

A photograph of a green and white train on tracks, with a blue semi-transparent overlay containing the title text. The train is moving from left to right. In the background, there are power lines, a utility pole, and a building. The train is on a concrete viaduct with a stone wall on the right side. The text is in a bold, yellow, sans-serif font.

# Profile of Water Associations 2018

**Japan Water Works Association  
Association Networking Meeting**

**Tuesday, 18 September, 2018 Tokyo, Jpan**

Enoden, Enoshima

# Table of contents

Contents		Page
Japan Water Works Association (JWWA)	Japan	1
American Water Works Association (AWWA)	USA	9
Chinese Taiwan Water Works Association (CTWWA)	Chinese Taiwan	19
Indian Water Works Association (IWWA)	India	28
Korea Water and Wastewater Works Association (KWWA)	Korea	35
Malaysian Water Association (MWA)	Malaysia	43
Thai Water Works Association (TWWA)	Thailand	52
Water Services Association of Australia (WSAA)	Australia	66



Association Meeting at JWWA General Conference 2017  
Takamatsu, Japan

# Japan Water Works Association



## About JWWA

### About JWWA

**Japan Water Works Association (JWWA)**, a Public Interest Incorporated Association, was established on May 12th, 1932 with the aim of spreading water supply to the public and developing robust water supply infrastructures. Water supply is an essential lifeline for people's daily life as well as social and economic activities. Therefore, it is particularly important to provide safe and stable supply services as well as quality water. JWWA's main activities include research and study of water supply services management, water supply related technologies and water quality. JWWA also provides various services such as inspection of water supply facilities and certification of water supply equipment to maintain stable water supply and safety of water, which is indispensable for people's daily life. In addition, JWWA actively lobbies government and makes recommendations to government for water related issues in Japan and JWWA will support water utilities.



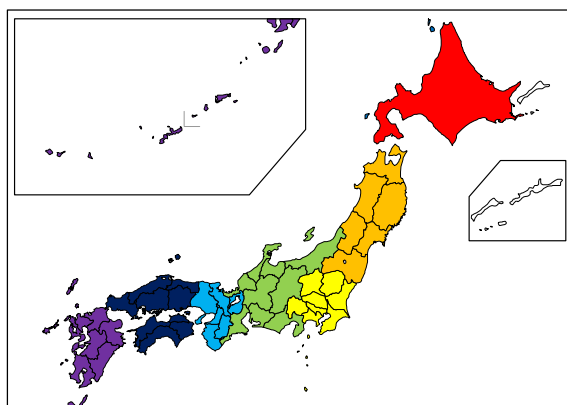
Executive Director  
Mr. Ei Yoshida



Office View

### Organization Framework and Members

- **President:** Ms. Yuriko Koike (Governor of Tokyo)
- **Executive Director:** Mr. Ei Yoshida



- **Board of Directors:** 13
- **Auditors:** 2
- **Members**

Corporate Members (Water Utilities)	1,359
Individual Members (Professors, researchers, staffs of utilities etc.)	388
Private Companies (Manufacturers, consultants etc.)	576
<b>Total</b>	<b>2,323</b>

(as of Dec 2017)

○ **Branch System**

Regional Branch	7
Prefectural Branch	46

○ **Corporate Logo**



## History

<b>1887</b>	The first modern water supply services in Japan were provided in Yokohama.
<b>1904</b>	The Federation of Water Authorities (JWWA's predecessor) was established. At the time when in 1904, Japan was in an early stage of introducing modern water supply. Modern water supply systems were installed only in major port cities; Yokohama, Hakodate, Nagasaki, Osaka, Tokyo, Hiroshima and Kobe.
<b>1932</b>	<b>Japan Water Works Association (JWWA) was established with legal registry</b> with the aim of spreading water supply to the public and developing robust water supply infrastructures.
<b>1956</b>	JWWA joined IWSA (predecessor of IWA).



## Activities

### Annual events [JWWA General Assembly and Conference]

**The general assembly** is the supreme decision-making body of JWWA. Contents of meetings include reporting of JWWA activities, approval of accounting reports, reporting of budgets as well as award presentation for recognizing members who made significant achievements in the field of water supply and discussion on issues raised by members.



Stakeholders of water supply services including government, national research institutes, water supply utilities and corporations in the water supply industry gather together to present results of their research and study activities at JWWA's annual conference and symposium. The conference consists of the following 10 divisions; management, planning, water resources/ water intake, purification, water conveyance/ transmission/ distribution, water supply system, mechanical/ electrical/ instrumentation equipment, water quality, and risk control/ disaster contingency planning, English.

### Lobby Activity

We concerns government affairs and organize lobby activities such as;  
- To submit petition/ list of demands to government raised by member utilities, to organize actions by members to influence politicians on special issues



## Executive Board

Members of the board discuss matters related to JWWA's operations including arranging and organizing general assembly meetings and approval of budgets. Matters important for the water supply industry such as issues raised by members and lobbying activities are discussed in the management committee, which consists of directors of regional and prefectural branches and district consultative committees. The auditors audit JWWA's activities and accounting reports.

## Training Programs

JWWA provides more than 30 training courses in management/engineering/science/technical areas annually. We have the Kawaguchi Training Center constructed in June 1993.



## Research/Consultation

We conduct researches/studies on issues raised by members and compile report/guideline/manual and standards of water supply equipment and materials. Also, we provide consultation services to member utilities on water supply management/technologies.

## Standardization

We standardize of materials and products used for water distribution facilities. It is discussed by engineering standing committee and water sanitation committee as well as special technical committee for drafting each standard. There are 89 standards. (as of Mar. 2015)



## Publications

We publish a journal, manuals, guidelines, reports such as; Monthly journal "JWWA journal", "Legal cases relating to Water Supply", "Guidelines of Design of Water Supply Facilities", "Guidelines on Earthquake-Resistant Engineering Methods for Water Supply Facilities"

## Inspection and Certification Services

JWWA implement inspection of water supply materials, such as ductile iron pipes, to secure "Safe and Stable Water Supply" by fair and strict performance test upon manufacturer's request. Also JWWA issues certifications according to the Regulation of Japanese Waterworks Law on water supply equipment / tools such as faucets, valves, pipe joints, water heaters, materials and water treatment chemicals installed in house or water supply facilities.



## International Activities

### - Cooperation with Overseas Water Associations

JWWA held international events at its annual conference from October 2014 to deepen partnership with overseas water associations.

Moreover, we have overseas training courses to contribute human resource development. This training courses are implemented with the cooperation of PERPAMSI and WSSA.

### - JICA Group Training Course

JWWA has organized the JICA (Japan International Cooperate Agency) Group Training Program since 1968.

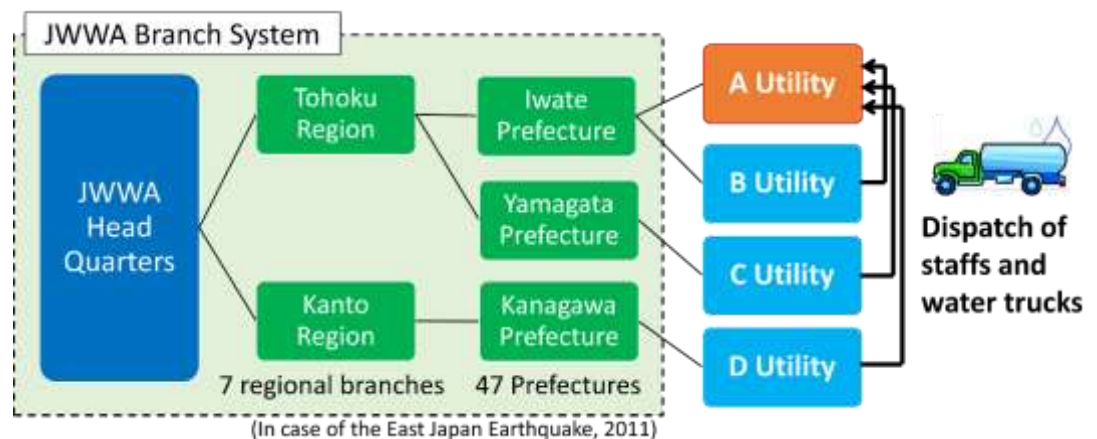
### - Activities related to IWA

JWWA and Japan Society on Water Environment jointly established IWA Japan National Committee (JNC). As IWA Governing Member, JWWA promotes participation in IWA events.



## Mutual Assistance Network for Disaster

JWWA brunch system is utilized as "mutual assistance network" for disaster such a big earthquake.



## Event Information

### 2018 JWWA General Assembly & y & Research Conference

FUKUOKA SUNPALACE Hotel, Fukuoka, Japan/ 24 - 26th October, 2018



## Contact

<b>Address</b>	4-8-9, Kudan-Minami, Chiyoda-ku, Tokyo 102-0074, Japan
<b>Mail</b>	<a href="mailto:kokusai@jwwa.or.jp">kokusai@jwwa.or.jp</a>
<b>Web</b>	<a href="http://www.jwwa.or.jp/english/">www.jwwa.or.jp/english/</a>
<b>Tel</b>	+81-3-3264-2307
<b>Fax</b>	+81-3-3264-2306

(Data as of the end of 2015)

<General Information>

1. Number of Water Utilities

Bulk Water Supply	92
Water Supply	1381

2. Who Supply Water (Organization Types of Water Utilities)

Central Government	0
Local Government	1381
Public Corporation	83
Private Company	9
Privatization	9
Concession	0

3. Who Regulate Water Utilities

Approve License to Supply Water	Ministry of Health Labour and Welfare
Water Quality Standards	
System of Water Supply	
Operation of Water Supply	
Water Resource Development	Ministry of Land, Infrastructure and Transport
River Control (Water Right)	
Sewerage System	
Water Environment	Ministry of Environment
Financial Management	Ministry of Internal Affairs and Communication
Water Tariff	Council of each Local Government

4. Status of Water Supply

Total Population	127,102,390 capita
Water Supply Population	124,403,567 capita
Coverage Ratio	97.9%
Annual Water Supply Volume	15,116,150 thousand m <sup>3</sup>
Number of Service Connections	54,520 thousand
Water Consumption volume per capita per day (including industrial use)	330 L/capita/d

## 5. Challenges

### 1) Financial Deterioration

The most of water utilities face to the problem of Financial Deterioration because of Revenue Reduction by Population declining and Decrease of Water Consumption per Capita. In addition, Grants from Central Government are also decreasing.

### 2) Aging Facilities, Aging Pipeline

Ratio of aging facilities and aging pipelines are increasing because of the financial deterioration.

### 3) Earthquake resistance

Large scale earthquakes occur frequently in Japan. However, ratio of the earthquake-resistant pipelines is only 37.2%.

### 4) Decreasing of Highly Skilled Workforce

The most of water utilities face to the problem of transferring technique and knowledge because of retirement of highly skilled workforce. In addition, the numbers of staffs in each utility are decreasing because of financial deterioration of municipal government.

