution of literature to all households in the city, the issuance of a guidebook for schoolchildren, and study tours to waterworks facilities, the city strives to maintain high public awareness of water conservation to promote “careful use of water as a finite resource”.

As a result, the citizens of Fukuoka City have a high awareness of water conservation. According to a survey on citizens’ awareness in 2007, 82.6% of the respondents answered that they always try to save water.

< Results of the efforts toward a water conservation-conscious city >

As a result of various efforts to secure a “stable water supply” since 1978, the total hours of restricted water supply in 1994, when the rainfall was below that in 1978, was reduced by about 40% and no water truck was mobilized. Furthermore, there was no restriction on water supply in 2005 when the rainfall was the third lowest ever since Fukuoka Meteorological Observatory started its observation.

< Comparison of conditions during droughts >

Year of drought	1978	1994	2005
Annual precipitation (mm)	1,138 (the fifth lowest)	891 (the lowest)	1,020 (the third lowest)
Population supplied	1,028,000	1,250,000	1,388,000
Sewage system coverage rate (%)	37.30	96.30	99.40
Maximum supply capacity (m ³ /day)	478,000	704,000	764,500
Total hours of supply restriction	4,054	2,452	0
Average hours of supply restriction per day	14	8	0
Number of mobilized valve operators	32,434	14,157	0
Number of mobilized water trucks	13,433	0	0
Number of complaints and inquiries	47,902	9,515	0

5. Finances

Fukuoka Waterworks Bureau is a municipal utility. It is provided by applicable law that the operating expenses must be covered, in principle, by collected water charges. This is called a self-supporting accounting system. Therefore, the Waterworks Bureau operated by this system is different from that of general extension and maintenance of public roads, which is supported by tax revenues.

The municipal utility accounting consists of “operating revenue and expenditure” and “capital

revenue and expenditure”. Operating revenue refers to all the revenue generated by a single year’s ordinary operating activity, whereas operating expenditure describes all the expenditure related to operating revenue.

Capital expenditure refers to expenditure for obtaining assets that one project uses over a period of years, whereas capital revenue such as corporation bonds describes revenue to finance capital expenditure.

The graph below shows each account based on the budget in 2007.

Figure-1 shows our main projects.