### 5) Vulnerability of Small Scale Water Utilities

70% of Japanese water utilities are small scale (Towns or villages). Such small scale utilities are vulnerable to the financial base and the staff skills.

## <Water Supply System>

### 1. Water Resources

	thousand m <sup>3</sup>	
Surface Water	11,407,929	74.4%
Natural Flow	3,871,214	25.2%
Dam	7,315,603	47.8%
Lake Water	221,112	1.4%
Ground Water	3,484,179	22.7%
Others	439,653	2.9%
Total	15,331,761	100.0%

### 2. Water Treatment Process

	thousand m <sup>3</sup>	
Only Disinfection	2,520,475	16.9%
Slow Sand Filtration	471,139	3.2%

Rapid Sand Filtration	11,590,467	77.8%
Membrane Filtration	315,313	2.1%
Total	14,899,394	100.0%

3. Length and Types of Pipes (km)

	DIP	SP	PVC	PE	SUS	Total
Water Intake	6,534.8	1,370.8	1,704.3	377.8	18.0	11,205.4
Pipe	58.3%	12.2%	15.2%	3.4%	0.2%	1.7%
Transmission	24,301.2	4,302.1	2,084.7	1,052.5	66.4	33,077.6
Main	73.5%	13.0%	6.3%	3.2%	0.2%	5.0%
Distribution	35,977.2	2,441.5	11,235.5	1,704.2	122.1	54,057.8
Main	66.6%	4.5%	20.8%	3.2%	0.2%	8.1%
Distribution	310,372.0	9,950.4	196,056.3	32,720.7	646.8	567,969.7
Branch	54.6%	1.6%	34.5%	5.8%	0.1%	85.2%
TOTAL	377,185.2	18,064.8	211,080.8	35,855.2	853.3	666,310.6
	56.6%	2.7%	31.7%	5.4%	0.1%	100.0%

4. Analysis of Water Supply Volume (IWA Water Balance)

				m <sup>3</sup> /year	
System Input Volume	Authorized Consumption	Billed Consumption Metered Consumption Unmetered Consumption	Revenue Water	13,053,611	90.03%
		Unbilled Authorized Consumption Flushing Pipe Reduced water volume due to deterioration of tap water quality, etc.	Non-Revenue Water (NRW)	378,332	2.61%
	Water Losses	Apparent Losses (Non Physical Loss) Illegal water Metering Inaccuracy		1,067,533	7.36%
		Real Losses (Physical Loss) Leakage on Mains Leakage/Overflow from Distribution Basins Leakage on Service Pipes			

## <Financial Management>

### 1. Water Tariff

Average unit cost per cubic meter	164.4 JPY/m <sup>3</sup>
Average unit tariff per cubic meter	172.5 JPY/m <sup>3</sup>

### 2. Composition of supply cost

Depreciation expenses	33.30%
Cost of receiving bulk water	16.40%
Personnel expenses	11.90%
Repair costs	8.40%
Interest expense	5.80%
Power cost	3.90%
Chemical costs	0.70%
Others	11.90%

### 3. Calculation Method to decide Water Tariff

Full Cost Recovery Method	86.2%
Cash Flow Balance Method	13.8%

### 4. Tariff Structure (Tariff Table)

Classified by Meter Size	56.6%
Classified by Customer's Use	32.6%
Others	10.8%

### 5. Affordability (Water Tariff 1 household/ 1 month)

Monthly consumption expenditure	290,254 JPY
Monthly Water Tariff	1,960 JPY
Affordability	0.7 %



# American Water Works Association



## About AWWA

Established in 1881, **the American Water Works Association** is the largest nonprofit, scientific and educational association dedicated to managing and treating water, the world's most important resource. With over 51,000 members, AWWA provides solutions to improve public health, protect the environment, strengthen the economy and enhance our quality of life.



## History

### **ST. LOUIS, 1881**

On March 29, 1881, in Engineers' Hall on the campus of Washington University in St. Louis, Mo., 22 men representing water utilities in Illinois, Indiana, Iowa, Kansas, Kentucky, and Tennessee founded the American Water Works Association.

They adopted a constitution that stated the purpose of the association as being "for the exchange of information pertaining to the management of water-works, for the mutual advancement of consumers and water companies, and for the purpose of securing economy and uniformity in the operations of water-works." On Jan. 1, 1976, AWWA filed Articles of Incorporation in Illinois that reframed AWWA's purpose as follows: "The purpose for which the Association is formed is to promote public health, safety, and welfare through the improvement of the quality and quantity of water delivered to the public and the development and furtherance of understanding of the problems relating thereto by:

- Advancing the knowledge of the design, construction, operation, water treatment and management of water utilities and developing standards for procedures, equipment and materials used by public water supply systems;
- Advancing the knowledge of the problems involved in the development of resources, production and distribution of safe and adequate water supplies;
- Educating the public on the problems of water supply and promoting a spirit of cooperation between consumers and suppliers in solving these problems; and
- Conducting research to determine the causes of problems of providing a safe and adequate water supply and proposing solutions thereto in an effort to improve the quality and quantity of the water supply provided to the public.

The history of AWWA is the history of the people who have committed themselves to achieving the purpose set forth more than a century ago. Today, AWWA's vision is simply to create a better world through better water.

In July 1015, AWWA open and office in Mumbai, India with the title AWWAIndia. As a benefit to the over 200 AWWA members in India, AWWA publishes an OpflowIndia.



## Activities

AWWA promotes safe and sustainable water by sharing knowledge among water professionals, providing education and creating volunteer opportunities. Specific AWWA activities include:

### **AWWA Standards**

AWWA publishes more than 170 standards that provide requirements for design, installation, performance, and manufacturing of pipe, chemicals, storage facilities, valves, meters and other products. AWWA Standards represent a consensus of the water industry and are developed by following procedures accredited by the American National Standards Institute (ANSI).

### **Manuals of Water Supply Practice**

AWWA publishes 50 manuals that provide recommended operating practices and procedures for the specification and use of equipment, pipe, chemicals and supply, as well as best management practices for water operations and resources. Manuals are consensus documents that provide guidance to assure the efficient day-to-day operation and management of water systems.

### **Conferences**

Each year, AWWA hosts eight or more conferences that serve the full spectrum of water professionals, with events targeting water quality specialists, utility finance and management teams, distribution system operators, water resource managers, and others. AWWA's Annual Conference and Exposition is held each June, drawing close to 12,000 water professionals and more than 500 exhibitors.

### **Education**

AWWA provides both in-person and electronic professional education opportunities. The Association provides a large number of webinars, self-paced e-learning modules and videos. In 2015, AWWA offered in-person workshops on small system compliance and utility finance in all 50 U.S. states and Puerto Rico.

### **Water Knowledge**

AWWA serves as an information warehouse for the water sector. AWWA's website, [awwa.org](http://awwa.org), is a gateway to information about not only AWWA products and services, but the breadth of activity ongoing throughout the water sector. Members are also kept aware of recent developments through regular e-newsletters, RSS feeds, and social media.

## Local Sections

AWWA's 43 state and regional sections throughout North America – and its new AWWA India office in Mumbai -- help water professionals network with local colleagues, find educational opportunities, get involved in local water issues, and grow professionally. Many of AWWA's sections play an important role in providing operator training to meet state certification requirements.



## Publications

*Journal AWWA* has been published continuously since 1914, and is AWWA's flagship publication. Readers benefit from its peer-reviewed research – available to everyone online -- and technical articles, as well as features on best management practices, industry trends, and the most current information on regulations impacting the water community.

Opflow is a magazine primarily written by and for water operators. It is a trusted link among water professionals in both small towns and large metropolitan areas, allowing operators to share their experiences with others.

## Water Policy and Leadership

AWWA provides leadership on critical issues that impact water professionals and the communities they serve. With active volunteer leaders providing technical and strategic guidance, the Association advocates for smart water policy that reflects sound science in both legislative and regulatory arenas. AWWA's work informs laws and rules that impact water service, water sources, security and preparedness, water infrastructure and affordability.

## Volunteer Opportunities

AWWA's strength comes from the combined knowledge and energy of its more than 51,000 members – and especially its volunteers. AWWA's events, educational material, publications and public policy work are all the result of volunteers sharing their experiences and wisdom. With more than 160 technical committees, six councils and 43 regional sections, there is no shortage of ways to become involved in advancing AWWA's mission.



### Event Information

AWWAIndia Conference (AICE18) in Hyderabad, India on 16-17 November 2018

AWWA Annual Conference and Exposition (ACE) in Denver, Colorado on 9-12 June 2019



### Contact

<b>Address</b>	6666 W. Quincy Ave. Denver, CO 80235-3098, USA
<b>Mail</b>	[Mail Form] <a href="http://www.awwa.org/about-us/contact-us.aspx">http://www.awwa.org/about-us/contact-us.aspx</a>
<b>Web</b>	<a href="http://www.awwa.org/">http://www.awwa.org/</a>
<b>Tel</b>	303.794.7711 800.926.7337
<b>Fax</b>	303.347.0804

(Data as of the end of **varying dates** are listed below)

### <General Information>

#### 1. Number of Water Utilities

Bulk Water Supply	
Water Supply	155,000 public water systems, 52,000 community water systems

- <https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Drinking-Water-Final.pdf>

#### 2. Who Supply Water (Organization Types of Water Utilities)

Central Government	0%
Local Government	88%
Public Corporation	
Private Company Privatization Concession	12%

Percent of National Population served by Private community water systems: 12% and public municipal water systems is 88% by population served.

- <http://efc.web.unc.edu/2016/10/19/public-vs-private-a-national-overview-of-water-systems/>

OR: Percent of Public community water systems 2014 is 51% and Private is 46% by number of systems. The majority of privately owned systems are small, serving a population of <3300.

- [https://www.foodandwaterwatch.org/sites/default/files/report\\_state\\_of\\_public\\_water.pdf](https://www.foodandwaterwatch.org/sites/default/files/report_state_of_public_water.pdf)

#### 3. Who Regulate Water Utilities

Approve License to Supply Water	Department of Public Health for each state or Local Primacy Agencies
Water Quality Standards	USEPA and local governments
System of Water Supply	Department of Public Health for each state or Local Primacy Agencies
Operation of Water Supply	Public and private owners of water systems.
Water Resource Development	State specific Department of Environmental Conservation
River Control (Water Right)	State and Local Government

Sewerage System	Federal and State Environmental Agencies
Water Environment	USEPA
Financial Management	State public utilities commissions
Water Tariff	Public Utility Commission for each state.

#### 4. Status of Water Supply

4.1 Total Population, 2015	325,000,000	capita
4.2 Water Supply Population, 2015	283,000,000	capita
4.3 Coverage Ratio, 2015	87	%
4.4 Annual Water Supply Volume, 2015	361,000 (445,113,000 thousand m <sup>3</sup> )	Thousand Acre-foot
4.5 Number of Service Connections	80,857	Thousand*
4.6 Daily Maximum Water Supply Volume, 2015	322	Billion gallons per day
4.7 Water Consumption volume per capita per day (including industrial use)	4335.6	L/capita/d

- 4.1, 4.2, 4.3 <https://pubs.usgs.gov/circ/1441/circ1441.pdf>
- 4.4 <https://water.usgs.gov/watuse/wuto.html>
- 4.5 - \* - estimated based on water supply population, based on AWWA's standard conversion of service connections = population/3.5
- 4.6 <https://pubs.usgs.gov/fs/2018/3035/fs20183035.pdf>
- 4.7 <https://www.statista.com/statistics/263156/water-consumption-in-selected-countries/>

#### 5. Challenges

- 1) Renewal and Replacement of aging water and wastewater infrastructure.
- 2) Financing for Capital improvements.
- 3) Public understanding of the value of water systems and services.

Challenges chosen from the issues facing the water industry in 2018 ranking found in the State of the Water Industry's Report.

- [https://www.awwa.org/Portals/0/files/resources/water%20Utility%20management/sotwi/2018\\_SOTWI\\_Report\\_Final\\_v3.pdf](https://www.awwa.org/Portals/0/files/resources/water%20Utility%20management/sotwi/2018_SOTWI_Report_Final_v3.pdf)

## <Water Supply System>

### 1. Water Resources

	thousand m <sup>3</sup>	%
Surface Water, 2015		
Natural Flow		
Dam	327,978,000	73.68%
Lake Water		
Ground Water, 2015	117,011,700	26.29%
Others	123,300	0.028%
Total	445,113,000	100.0%

- <https://pubs.usgs.gov/circ/1441/circ1441.pdf>

### 2. Water Treatment Process

	thousand m <sup>3</sup>	%
Only Disinfection		98
Slow Sand Filtration	*see note below	
Rapid Sand Filtration	*see note below	
Membrane Filtration (MF/UF only, North American Estimate)	29,000,000	
Total		100.0%

- Although it was difficult to locate exact numbers, the vast majority of surface water treatment plants in the United States (estimated at approximately 11,000 systems) employ rapid sand filtration as a primary treatment technology. Slow sand filtration is not widely used in the US. Nearly all water systems are required to disinfect.
- [file:///C:/Users/sdontanville/Downloads/CSS%20\(2008\)%20U.S.%20Water%20Supply%20and%20Distribution%20Fact%20Sheet%20\(1\).pdf](file:///C:/Users/sdontanville/Downloads/CSS%20(2008)%20U.S.%20Water%20Supply%20and%20Distribution%20Fact%20Sheet%20(1).pdf)
- <https://www.waterworld.com/articles/wwi/print/volume-33/issue-3/technology-case-studies/is-the-water-membrane-market-in-a-state-of-flux.html>

### 3. Length and Types of Pipes (km/%)

	DIP	SP	PVC	PE	SUS	Total
Water Intake	Km	Km	Km	Km	Km	Km
Pipe	%	%	%	%	%	%
	Km	Km	Km	Km	Km	Km

Transmission Main	%	%	%	%	%	%
Distribution Main	Km	Km	Km	Km	Km	Km
	%	%	%	%	%	%
Distribution Branch	Km	Km	Km	Km	Km	Km
	%	%	%	%	%	%
TOTAL	Km	Km	Km	Km	Km	1 million miles
	%	%	%	%	%	100%

- <https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Drinking-Water-Final.pdf>

#### 4. Analysis of Water Supply Volume (IWA Water Balance)

				m <sup>3</sup> /year	%
System Input Volume	Authorized Consumption	Billed Authorized Consumption Metered Consumption Unmetered Consumption	Revenue Water		
		Unbilled Authorized Consumption Flushing Pipe Reduced water volume due to deterioration of tap water quality, etc.		15 Billion gallons <a href="https://sensus.com/solutions/think-beyond-the-leaks-infographic/">https://sensus.com/solutions/think-beyond-the-leaks-infographic/</a>	
	Water Losses	Apparent Losses (Non Physical Loss) Illegal water Metering Inaccuracy	Non-Revenue Water (NRW) Average of 24% <a href="https://sensus.com/solutions/non-revenue-water-infographic/">https://sensus.com/solutions/non-revenue-water-infographic/</a>		
		Real Losses (Physical Loss) Leakage on Mains Leakage/Overflow from Distribution Basins Leakage on Service Pipes		1.7 Trillion Gallons <a href="https://sensus.com/solutions/non-revenue-water-infographic/">https://sensus.com/solutions/non-revenue-water-infographic/</a>	

The below white paper by United Water has the IWA Water Balance table completed for a full years water balance, though it does not show national information.

- <file:///C:/Users/sdontanville/Downloads/%7BC8C66E75-DD89-4934-B76C-7589DED7FA77%7D.pdf>

## <Financial Management>

### 1. Water Tariff

Average unit cost per cubic meter, 2016	0.004	US Dollar/gallon
Average unit tariff per cubic meter, 2011	1.25	US Dollar/m <sup>3</sup>

- <https://awwa.onlinelibrary.wiley.com/doi/full/10.5942/jawwa.2016.108.0108>
- [http://cwf.ca/wp-content/uploads/2015/11/CWF\\_WaterBackgrounder8\\_SEP2011.pdf](http://cwf.ca/wp-content/uploads/2015/11/CWF_WaterBackgrounder8_SEP2011.pdf)

### 2. Composition of supply cost

According to the EPA site below depreciation expenses (12%), taxes (16%), deductions (10% including debt), dividends (9%) and operations and maintenance (50%), Net income (3%)

Depreciation expenses	12%
Cost of receiving bulk water	10-43%
Personnel expenses	18-29%
Repair costs	7%
Interest expense	22%
Power cost	25-30%
Chemical costs	20%
Others	%

- Personnel Expenses & Bulk water cost:  
<https://www.bafuture.org/sites/default/files/key-topics/attachments/impacts-of-water-utility-sector.pdf>
- The below website provides a very different cost breakdown for a water utility with only 12% of the cost being for staff and 6% for administration costs which have been combined above to display the lower end of 18% of cost for personnel expenses: <http://costwater.com/runningcostwater.htm>
- Power Costs: <http://www.govtech.com/fs/The-Energy-of-Water-How-Much-Do-Water-Wastewater-Companies-Use.html>
- <https://nepis.epa.gov/Exe/ZyPDF.cgi/60000FOQ.PDF?Dockey=60000FOQ.PDF>

### 3. Calculation Method to decide Water Tariff

Full Cost Recovery Method	%
Cash Flow Balance Method	%

4. Tariff Structure (Tariff Table)

Classified by Meter Size	33%
Classified by Customer's Use	29%
Others	2%

- <https://www.epa.gov/sustainable-water-infrastructure/pricing-and-affordability-water-services#pricing> (33%)
- <https://nepis.epa.gov/Exe/ZyPDF.cgi/901U1200.PDF?Dockey=901U1200.PDF>

These do not add up to 100% but they are the closest information I could find for the table.

5. Affordability (Water Tariff 1 household/ 1 month)

Monthly consumption expenditure	4,776	\$ (2016 data)
Monthly Water Tariff (Monthly water rate)	65.54	\$ based on family of 4 using 100 gallons per person per day. (2016 data)
Affordability	1.37	%

- <https://www.bls.gov/news.release/cesan.nr0.htm>
- <https://www.circleofblue.org/waterpricing/>



# Chinese Taiwan Water Works Association



## About CTWWA



Chairman

- [Work Experience]
1. President, Taiwan Water Corporation
  2. Vice President, Taiwan Water Corporation (Sept. 2006- June 2013)
  3. Chief Engineer, Taiwan Water Corporation (Jan.2005-Sept. 2006)

**Mr. Nan-Tzer Hu**



Secretary General

- [Work Experience]
1. Commissioner, Taipei Water Department (Dec. 2010- Dec. 2014)
  2. Superintendent, Engineering Division, Taipei Water Department (Jan. 2006-Dec. 2010)
  3. Chief Engineer, Engineering Division, Taipei Water Department (1999- 2005)

**Mr. Yang- Long Wu**

Chairman of Advisory Committee	Mr. Nan-Tzer Hu	Chairman of Management Research Committee	Dr. Kung-Cheh Li
Chairman of National Committee	Dr. Shang-Lien Lo	Chairman of Technical Research Committee	Dr. Tsair-Fuh Lin
Chairman of Publishing Committee	Dr. Chip-Pin Huang	Chairman of Financial Research Committee	Dr. Shyh-Fang Kang
Chairman of membership Committee	Mr. Yang-Long Wu		

The first water supply system has been beginning in Taiwan since 1898. There are 151 water supply systems with design capacities 18.46 million M<sup>3</sup>/day, and supply 10.61 million M<sup>3</sup>/day tap water to 21.99 million people nowadays.

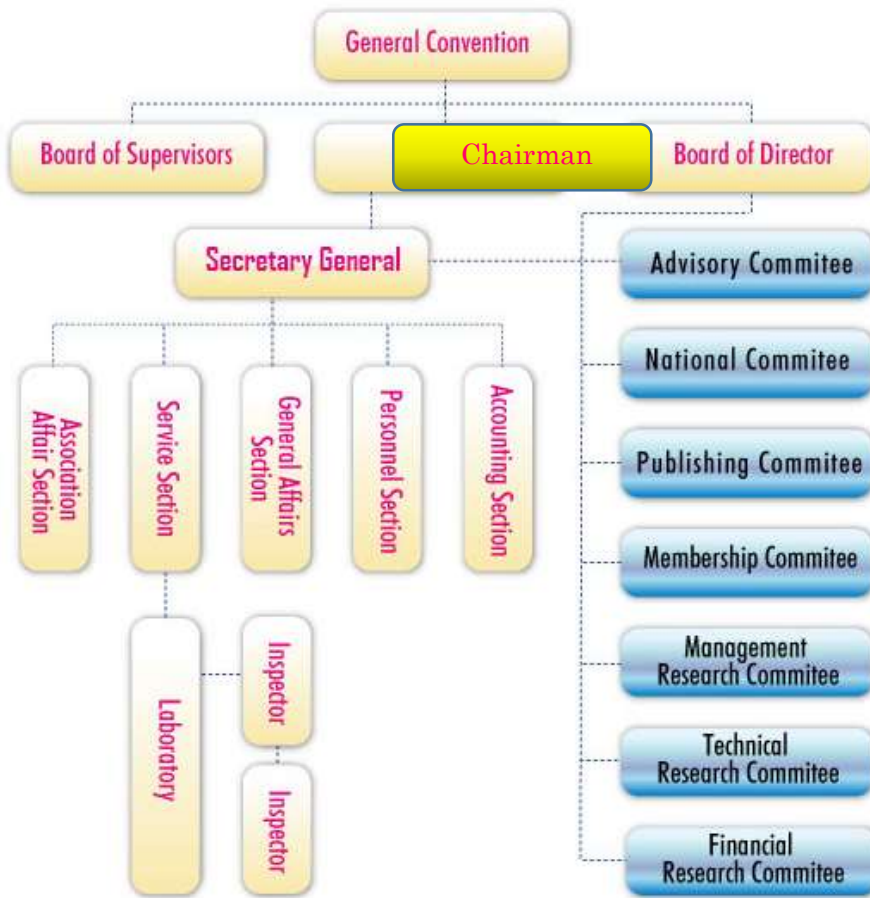
The mission of CTWWA defines as follow: (1). Academic research related to tap water. (2). Exchange of the tap water works experience. (3). Compilation of tap water publications. (4). Cooperate and liaise with international tap water organizations. (5). Managing membership benefits and mutual assistance. (6). Conduct research or manage tap water-related matters at the request of members or relevant organizations.