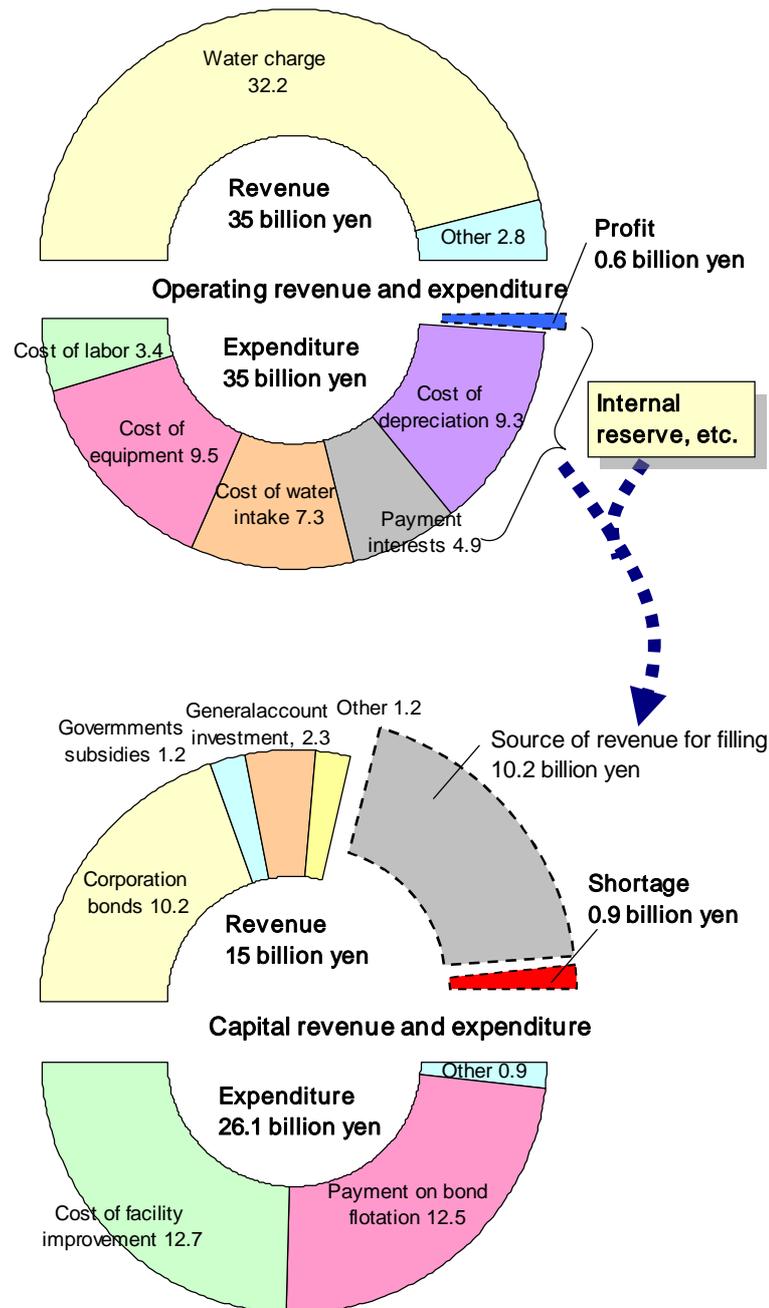


Figure 1: Main Projects

(Unit: 1,000 yen)

Classification	Project	Fiscal year	Content	Budget in 2007
Promotion of water resource development	Gokayama Dam construction	1988-2017	Gokayama Dam construction (by Fukuoka Prefecture) upstream on the Naka River to secure stable supply even during a severe drought	4,062,874
Promotion of effective water use	Water leakage prevention	2005-2008	Effort for early detection and prevention of water leakage to promote effective use of water distributed from purification plants, which, combined with the effect of water distribution adjustment, leads to higher effective water ratio	695,770
	Waterworks public relations		PR activities and public opinion gathering to deepen public understanding of water services and promote efforts toward a water conservation-conscious city	34,310
	Adjustment system of water distribution	2005-2008	Installation and maintenance of adjustment system of water distribution to facilitate stable water supply and effective use of water	185,888
Promotion of well-balanced water supply	Maintenance and construction of distribution pipes	2005-2008	Maintenance and construction of distribution pipe networks to facilitate well-balanced water supply	6,113,319
Promotion of water resource development and purification plant maintenance	Water resource development and purification plant maintenance	2005-2008	Land acquisition near and around water resources and water purification plant maintenance to nurture water resources and preserve water quality	1,068,464
	Reorganization of purification plants	2001-2015	Renewal of old purification plants and installation of aqueducts and water pipes for more effective water management and to enhance their function as a lifeline in case of emergency	897,340
Preservation of water resources			Improvement of the function of water source forests to preserve and nurture water resources, and strengthening of relations with water source areas to secure long-term and stable supply of high-quality water: Fukuoka City Foundation for Water Resource Preservation Projects can be utilized for this purpose	81,000