CTWWA has done as an important contributor in the development of the water supply system throughout the country, it has provided a platform to communicate with individuals, agencies and organizations involved with tap water for sharing tap water experience and to support the development of tap water utilities.

The CTWWA office is headed by its Secretary General and the offices are organized into five departments: general administration, accounting, services, personnel, and association affairs.

## Organization Framework

Organization Chart of the (CTWWA)



## Committees and Functions





## History

The Association's predecessor was the Taiwan Provincial Water Development Association, a non-government organization that was established with the approval of the provincial government in June, 1950. In November, 1967, the association changed its name to The Chinese Taiwan Water Works Association. To promote the exchange of tap water technology and management know-how with developed nations around the world, the association became a member of the International Water Association in 1980.

The CTWWA has also been active in organizing conferences. In 1984, the CTWWA held its first conference on Water Supply Technologies and Management Strategies to promote research and development for water supply technologies and stimulate communication between business, academia, and facility managers. In 1988, the conference was renamed the Water Research Conference.

In order to increase and enhance the testing and inspection the material items of water supply system, the Testing and Inspection Laboratory established at Tainan, south of Taiwan, in 2002. For providing more water supply equipment testing and inspection services. new Testing and Inspection Laboratory has been established at Tainan City in 2017 and has been operating from Jan. 2018.

As of 2017, the CTWWA had 31 organizational members, including four national water supply facilities (Taipei Water Department, Taiwan Water Supply Corporation, Kinmen Water Works, and Lien-jiang Water Works), two government agencies, and 25 companies involved in providing water supply engineering services of equipment. In addition, the CTWWA also has 5,500 individual members from industry, academia, and research institutes.

"Water Supply Quarterly" began published in 1981 and contains research papers, practical reports, expert lectures, member dynamics, academic activities, etc.



The Water Supply Quarterly of CTWWA



Research Reports and Issues of CTWWA



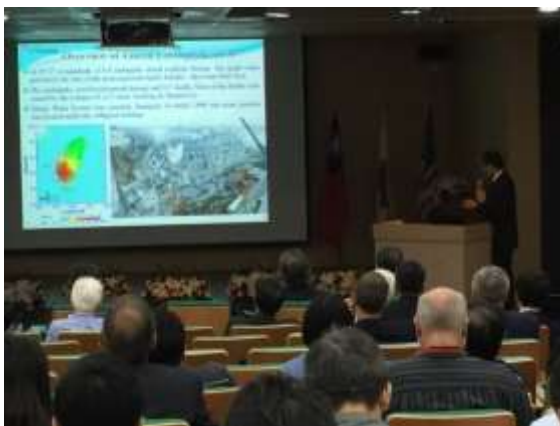
## Activities

### International and Academic Activities

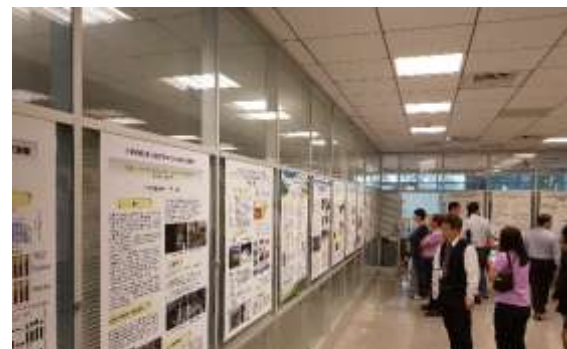
Every year, CTWWA's General Assembly and Research Conference and water products Exhibition was handled with two days around November 17<sup>th</sup>. At the same time 'Water Forum' will be held during the Research Conference with the topic "Smart Water system" on 2017 and "Water Quality upgrade" on 2018.

The 10<sup>th</sup> JWJA/WRF/CTWWA Water System Seismic Conference was held on 18<sup>th</sup> -20<sup>th</sup>, Oct. 2017, at National Center for Research on Earthquake Engineering in Tainan, south of TAIWAN. And the total of 188 participants, 8 come from United States and 32 come from Japan with 3 keynote and 33 papers.

The "Water Leaders Forum – Sustainable Water Practice" was held at Taipei on 10<sup>th</sup>, May. 2018 to discuss how to use water resources sustainably under the challenges of limited water resources and climate change. Dr. Kala Vairavamorthy, Executive Director of International Water Association, was invited to do as the keynote Speaker. Dr. Kala also meet IWA governing representatives of CTWWA and visited Taipei Water Department.



The 10<sup>th</sup> JWJA/WRF/CTWWA Water System Seismic Conference



Posters of Water Research Conference 2017

## Laboratory Inspections & Training Course

The laboratory is staffed by well-qualified inspectors who have undergone a rigorous training program and are certified under ISO/IEC 17025. The inspectors provide services to CTWWA members and other organizations. To improve the quality of tap water piping works, CTWWA has been commissioned by the Water Resource Agency to organize the water piping course since 2005. There are 735 workers had been trained and taken the certification then allowed doing the piping works on site.



Pipe inspection on piping factory



Training course of water piping works



### Event Information

- 6<sup>th</sup> Feb., 2018, Hualien earthquake, 17 people died, more than 40,000 users of water stop.
- Water Loss Asia 2108 and Taiwan International Water Show were held on 29<sup>th</sup>-31<sup>th</sup>, Aug., 2018 at International Convention Center Kaohsiung.
- 2018 CTWWA's General Assembly and Research Conference and water products Exhibition will be handled at I-Lan County, northeast of Taiwan, on 15<sup>th</sup> -16<sup>th</sup> Nov. 2018.



### Contact

<b>Address</b>	7F., No.106, Sec. 2, Chang-an E. Rd., Zhongshan District, Taipei City 104, Taiwan
<b>Web</b>	<a href="http://www.ctwwa.org.tw/">http://www.ctwwa.org.tw/</a>
<b>Email</b>	ctwwa@ctwwa.org.tw
<b>Tel</b>	886-2-2507-3832
<b>Fax</b>	886-2-2504-2350
<b>Contact (Lab)</b>	Lab Phone : 886-6-302-4691 / Lab Fax : 886-6-301-3221 e-mail address : <a href="mailto:ctwwa.mtla@msa.hinet.net">ctwwa.mtla@msa.hinet.net</a> Laboratory representative director: Mr. Yang-Long Wu

(Data as of the end of 30<sup>th</sup>, Dec. 2017)

### <General Information>

#### 6. Number of Water Utilities

Bulk Water Supply	0
Water Supply	4

#### 7. Who Supply Water (Organization Types of Water Utilities)

Central Government	0
Local Government	3
Public Corporation	1
Private Company Privatization Concession	0

#### 8. Who Regulate Water Utilities

Approve License to Supply Water	Ministry of Economic Affairs
Water Quality Standards	Environmental Protection Agency
System of Water Supply	Ministry of Economic Affairs & Local Government
Operation of Water Supply	Ministry of Economic Affairs & Local Government
Water Resource Development	Water Resource Agency
River Control (Water Right)	Water Resource Agency
Sewerage System	Ministry of Interior
Water Environment	Environmental Protection Agency and Water Resource Agency
Financial Management	Ministry of Economic Affairs & Local Government
Water Tariff	Ministry of Economic Affairs & Local Government

#### 9. Status of Water Supply

Total Population	23,445,605 capita
Water Supply Population	21,994,102 capita

Coverage Ratio	93.81 %
Annual Water Supply Volume	3,871,555 thousand m <sup>3</sup>
Number of Service Connections	8,669 thousand
Daily Maximum Water Supply Volume	12,729 thousand m <sup>3</sup> /day
Water Consumption volume per capita per day (including industrial use)	385 L/capita/d

## 10. Challenges

### 1) Financial deterioration

Because the water tariff is not easy to be adjusted with reasonable return ratio.

### 2) Aging facilities and aging pipeline

Because the financial deterioration and the excavation control of the road authority

### 3) Earthquake resistance

Because aging facilities and aging pipeline

## <Water Supply System>

## 5. Water Resources

	thousand m <sup>3</sup>	%
Surface Water	3,634,223	89.2
Natural Flow	1,615,776	44.5
Dam	2,018,227	55.5
Lake Water	0	0
Ground Water	417,216	10.2
Others	23,971	0.6
Total	4,075,780	100.0%

## 6. Water Treatment Process

	thousand m <sup>3</sup>	%
Only Disinfection	72,773	1.88
Slow Sand Filtration	18,250	0.47
Rapid Sand Filtration	3,707,532	95.76
Membrane Filtration	73,000	1.89
Total	3,871,555	100.0%

## 7. Length and Types of Pipes (km/%)

	DIP	SP	PVC	PSCP	others	Total
Water Intake	Km	Km	Km	Km	Km	Km
Pipe	%	%	%	%	%	%
Transmission	208Km	359Km	Km	292Km	Km	859Km
Main	0.3%	0.4%	%	0.4%	%	1.3%
Distribution	5,254Km	538Km	Km	679Km	196Km	6,667Km
Main	8.0%	0.9%	%	1.1%	0.3%	10.2%
Distribution	23,495K m	Km	32,510K m	Km	1,885Km	57,890K m
Branch	36.0%	%	49.7%	%	2.9%	88.5%
TOTAL	28,957K m	897Km	32,510K m	971Km	2,081Km	65,416K m
	44.3%	1.3%	49.7%	1.5%	3.2%	100%

8. Analysis of Water Supply Volume (IWA Water Balance)

				m <sup>3</sup> /year	%
System Input Volume	Authorized Consumption	Billed Authorized Consumption Metered Consumption Unmetered Consumption	Revenue Water	2,968,025,301	76.64
		Unbilled Authorized Consumption Flushing Pipe Reduced water volume due to deterioration of tap water quality, etc.		309,751,341	8.00
	Water Losses	Apparent Losses (Non Physical Loss) Illegal water Metering Inaccuracy	Non- Revenue Water (NRW)	89,117,269	2.30
		Real Losses (Physical Loss) Leakage on Mains Leakage/Overflow from Distribution Basins Leakage on Service Pipes		505,997,859	13.06

## <Financial Management>

### 6. Water Tariff

Average unit cost per cubic meter	10.80	Your country's currency/m <sup>3</sup>
Average unit tariff per cubic meter	10.99	Your country's currency/m <sup>3</sup>

### 7. Composition of supply cost

Depreciation expenses	36.82%
Cost of receiving bulk water	6.00%
Personnel expenses	39.79%
Repair costs	6.58%
Interest expense	3.59%
Power cost	5.00%
Chemical costs	2.22%
Others	0.00%

### 8. Calculation Method to decide Water Tariff

Full Cost Recovery Method	100%
Cash Flow Balance Method	0%

### 9. Tariff Structure (Tariff Table)

Classified by Meter Size	21.90%
Classified by Customer's Use	51.10%
Others	27.00%

### 10. Affordability (Water Tariff 1 household/ 1 month)

Monthly consumption expenditure	74,516	Your country's currency
Monthly Water Tariff	231	Your country's currency
Affordability	0.31	%

# Indian Water Works Association



## About IWWA



**The Indian Water Works Association (IWWA)** is a voluntary body of professionals concerned and connected with water supply for municipal, industrial, agricultural uses and treatment and disposal of wastewater. IWWA focuses basically on the entire Water Cycle; encompassing the environmental, social, institutional and financing issues.

The Indian Water Works Association is a voluntary organization of Professionals concerned with WATER....

WATER for Municipal, Industrial & Agricultural uses.

WASTEWATER collection, treatment, disposal and reuse.

IWWA was founded in 1968 (and registered under the Societies Registration Act of 1961) with headquarters at Mumbai. IWWA has 34 Centers spread across the country and is very active in conducting different activities in the areas of Water Supply and Wastewater Treatment and Disposal. IWWA has a membership of more than 9500 plus professionals spread all over the country and abroad.

, they Include...

- The decision makers in Water & Waste Water Sector such as Chief Engineers and Heads of Departments of Government and Semi - Govt. Organizations.
  - The policy implementing Engineers, Scientists, Hydro-Geologists, Environmentalists, Chemists, Biologists etc.
- The beneficiary & contributing organizations of the Sector viz. Municipalities, Water Supply and Sewerage Boards, Pollution Control Boards, Irrigation Departments, Engg. & Science Colleges, Research Institutes etc.
- The supporting limbs of the Sector viz. Industrial Houses, Equipment Manufacturers, Consultants, Contractors etc.

IWWA brings out a quarterly Journal and a bi-monthly newsletter called Mid-stream.



## Activities

### OBJECTIVES & ACTIVITIES

The Objective of IWWA is to stimulate and promote the development of Science, Technology, Economics, Environment, Ecology and Social Sciences in managing the Water; both fresh and waste water. It provides a common platform for the persons and organizations working in this sector to exchange views, share ideas, disseminate information and knowledge about new and appropriate technologies for improving and upgrading the services.

IWWA is now in its forties and have accumulated good experience in the promotion and transfer of knowledge in Water and Waste Water management Science & Technology and handling the related issues. It serves to promote programme to accelerate and enhance sustainable growth of Water and Waste Water systems in INDIA.

At the International level, it has relations with other similar Associations such as: International Water Association (IWA), American Water Works Association (AWWA), Japan Water Works Association (JWWA), Global Water Partnership (GWP), World Water Council (WWC), India Water Partnership (IWP), PUB Singapore, Korean Water and Wastewater Association (KWWA)

These linkages provide a vista to the members of the Association to exchange and promote ideas at international level.

### Journal of Indian Water Works Association [JIWWA]

Aims and Scope:

Journal of IWWA publishes papers reviewed, original research papers on all aspects of the science, technology and management of water and wastewater and its management.

Broad scope of journal Includes:

- Augmentation and collection of water.
- Water treatment.
- Water supply to domestic and industrial purposes.
- Sources of water pollution.
- Groundwater, point and non-point sources of pollution, and remediation.
- Analysis and monitoring of water quality, water quality standards and the analysis, monitoring and assessment of water quality by chemical, physical and biological methods.
- Studies on inland, tidal or coastal waters, including surface and ground waters, and point and non-point sources of pollution.

- The application of mathematical and modeling techniques in water treatment and water distribution.
- Public health.
- Municipal water collection and treatment.
- Industrial wastewater treatment, disposal and reuse.
- Private sector participation in Environmental Infrastructure.



Apart from above broad areas Journal of IWWA also publishes papers on interdisciplinary subjects related to public health, environment etc.

## Membership

Indian Water Works Association has members from all over India and abroad. Presently the association has a membership of over 10,000 which comprises decision making persons such as Chief Engineers and Heads of the Departments in various government, semi - government departments, Municipal Corporations and large Industrial Houses and Equipment Manufacture, Contractors, Consultants. Apart from the above IWWA also has membership from Educational Institutions, Research Organizations and Students.



## Event Information

50<sup>th</sup> Annual Convention of IWWA at Indore from January 18<sup>th</sup> to 20<sup>th</sup>, 2019. For Details visit website: <http://www.iwwa.info/index.php>



## Contact

<b>Address</b>	MCGM Compound, Pipeline Road, Vakola, Santacruz (East), Mumbai - 400 055, INDIA.
<b>Mail</b>	iwwahq@gmail.com iwwa@rediffmail.com
<b>Web</b>	<a href="http://www.iwwa.info/index.php">http://www.iwwa.info/index.php</a>
<b>Tel</b>	+91-22-26672665 / +91-22-26672666
<b>Fax</b>	+91-22-26686113

(Data as of the end of 2011)

### <General Information>

#### 1 1. Number of Water Utilities

Bulk Water Supply	
Water Supply	3400

#### 1 2. Who Supply Water (Organization Types of Water Utilities)

Central Government	0
Local /State Government	29+7
Public Municipal Bodies/Corporation	3400
Private Company Privatization Concession	25 +

#### 1 3. Who Regulate Water Utilities

Approve License to Supply Water	State Govt and CPHEO
Water Quality Standards	
System of Water Supply	Local Urban Government and State water Supply Dept.
Operation of Water Supply	
Water Resource Development	Ministry of Water Resources, River Development & Ganga Rejuvenation
River Control (Water Right)	
Sewerage System	CPHEO and Ministry and Water and Sanitation and Pollution Control Boards.
Water Environment	
Financial Management	
Water Tariff	Central and State Water Commission

#### 1 4. Status of Water Supply

Total Population	1,324,171,354	Capita Number
Water Supply Population	1,165,270,791	Capita Number
Coverage Ratio	88 %	
Annual Water Supply Volume	3821335.4	thousand m <sup>3</sup>

Number of Service Connections	thousand
Daily Maximum Water Supply Volume	10394.43 thousand m <sup>3</sup> /day
Water Consumption volume per capita per day (including industrial use)	May be 130 L/capita/d

1 5. Challenges

- 4) Continuous and Adequate Water Supply for all.  
High NRW and water losses due to leakages.
- 5) Water Quality
- 6) Polluted sources of water surface and ground  
Efficient O &M
- 7) Self-Sustainable water supply utilities. Access to finance  
Tariff  
Aging Infrastructure  
Increasing population and urbanization.

<Water Supply System>

9. Water Resources

	thousand m <sup>3</sup>	%
Surface Water Natural Flow Dam Lake Water		78.3
Ground Water		21.4
Others		0.3
Total		100.0%

1 0. Water Treatment Process

	thousand m <sup>3</sup>	%
Only Disinfection		
Slow Sand Filtration		
Rapid Sand Filtration		
Membrane Filtration		
Total		100.0%

1 1. Length and Types of Pipes (km/%)

	DIP	SP	PVC	PE	SUS	Total
Water Intake Pipe	Km	Km	Km	Km	Km	Km
	%	%	%	%	%	%
Transmission Main	Km	Km	Km	Km	Km	Km
	%	%	%	%	%	%
Distribution Main	Km	Km	Km	Km	Km	Km
	%	%	%	%	%	%
Distribution Branch	Km	Km	Km	Km	Km	Km
	%	%	%	%	%	%
TOTAL	Km	Km	Km	Km	Km	Km
	%	%	%	%	%	100%

1 2. Analysis of Water Supply Volume (IWA Water Balance)

				m <sup>3</sup> /year	%
System Input Volume	Authorized Consumption	Billed Consumption Metered Consumption Unmetered Consumption	Revenue Water		
		Unbilled Authorized Consumption Flushing Pipe Reduced water volume due to deterioration of tap water quality, etc.			
	Water Losses	Apparent Losses (Non Physical Loss) Illegal water Metering Inaccuracy	Non- Revenue Water (NRW)		
		Real Losses (Physical Loss) Leakage on Mains Leakage/Overflow from Distribution Basins Leakage on Service Pipes			

## <Financial Management>

### 1 1. Water Tariff

Average unit cost per cubic meter	Your country's currency/m <sup>3</sup>
Average unit tariff per cubic meter	4.9 Rs. Your country's currency/m <sup>3</sup>

### 1 2. Composition of supply cost

Depreciation expenses	%
Cost of receiving bulk water	%
Personnel expenses	%
Repair costs	%
Interest expense	%
Power cost	%
Chemical costs	%
Others	%

### 1 3. Calculation Method to decide Water Tariff

Full Cost Recovery Method	%
Cash Flow Balance Method	%

### 1 4. Tariff Structure (Tariff Table)

Classified by Meter Size	%
Classified by Customer's Use	%
Others	%

### 1 5. Affordability (Water Tariff 1 household/ 1 month)

Monthly consumption expenditure	Your country's currency
Monthly Water Tariff	Your country's currency
Affordability	%

# Korea Water and Wastewater Works Association



## About KWWA



President, Kwon Young-jin

## What We Do

- Attend as the policy consultative body
- Conduct research and produce statistical data
- Establish and disseminate standardized information
- Perform inspections and certifications
- Offer programmes to cultivate field specialists
- Participate in multifarious international exchanges worldwide

### Utility Members

- Governmental authorities of public water and wastewater works
- Korea Water Resources Corporation (K-water)
- Korea Environment Corporation (KECO)

### Individual Members

- Individuals who are now engaging in relevant industries or having interest on water industry