6. Water Charges

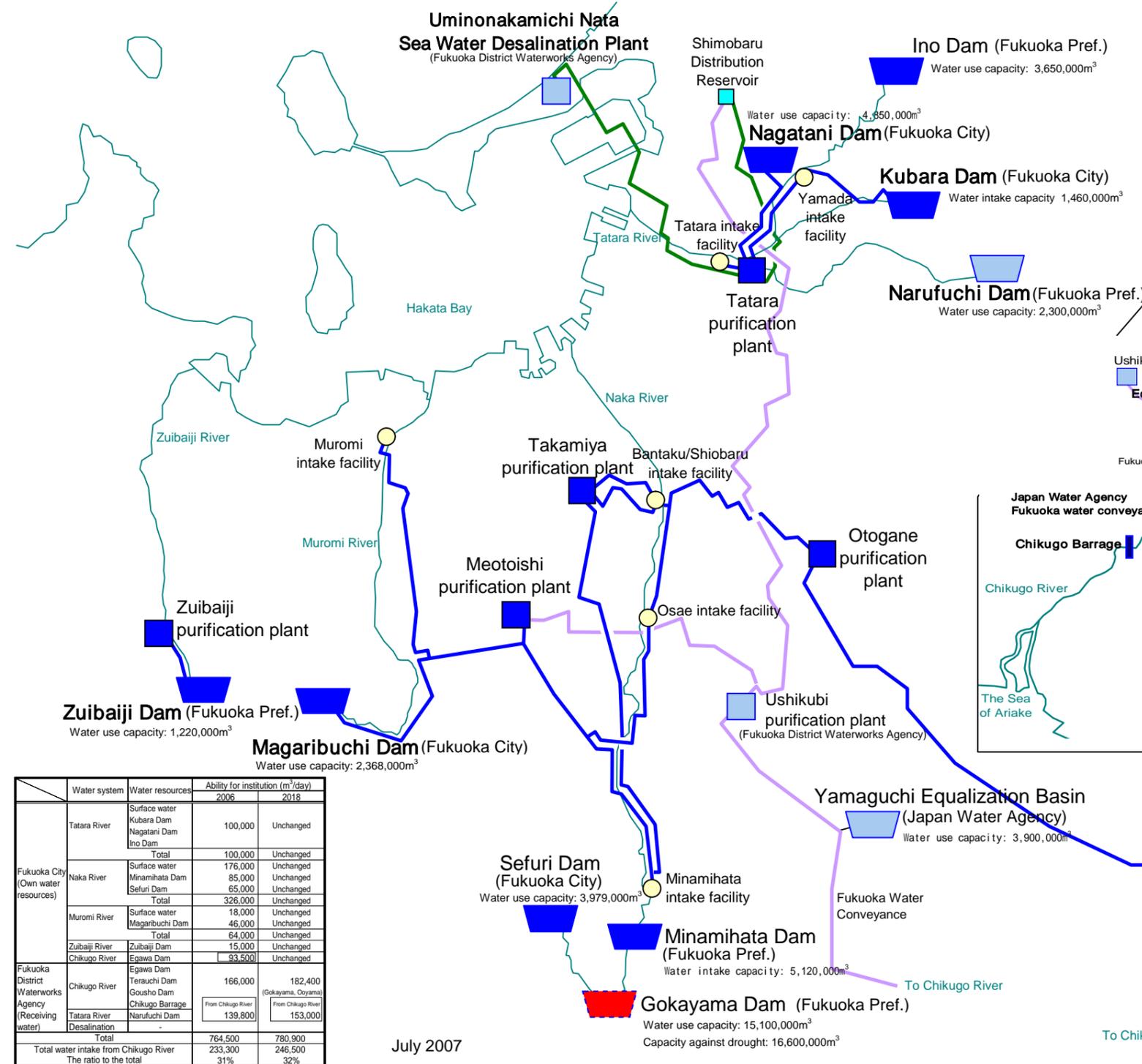
Water charges in Fukuoka City are determined by the combination of a flat basic rate and a metered rate that varies depending on the volume of water consumed. The basic rate rises according to the size of the diameter of the supply pipe and the metered rate varies depending on the type of use – the rate for domestic use is less than the rate for commercial use. Since water is a limited natural resource, the rate system is designed to promote water conservation: as the water consumption increases, the unit

price per cubic meter also increases.

Metered rates for 2 months' domestic use by a single-family residential unit (Tax excluded)

Level	Diameter of supply pipe (mm)	Water use (m ³)	Rate (per m ³)
1st level	25 and below	1-20	17 yen
	40 and above	1-20	120 yen
		21-40	155 yen
2nd level		41-60	243 yen
3rd level		61-100	284 yen
4th level		101-200	335 yen
5th level		201 and over	387 yen

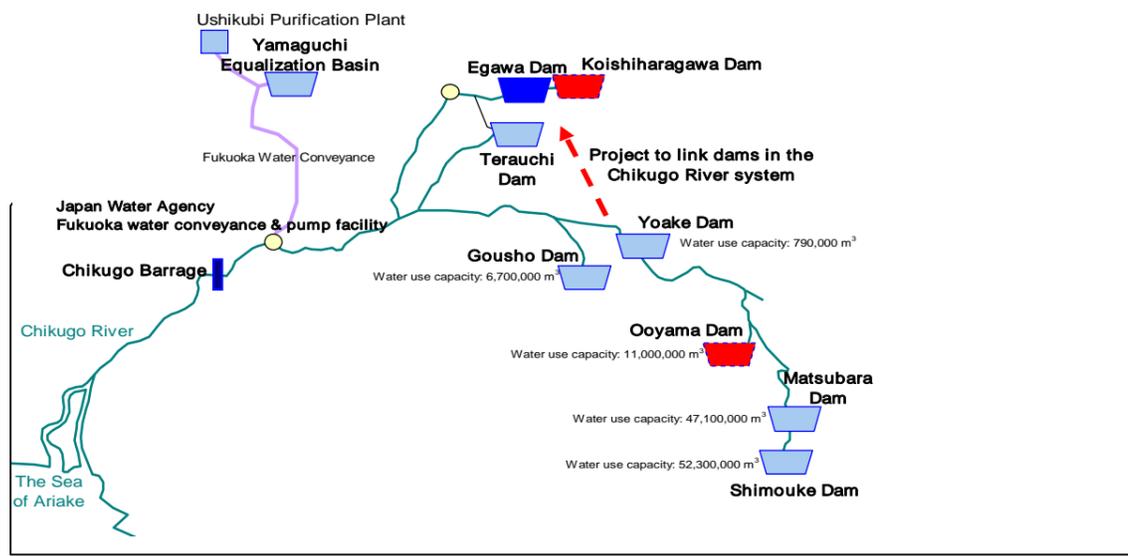
Fukuoka City's Water Resources and Waterworks Facilities