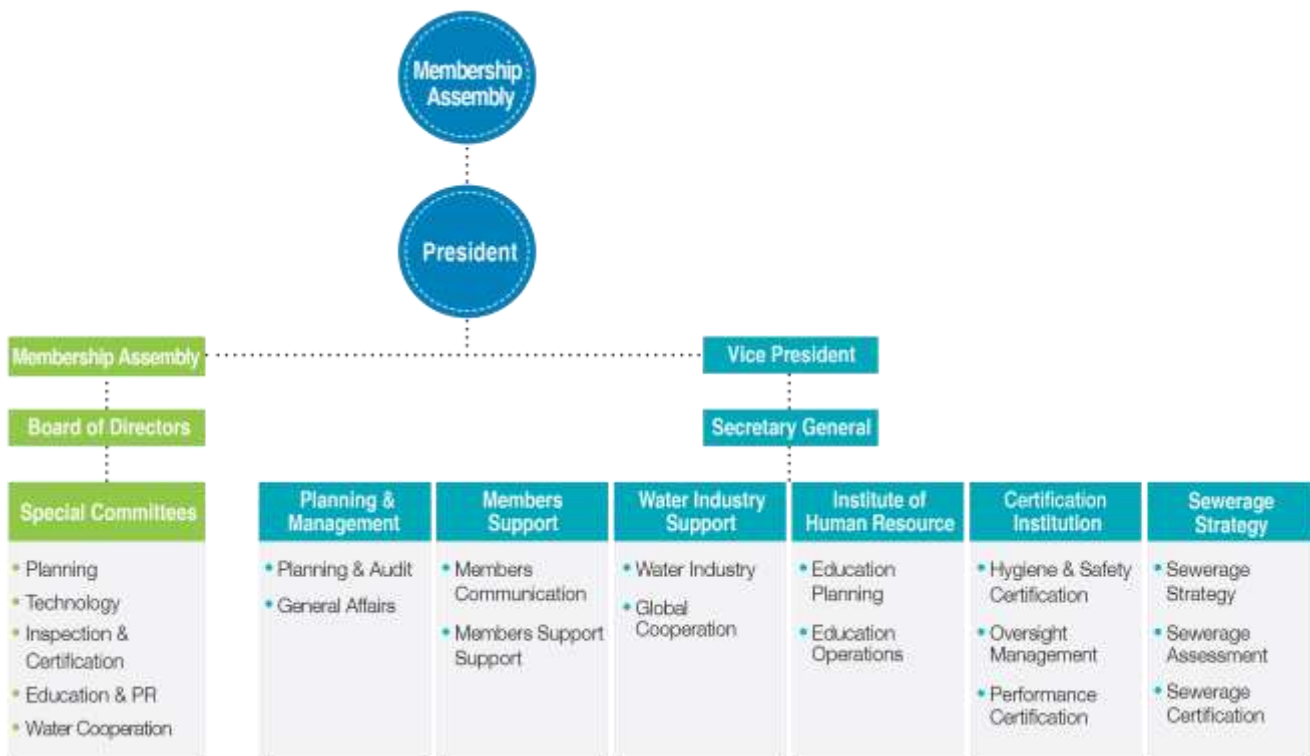


### Enterprise Members

- Companies related to water and wastewater works industry

### Group Members

- Academic societies, unions, and associations



- Members support support -> Members support

## Purpose of Establishment

Korea Water and Wastewater Works Association (KWWA) was founded in 2002, under the Water Supply and Waterworks Installation Act to expand Korea's water and wastewater industry. We are dedicated to investigate the most effective solutions of water industry and supply safe water to the nation.



## History

**Korea Water and Wastewater Works Association (KWWA)** was founded in 21st/Jan/2002 based on Article 56 of Water Supply and waterworks installation Act, for the stable reservation and supply of clean water, which is one of the most important factors for the improvement of the quality of life. KWWA, aiming for the healthy development and supply of the waterworks, contributes to the qualitative improvement in public life, the water quality conservation and the advancement in water and wastewater areas, promotes the improvement in the conditions of the workers involved in the water and wastewater and provides technical information for them, therefore the association is working as a bridge between industry and academics and governments through the exchange and expansion of the knowledge and information on the water supply and wastewater.

- 2001.03 Water Supply and waterworks installation Act revised
- 2001.03 Visiting the advanced associations (for example, Japan Water Works Association)
- 2001.06 Agreement with local governments on about the foundation of the association.



## Activities

1. Making proposals and providing advice with respect to policies on and administration of water services (including sewage; hereinafter the same shall apply in this Article)
2. Collecting statistics with respect to water services and publishing books related thereto
3. Surveying and researching on, and propagating the development of water supply-related technology and water services
4. Researching on and propagating standards for water services facilities and for the design thereof, and official instructions
5. Public relations, education, and in-service training for water services
6. International exchanges relating to water supply
7. Promoting the welfare of members of the Association and protecting their rights and interests
8. Research on specifications of materials and products for waterworks, the establishment of collective standards, testing, and certification
9. Evaluation of technology and technical support for water services facilities
10. Other missions that are commissioned by the Minister of Environment, or prescribed by the articles of association.

- 2002 • Appointed its first President-Goh Gun, the former mayor of Seoul  
• Hosted the first WATER KOREA (International Water Industry Exposition)
- 2003 • Organized representatives for overseas exhibition and participated in international exchanges
- 2005 • Implemented the KWWA Certification service
- 2006 • Received the Prime Minister's Award for its contribution to water management
- 2007 • Initiated statutory and mandatory employee education programs
- 2008 • Published 『The 100 Years History of Korean Waterworks』
- 2009 • Received the Prime Minister's Award for its contribution to the standardization business of water industry
- 2010 • Recognized as a lifelong education institution by the Ministry of Education
- 2011 • Implemented the Hygiene and Safety Certification service officially
- 2012 • Implemented the performance examination of public sewerage system
- 2013 • Signed MOU with the Ministry of Education to increase young employment in the overall water industry
- 2014 • Participated in foreign exhibitions and officially launched export conference service
- 2015 • Nominated as a public organization for its contribution to the leading body of comprehensive water industry in Korea
- 2016 • Designated as the national standards certification authority



## Event Information

WATER KOREA is the international comprehensive water industry exposition with the largest scale all over the nation. It has been mounting every March and covers nearly 30 affiliated events including exhibitions, conferences, and seminars.

- 2019 WATER KOREA information
  - Period : March 20(Wed)~22(Fri), 2019
  - Venue : EXCO (Daegu Metropolitan city)
  - Organizer : KWWA, Daegu Metropolitan city
- For more information, please visit the web page: <https://www.waterkorea.kr>



## Contact

<b>Address</b>	244 Daelim-ro, Yeongdeungpo-gu, SEOUL 07379 KOREA
<b>Mail</b>	international@kwwa.or.kr
<b>Web</b>	<a href="http://www.kwwa.or.kr/english/">http://www.kwwa.or.kr/english/</a>
<b>Tel</b>	82-2-3156-7740 (English)
<b>Fax</b>	82-2-3156-7778

(Data as of the end of 2016 )

<General Information>

1 6. Number of Water Utilities

Bulk Water Supply	1
Water Supply	161

1 7. Who Supply Water (Organization Types of Water Utilities)

Central Government	
Local Government	161
Public Corporation	2
Private Company Privatization Concession	

1 8. Who Regulate Water Utilities

Approve License to Supply Water	Ministry of Environment
Water Quality Standards	Ministry of Environment
System of Water Supply	Ministry of Environment
Operation of Water Supply	Ministry of Environment
Water Resource Development	Ministry of Environment
River Control (Water Right)	Ministry of Land, infrastructure and Transport
Sewerage System	Ministry of Environment
Water Environment	Ministry of Environment
Financial Management	Ministry of Environment, Ministry of the interior and safety
Water Tariff	Ministry of the interior and safety, Council of each local Government

1 9. Status of Water Supply

Total Population	52,857,893 capita
Water Supply Population	52,259,027 capita
Coverage Ratio	98.9 %
Annual Water Supply Volume	6,419,489 thousand m <sup>3</sup>

Number of Service Connections	7,943 thousand
Daily Maximum Water Supply Volume	21,115 thousand m <sup>3</sup> /day
Water Consumption volume per capita per day (including industrial use)	287 L/capita/d

## 2.0. Challenges

### 8) Financial problem

The most of water utilities face to the problem of Financial Deterioration because of Revenue Reduction by Population declining and Decrease of Water Consumption per Capita and low tariff coverage per production cost (81.1%)

### 9) Aging Facilities and Pipeline

Ratio of aging facilities and aging pipelines are increasing, 31% of pipeline had installed before 2 1 years ago

## <Water Supply System>

### 1.3. Water Resources

(m <sup>3</sup> /year)	thousand m <sup>3</sup>	%
Surface Water	6,526,145	97.8
Natural Flow	3,079,658	46.2
Dam	3,376,762	50.6
Lake Water	69,725	1
Ground Water	145,560	2.2
Others		
Total		100.0%

### 1.4. Water Treatment Process

(m <sup>3</sup> /day)	thousand m <sup>3</sup>	%
Only Disinfection	310	1.1
Slow Sand Filtration	545	2
Rapid Sand Filtration (including advanced treatment)	25,965	96.2
Membrane Filtration	202	0.7
Total		100.0%

1 5. Length and Types of Pipes (km/%)

	DIP	SP	PVC	PE	SUS	Total
Water Intake Pipe	897Km	2,101Km	20Km	48Km	Km	3,067Km
	1.4%	9.9%	0.05%	0.1%	%	1.6%
Transmission Main	6,170Km	4,508Km	276Km	213Km	Km	11,167K m
	9.8%	21.3%	0.7%	0.6%	%	5.9%
Distribution Main	54,660K m	8,596Km	23,817K m	17,099K m	Km	104,173 Km
	86.5%	40.7%	56.5%	44.2%	%	55.0%
Distribution Branch	1,443Km	5,937Km	18,074K m	21,338K m	24,336K m	71,128K m
	2.3%	28.1%	42.8%	55.1%	100%	37.5%
TOTAL	63,171K m	21,142K m	42,187K m	38,699K m	24,336K m	189,534 Km
	100%	100%	100%	100%	100%	100%

1 6. Analysis of Water Supply Volume (IWA Water Balance)

				m <sup>3</sup> /year	%
System Input Volume	Authorized Consumption	Billed Authorized Consumption Metered Consumption Unmetered Consumption	Revenue Water	5,445,978,458	84.8
		Unbilled Authorized Consumption Flushing Pipe Reduced water volume due to deterioration of tap water quality, etc.		284,997,224	4.4
	Water Losses	Apparent Losses (Non Physical Loss) Illegal water Metering Inaccuracy	Non- Revenue Water (NRW)	6,009,555	0.1
		Real Losses (Physical Loss) Leakage on Mains Leakage/Overflow from Distribution Basins Leakage on Service Pipes		682,503,905	10.6

## <Financial Management>

### 1 6. Water Tariff

Average unit cost per cubic meter	868 KRW /m <sup>3</sup>
Average unit tariff per cubic meter	703.4 KRW /m <sup>3</sup>

### 1 7. Composition of supply cost

Depreciation expenses	%
Cost of receiving bulk water	33.2%
Personnel expenses	19.0%
Repair costs	11.9%
Interest expense	%
Power cost	7.4%
Chemical costs	1.1%
Others	27.4%

### 1 8. Calculation Method to decide Water Tariff

Full Cost Recovery Method	100%
Cash Flow Balance Method	%

### 1 9. Tariff Structure (Tariff Table)

Classified by Meter Size	15%
Classified by Customer's Use	85%
Others	%

### 2 0. Affordability (Water Tariff 1 household/ 1 month)

Monthly consumption expenditure	4,130,000 KRW
Monthly Water Tariff	16,482 KRW
Affordability	0.4 %



## About MWA



MWA President

**Datuk Ir. Abdul Kadir bin Mohd Din**

President of MWA for 2017/2019 Session. Joined MWA on 7 March 2003.

He is a Managing Director of Sacra Sol Sdn Bhd, Advisor to President of Ranhill Holdings Berhad and Board of Director of Ranhill Subsidiaries Companies.



Office view

## Introduction

**The Malaysian Water Association (MWA)** brings together practitioners in the water service industries value chain. Our membership consists of both individuals and organisations.

The strength of the association is derived from the mix of members coming from water supply and sewerage utilities, manufacturers, consultants, contractors, suppliers, regulators and academicians.

MWA is a platform for efforts towards bringing about enhancement of the knowledge and skill of its members and promotes awareness of water issues among the public. Together with this, public interests and environmental concerns are also promoted. MWA puts forward views of the members to the authorities and makes representation on strategic issues. In essence, we are committed towards promoting sustainable management of the water services.

Internationally, MWA maintains linkages with related organisations abroad to establish networking in order to realize the water industry's common universal goals. We are also a Corporate Member of the International Water Association (IWA).

## The Council

The present Council was elected during the election year in 2017 for the Session of 2017/2019, which is the fifteenth voted in by members, consists of 19 Council Members. The Council took over the management of the affairs of the Association after the conclusion of 29<sup>th</sup> AGM in April 2017. Their term of office will end at the conclusion of the 31<sup>st</sup> AGM in April 2019 when the new Council will take over.

## The Secretariat

The Secretariat is now occupying the second floor of its building in Taman Sri Hartamas since 1 May 2005. The third floor the office of Malaysian Water Academy Sdn Bhd (MyWA). The ground floor is for multipurpose uses including meeting, technical talk, gathering of MWA members and serves as training centre.

At present, there is a Group Executive Director, four permanent staff of MWA – a Manager, an Account Executive, an Account Assistant and an Admin. Assistant while three staff under MyWA – a Technical Director, Assistant Training Manager and a Marketing Executive.



## Activities

### Objectives

Malaysian Water Association (MWA) was formed and registered in 1988 as a non-profit organisation. The objects of the Association shall be:

- i. To promote and advance the science and practice of engineering and management in the water supply and wastewater industries.
- ii. To provide a forum for exchange of views among various sectors making up the water and wastewater industries, including water authorities, research bodies, consultants, manufacturers, suppliers and contractors.
- iii. To gather and disseminate through publications and other appropriate means information on water supply and wastewater with prior approval of relevant authority.
- iv. To provide advice and information on water supply and wastewater to public and private bodies as well as the public in general.
- v. To publicise new technologies and promote the use of appropriate technology in the water supply and wastewater industries.
- vi. To promote and update standardisation in water supply and wastewater practices, and also in goods, equipment and fittings used in the water supply and the wastewater industries.
- vii. To promote training, research and development in the science and practice of engineering and management in the water supply and wastewater industries.



- viii. To cooperate, as may seem conducive to any of the above objects, with national and international organisations and to support and complement their activities.

## **Mission**

To promote synergy and enhance knowledge and good practice within the Malaysian water and wastewater industries to enable them to achieve their corporate goals and hence contributing effectively towards creating national competitiveness and success. We will focus and work on strategic issues and help outline direction and priorities in the industries.

Nationally we will work in close cooperation with all parties in the government and private sectors. We will network internationally by establishing and maintaining linkages with related organisations abroad. We believe in professionalism, teamwork, free exchange of information and learning. Our members are dedicated and are friends to the water and wastewater industries

## **Honors & Awards**

The Malaysia Water Awards are presented annually for outstanding contributions to Malaysian individuals or institutions in the field of water and wastewater engineering either in Research and Management.

Awarded by the Malaysian Water Association, the Malaysia Water Awards honour achievements in science, engineering, technology, education or public policy that have resulted in significant impact in advancing the science and practice of water and wastewater engineering at national and international level. These contributions involve achievements in management and innovations, design, and engineering solutions which have immediate application to the industry as a whole.

The Malaysia Water Awards comes with a prize of a Challenge Crystal Trophy, a commemorative Plaque and RM5,000. MWA has instituted the Malaysia Water Awards since 1994.



## **About Membership**

### **List of Members**

Since its formation in 1988, MWA has grown to a total membership of 1,467

Membership in the Association shall be of four grades: Honorary, Ordinary, Institutional, Associate and Student.

<b>Institutional Members</b>	191
<b>Ordinary Members</b>	1,241
<b>Associate Members</b>	34

## **Membership Qualifications**

The requirements for admission are:

### **a. Honorary Membership**

- A person distinguished in public life or by service to the Association.

### **b. Ordinary Membership**

- A person who possesses a tertiary qualification or holds a position of responsibility in an organisation acceptable to the Council for Ordinary Membership, and who is involved in the water supply or wastewater industry.

### **c. Institutional Membership**

- A legally constituted professional institution, association, firm, company, organisation or any other similar body whose activities include or concern the water supply or wastewater industry.

### **d. Associate Membership**

- A person who is keenly interested in the water supply or wastewater industry but is not eligible for election to other classes of membership.

### **e. Student Membership**

- A person who is
  - i. is a student of a higher learning institution as defined by the relevant laws;
  - ii. a Malaysian citizen;
  - iii. is above 18 years of age.



## **Event Information**

### **Borneo Water & Wastewater Conference & Exhibition 2018**

Date: 9 – 11 October 2018

Venue: Pullman Hotel Kuching, Sarawak

## **Water Malaysia Conference & Exhibition 2019**

A MWA Specialised International Conference and Exhibition

Date: 29 – 31 July 2019

Venue: Kuala Lumpur Convention Centre



### **Contact**

<b>Address</b>	No. 24, Second Floor, Jalan Sri Hartamas 8, Taman Sri Hartamas, 50480 Kuala Lumpur, Malaysia.
<b>Mail</b>	<a href="mailto:leeky@mwa.org.my">leeky@mwa.org.my</a> (Mr. Lee Koon Yew, Group Executive Director)
<b>Web</b>	<a href="http://www.mwa.org.my">www.mwa.org.my</a>
<b>Tel</b>	+603-6201 2250 /+603-6201 9521
<b>Fax</b>	+603-6201 5801

<General Information>

2 1. Number of Water Utilities

Bulk Water Supply	5
Water Supply	18

2 2. Who Supply Water (Organization Types of Water Utilities)

Central Government	1
Local Government	0
Public Corporation	17
Private Company	
Privatization	-
Concession	-

2 3. Who Regulate Water Utilities

Approve License to Supply Water	National Water Services Commission
Water Quality Standards	Ministry of Health
System of Water Supply	National Water Services Commission
Operation of Water Supply	National Water Services Commission
Water Resource Development	Provincial Government
River Control (Water Right)	Provincial Government
Sewerage System	National Water Services Commission
Water Environment	Department of Environment
Financial Management	National Water Services Commission
Water Tariff	National Water Services Commission

2 4. Status of Water Supply

Total Population	31,633,500 capita
Water Supply Population	30,209,992 capita
Coverage Ratio	95.5 %
Annual Water Supply Volume	6,035,640 thousand m <sup>3</sup>
Number of Service Connections	7,773 thousand
Daily Maximum Water Supply Volume	16,536 thousand m <sup>3</sup> /day
Water Consumption volume per capita per day (including industrial use)	209 L/capita/d

## 2.5. Challenges

- 10) High Non Revenue Water at 36% national average is a concern and need more concerted effort to provide budget and technical solutions to address the problem beginning with meter changeout, pipe replacement and a dedecated NRW and Leakage control setup in each water perator to focus and follow up .
- 11) Overall aging nrastructure and system that needs urgent attention and proper asset management using the advances of digital age
- 12) Deteriorating water quality due to uncoordinated and ineffective water resources control and planning and catchment protection / reserve etc.including pollution from nonpoint sources due to development upstream of intakes.

## <Water Supply System>

### 1.7. Water Resources

	thousand m <sup>3</sup>	%
Surface Water		
Natural Flow	14,431	82
Dam	3,065	16.5
Lake Water		
Ground Water	254	1.5
Others		
Total		100.0%

### 1.8. Water Treatment Process

	thousand m <sup>3</sup>	%
Only Disinfection	-	
Slow Sand Filtration	-	
Rapid Sand Filtration	16,536	97
Membrane Filtration		
Total		100.0%

1 9. Length and Types of Pipes (km/%)

	DIP	MS	PVC	PE	AC	Total
Water Intake Pipe	Km	Km	Km	Km	Km	Km
	%	%	%	%	%	%
Transmission Main	Km	Km	Km	Km	Km	Km
	%	%	%	%	%	%
Distribution Main	Km	Km	Km	Km	Km	Km
	%	%	%	%	%	%
Distribution Branch	Km	Km	Km	Km	Km	Km
	%	%	%	%	%	%
TOTAL	11,926K m	43,128K m	21,517K m	28,025K m	42,643K m	Km
	7.9%	28.7%	14.3%	18.6%	28.4%	100%

2 0. Analysis of Water Supply Volume (IWA Water Balance)

				m <sup>3</sup> /year	%
System Input Volume	Authorized Consumption	Billed Authorized Consumption Metered Consumption Unmetered Consumption	Revenue Water	NA	
		Unbilled Authorized Consumption Flushing Pipe Reduced water volume due to deterioration of tap water quality, etc.		NA	
	Water Losses	Apparent Losses (Non Physical Loss) Illegal water Metering Inaccuracy	Non- Revenue Water (NRW)	NA	
		Real Losses (Physical Loss) Leakage on Mains Leakage/Overflow from Distribution Basins Leakage on Service Pipes		NA	

## <Financial Management>

### 2 1. Water Tariff

Average unit cost per cubic meter	RM0.42 Your country's currency/m <sup>3</sup>
Average unit tariff per cubic meter	RM0.60 Your country's currency/m <sup>3</sup>

### 2 2. Composition of supply cost

Depreciation expenses	NA%
Cost of receiving bulk water	NA %
Personnel expenses	NA %
Repair costs	NA %
Interest expense	NA %
Power cost	NA %
Chemical costs	NA %
Others	NA %

### 2 3. Calculation Method to decide Water Tariff

Full Cost Recovery Method	20%
Cash Flow Balance Method	80%

### 2 4. Tariff Structure (Tariff Table)

Classified by Meter Size	%
Classified by Customer's Use	100%
Others	%

### 2 5. Affordability (Water Tariff 1 household/ 1 month)

Monthly consumption expenditure	NA Your country's currency
Monthly Water Tariff	NA Your country's currency
Affordability	NA %



## About TWWA



**Mr. Prinya Yamasamit**  
**Chairman**

### ❖ **THAI WATERWORKS ASSOCIATION (TWWA)**

TWWA was established in 1971 by a group of engineers who involve in the waterworks industry. TWWA is intended to be a center for all who work in the water industry and more importantly a non-profit organization and not to involve in politics. The Executive Committee is elected by its members to run the TWWA a two-years term basis. TWWA has been serving the waterworks industry in Thailand according to its commitments for this past 47 years.