Legend

- Dam (Fukuoka has own capacity)
- Dam (Fukuoka does not have own capacity)
 - *At Narufuchi, Terauchi and Gousho dams, part of water is received from Fukuoka District Water Agency
- Dam (Planned or under construction)
- Intake facility
- Purification plant (Fukuoka City)
- Purification plant (Fukuoka District Waterworks Agency)

Outline of Chikugo River Basin



Water system	Water resources	Ability for institution (m³/day)		
		2006	2018	
Fukuoka City (Own water resources)	Tatarara River	Surface water Kubara Dam Nagatani Dam Ino Dam	100,000	Unchanged
	Naka River	Surface water Minamihata Dam Sefuri Dam	176,000 85,000 65,000	Unchanged
	Muromi River	Surface water Magaribuchi Dam	18,000 46,000	Unchanged
	Zuibaiji River	Zuibaiji Dam	64,000	Unchanged
Fukuoka District Waterworks Agency (Receiving water)	Chikugo River	Egawa Dam	93,500	Unchanged
	Chikugo River	Terauchi Dam Gousho Dam Chikugo Barrage Narufuchi Dam	166,000	182,400 (Gokayama, Ooyama)
Total			764,500	780,900
Total water intake from Chikugo River			233,300	246,500
The ratio to the total			31%	32%

July 2007

Fukuoka City Waterworks Statistics

Year	1977	1978	1979	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
Total population	1,037,239	1,052,679	1,069,655	1,265,239	1,271,336	1,280,545	1,294,421	1,308,134	1,319,214	1,329,116	1,340,306	1,353,866	1,367,233	1,380,205	1,389,966	1,401,870	1,414,747	1,429,909	1,440,809	
Population supplied	985,000	1,028,000	1,049,000	1,245,000	1,250,000	1,259,500	1,273,400	1,289,400	1,301,500	1,312,200	1,323,700	1,338,000	1,351,900	1,365,400	1,375,600	1,388,400	1,402,200	1,417,600	1,429,300	
Number of households supplied	336,136	350,788	366,488	581,814	594,596	607,313	623,137	636,803	650,925	662,396	674,813	688,836	702,578	714,553	724,966	739,519	752,696	765,799	775,301	
Population inside water supply district	1,025,000	1,044,000	1,062,000	1,261,000	1,267,000	1,276,500	1,290,400	1,034,700	1,315,800	1,325,800	1,336,800	1,350,700	1,364,100	1,377,200	1,386,600	1,398,500	1,411,300	1,426,600	1,437,500	
Number of households inside water supply district	345,000	355,000	365,000	523,800	531,800	542,500	555,300	567,800	578,500	588,900	599,400	609,900	620,600	631,300	639,800	651,500	663,600	676,500	687,100	
Percentage of population served (%)	96.1	98.5	98.8	98.7	98.7	98.7	98.7	98.8	98.9	99.0	99.0	99.1	99.1	99.1	99.2	99.3	99.4	99.4	99.4	
Percentage of population supplied (Coverage of the water supply system) (%)	95.0	97.7	98.1	98.4	98.3	98.4	98.4	98.6	98.7	98.7	98.8	98.8	98.9	98.9	99.0	99.0	99.1	99.1	99.2	
Annual supply (m ³)	130,331,280	104,023,460	122,696,990	150,065,500	134,942,000	139,745,300	145,526,000	143,957,100	144,951,800	144,925,800	145,134,800	146,207,500	144,327,800	145,944,900	146,771,600	148,316,700	147,216,200	147,501,500	145,162,100	
Maximum daily supply (m ³)	443,050	371,500	408,900	491,200	481,200	444,100	464,400	459,100	453,300	441,500	442,900	457,700	445,300	440,900	450,200	440,000	451,300	437,000	448,100	
Average daily supply (m ³)	357,072	284,996	335,238	411,138	369,704	381,818	398,701	394,403	397,128	395,972	397,630	400,568	395,419	398,757	402,114	406,347	403,332	403,010	397,704	
Average daily supply per person (L)	363	277	320	330	296	303	313	306	305	302	300	299	292	292	292	293	288	284	278	
Average daily supply per person for domestic use (L)	172	150	161	203	192	193	200	200	203	200	202	202	200	199	201	201	201	201	199	
Annual effective water supply (m ³)	111,442,548	92,833,785	104,279,583	139,175,044	129,857,914	131,498,166	138,176,029	138,910,560	140,755,907	140,135,222	141,973,453	141,322,599	141,277,957	141,353,975	142,288,505	142,709,998	143,025,584	143,930,538	141,633,754	
Effective water ratio (%)	85.5	89.2	85.0	92.7	96.2	94.1	94.9	96.5	97.1	96.7	97.8	97.3	97.9	96.9	96.9	96.2	97.2	97.6	97.6	
Estimated rate of adoption of water-saving faucets (with water-saving packing, etc.) (%)	4.7	79.8	81.2	92.5	93.0	93.6	94.1	94.6	94.9	95.0	95.1	95.3	95.4	95.4	95.5	95.6	95.7	95.8	95.8	
Number of water-saving toilets installed	-	658	10,876	380,018	407,580	436,565	464,132	490,483	517,187	542,846	569,012	591,706	613,785	636,124	659,056	686,806	714,221	744,250	768,157	
Cumulative number of water recycling facilities installed	-	-	1	294	319	344	384	398	422	448	468	488	504	530	562	587	597	619	639	
Water-conservation awareness of city residents (%)	-	97.4	77.4	66.8	68.5	90.2	72.9	72.1	No data	73.8	72.6	63.6	85.2	94.1	90	92.9	91.1(82.6)	87.4	-	
Annual precipitation (mm)	1,353.5	1,138.0	1,742.5	2,049.5	891.0	1,593.0	1,275.5	2,083.0	1,865.5	1,661.5	1,344.0	1,942.5	1,371.5	1,600.5	1,741.5	1,020.0	2,018.0	1,195.0	1,780.5	
Sewage system coverage rate (%)	36.1	37.3	40.1	94.7	96.3	97.3	97.9	98.3	98.5	98.6	98.8	98.9	99.1	99.2	99.3	99.4	99.4	99.5	99.5	
Maximum supply capacity (m ³ /day)	478,000	478,000	498,000	704,800	704,800	704,800	704,800	704,800	704,800	704,800	704,800	738,300	748,100	748,100	748,100	764,500	764,500	764,500	764,500	
Revision of water charge (%)	50.36%up			15.93%up				15.31%up												
Monthly minimum charge for domestic use with a pipe diameter of 13 mm (¥)	280	280	280	772	772	772	772	892	892	892	892	892	892	892	892	892	892	892	892	
Supply restriction days		287 days (May 20 - March 24)			295 days (August 4 - May 31)															
Events of Fukuoka Waterworks Bureau	May 1977: Zuibaiji Dam completed March 1977: Zuibaiji Purification Plant completed	Aug. 1978: Water-saving Promotion Section established Feb. 1979: "Municipal Ordinance concerning Water Conservation" became effective	Apr. 1979: Water-saving Day enacted and Water-saving Mark determined	Oct. 1993: Started water supply from Nagatani Dam					Feb. 1998: Water Examination Laboratory moved to a newly constructed building		Apr. 2000: "Fukuoka City Ordinance on Water Supply" became effective	Aug. 2001: Started water supply from Ino Dam	Jul. 2002: Started water supply from Narufuchi Dam	Dec. 2003: Customer Service Center of the Fukuoka City Waterworks Bureau opened Dec. 2003: "Fukuoka City Ordinance on the Promotion of Water Conservation" became effective		May 2005: Started advanced water treatment in Tatara Purification Plant June 2005: Started Uminonakami chi Nata Sea Water Desalination Plant				

*Population supplied is be adjusted retroactively as it is calculated based with the esimated population at each national census. (adjusted to 2005)

*Figures of water-conservation awareness of city residents are based on the results of a questionnaire survey on municipal administration. Figures in parentheses show the results of a public awareness survey on water (conducted by Fukuoka Waterworks Bureau).

- 1) Percentage of population served in supply district = Population supplied / Population in water supply district x 100
- 2) Percentage of population supplied (Coverage of the water supply system) = Population supplied / Total population in the administrative district x 100
- 3) Average daily supply = Annual supply / Total days that year
- 4) Average daily supply per person = Average daily supply / Population supplied

*The (cumulative) number of water recycling facilities installed does not include the number of such facilities at the area level.

*Annual precipitation: January to December data of Fukuoka District Meteorological Observatory

- 5) Effective water supply = Amount of water effectively used out of water supplied, excluding leaked amount, etc.
- 6) Effective water ratio = Annual effective water amount / Annual supply x 100
- 7) Sewage system coverage rate = Population in water supply district / Total population x 100