### ❖ **BACKGROUND**

TWWA Executive Committee comprises of 14 committees and like most associations TWWA has one president, 4 vice-presidents whereas the rest of the committees look after Technical, Engineering, Foreign Affairs, Finance and Secretary - most of which are permanent staff of Metropolitan Waterworks Authority or MWA and provincial Waterworks Authority or PWA. They work for TWWA on voluntary basis with no pay. As

TWWA is a non-profit organization and its source of income is solely from membership fee therefore TWWA is not afford to pay for anything unnecessary.

## ❖ TWWA MISSION

TWWA has 5 main missions namely

1. Center for promoting water supply occupation in Thailand
2. Conduct research and disseminate water supply information and technology for safety and welfare of the public
3. Support and provide consultation in determination of water supply material and equipment standard.
4. Exchange know-how and experiences among members.
5. Provide training to those who engaged in water supply occupation.

## ❖ ACHIEVEMENTS



In line with its vision and mission as of year 2017 TWWA has been so far proud of the following Achievements Establish the waterworks Guidelines & Handbooks, they are ..

- Piping Water Quality
- Pipe & fittings
- Pipe Laying and fittings installation



## Activities



### Annual General Meeting

Thai Waterworks Association held Annual General Meeting once a year. The members join the meeting to be informed about the activities progress of the association, future trends and directions. Also, they come to learn the technical knowledge from specialists.

### Waterworks Exhibition and Knowledge Sharing

The event is combined with TWWA Annual General Meeting. The exhibition provides knowledge in water supply from members, public sector and private sector that join the water supply network. This is an opportunity for members and those who interest to get the beneficial knowledge.



### Integrated Water Management Program

The object of this program is to enhance the knowledge and experience of the trainees. The targets are the executives and the decision makers in water supply organizations, both public and private. The course was designed to cover from water resource management to wastewater treatment. Also, it can generate beneficial network between the executives.

## ❖ TWWA CHALLENGES

Despite the fact that TWWA has produced substantial guideline and handbook for Thailand water industry but there are still some challenges. TWWA has to confront with If TWWA needs to fully achieve its vision therefore it must be sure that its guideline and handbook are brought into operation and by this TWWA must do all possible to

1. convince Local Administrative who run their own waterworks system for the municipal which account for 58% of water meter in the country.
2. Recruiting members from AEC - 10 countries member.

## PRIORITY

Firstly, TWWA has to put its efforts to convince the Local Administrative who have waterworks system for their own community to use TWWA guideline and handbook - secondly TWWA has to reshuffle its executive committee to be multidisciplinary board of management and from both private and government sector as there is still less committee from private sector involved in the present committee and thirdly more member particularly corporate member is needed as the more member means the more income for TWWA of which will enable TWWA to actively organize more useful events to the public.



## Event Information

TWWA will held General Annual Meeting & Workshop 2018 on November 22-23, 2018 at Jupiter Room, Miracle Grand Covention Hotel, Bangkok. The event aims to generate knowledge and views can be exchanged among members over related topics and that the public can acknowledge TWWA's activities and future plan. Members and those interested please contact TWWA Secretary **at TWWA2514@gmail.com or call +66 2 504 0123 ext 1949**



## Contact

<b>Address</b>	Thai Waterworks Association (TWWA) 400 Prachachuen Road, Laksi, Bangkok 10210 , Thailand
<b>Mail</b>	<a href="mailto:TWA2514@gmail.co.th">TWA2514@gmail.co.th</a>
<b>Web</b>	<a href="http://www.twwa.or.th">www.twwa.or.th</a>
<b>Tel</b>	+66 2 504 0123-1949
<b>Fax</b>	+66 2 500 2503

## Questionnaire on Water Supply

(Data as of the end of Fiscal year 2017)

### <General Information>

#### 1. Number of Water Utilities

Bulk Water Supply	-
Water Supply	-

#### 2. Who Supply Water (Organization Types of Water Utilities)

Central Government	Metropolitan Waterworks Authority (MWA) services area in Bangkok, Nonthaburi and Samutprakarn
Local Government	-
Public Corporation	-
Private Company	
Privatization	-
Concession	

#### 3. Who Regulate Water Utilities

Approve License to Supply Water	-
Water Quality Standards	-
System of Water Supply	-
Operation of Water Supply	-
Water Resource Development	-
River Control (Water Right)	-
Sewerage System	-
Water Environment	-
Financial Management	-
Water Tariff	-

#### 4. Status of Water Supply

Total Population	8.223 million
Water Supply Population	8.206 million
Coverage Ratio	99.8 %
Annual Water Supply Volume	2,063,830 thousand m <sup>3</sup>
Number of Service Connections	2.328 million
Daily Maximum Water Supply Volume	6,320 m <sup>3</sup> /day
Water Consumption volume per capita per day (included industrial use)	329.78 L/capita/d

#### 5. Challenges

1. MWA has a high level of water leakage caused by the aging pipeline networks. Therefore, MWA has policy to reduce water loss to 19% by 2021.
2. MWA use the conventional treatment system which is not suitable for the current deteriorated raw water. Therefore, MWA has to adapt the new advanced technology in the treatment process.
3. MWA should provide the reserved system to ensure that MWA can serve the potable water when faced severe situation.

#### <Water Supply System>

##### 1. Water Resources

	Cum. per second	%
Surface Water		
- Chao Phraya River	50	75
- Mae Klong River	17	25
Total	67	100

## 2. Water Treatment Process

	m <sup>3</sup>	%
Only Disinfection	-	-
Slow Sand Filtration	-	-
Rapid Sand Filtration	6,320,000	100%
Membrane Filtration	-	-
Total	6,320,000	100%

## 3. Length an Types of Pipes (km/%)

Type and Diameter Size (mm.)	Pipe Length (km.) Classified by Type											Total
	ST	SCP	RCP	CI	PC-ST	PC	AC	GI	PVC	GI	HDPE	
<b>Tunnel and Conduit</b>												
3600	12.367	-	-	-	6.582	-	-	-	-	-	-	18.949
3000	40.846	-	-	-	-	-	-	-	-	-	-	40.846
3000	16.286	-	-	-	-	-	-	-	-	-	-	16.286
2800	0.070	-	-	-	25.120	-	-	-	-	-	-	25.190
2500	11.990	-	-	-	6.172	-	-	-	-	-	-	18.162
2300	19.497	-	-	-	1.750	-	-	-	-	-	-	21.247
2000	36.801	-	-	-	8.150	-	-	-	-	-	-	44.951
1500	7.289	-	-	-	-	-	-	-	-	-	-	7.289
<b>Total in Transmission System</b>	143.135	0.000	0.000	0.000	47.786	0.000	0.000	0.000	0.000	0.000	0.000	190.921
<b>Trunk Main</b>												
1800	12.540	0.476	-	-	-	-	-	-	-	-	-	13.016
1500	95.471	11.079	10.320	-	-	-	-	-	-	-	-	116.870
1200	140.860	14.715	1.965	0.064	-	0.354	-	0.013	-	-	-	157.961
1000	556.126	12.407	32.209	12.937	-	4.533	-	-	-	-	-	598.212
900	28.867	-	-	20.384	-	3.128	-	-	-	-	1.285	53.664
800	476.363	0.114	0.164	8.823	-	4.874	-	0.423	-	-	2.643	493.363
700	36.687	-	-	11.001	-	6.934	-	-	-	-	-	54.622
600	153.935	-	0.009	15.863	-	8.310	3.789	2.704	-	-	0.582	185.169
500	36.190	-	-	19.804	-	13.882	3.090	-	-	-	0.127	72.073
400	19.144	-	-	19.784	-	0.934	0.062	-	0.234	-	-	40.142
<b>Total in Trunk Main</b>	1,538.183	36.990	44.648	108.220	0.000	42.929	6.918	3.140	0.234	0.000	5.959	1,789.221
<b>Distribution Pipe</b>												
400	37.438	-	6.434	-	-	110.460	-	110.833	-	0.153	-	265.718
300	290.899	-	2.264	-	-	1,299.300	-	4,173.648	0.062	66.501	-	5,962.673
250	1.924	-	0.351	-	-	19.673	-	1.820	-	-	-	23.771
200	106.305	-	2.461	-	-	466.082	-	4,293.443	0.012	52.447	-	4,920.950
150	122.968	-	0.112	-	-	974.221	-	8,626.685	26.589	12.713	-	9,743.307
100	3.503	-	1.193	-	-	361.365	-	11,972.567	215.213	64.242	-	12,608.084
50	0.048	-	0.057	-	-	0.461	-	37.223	31.076	3.071	1,733.170	1,805.094
<b>ToTM in Distribution Pipe</b>	535.125	0.000	13.052	0.000	0.000	3,251.564	0.000	29,415.726	270.954	159.354	1,733.170	35,359.123

Update : 30/6/2018

#### 4. Analysis of Water Supply Volume (IWA Water Balance)

				m <sup>3</sup> /year	%
System Input Volume	Authorized Consumption	Bill Authorized Consumption Metered Consumption Unmetered Consumption	Revenue Water	1,380,599,005.47	66.89%
		Unbilled Authorized Consumption Flushing Pipe Reduced water volume due to deterioration of tap water quality, etc	Non- Revenue Water (NRW)	27,958,251.61	1.35%
	Water Losses	Apparent Losses (Non physical Loss) illegal water Metering Inaccuracy		68,948,745.81	3.34%
		Real Losses (Physical Loss) Leakage on Mains Leakage/Overflow from Distribution Basins Leakage on Service Pipes	586,324,983.11	28.41%	

<Financial Management>

1. Water Tariff

Average Unit Cost per cubic meter	8.23 m <sup>3</sup>
Average Unit tariff per Cost per cubic meter	12.12 m <sup>3</sup>

2. Composition of Supply cost

Depreciation expense	39.16 %
Cost of receiving bulk water	2.37 %
Personnel expense	23.86 %
Repair costs	-
Interest expense	0.37 %
Power cost	11.50 %
Chemical costs	2.51 %
Others	20.24 %

3. Calculation Method to decide Water Tariff

Full Cost Recovery Method	-
Cash Flow Balance Method	-

4. Tariff Structure (Tariff Table)

Classified by Meter Size	-
Classified by Customer's Use	100 %
Others	-

5. Affordability (Water Tariff 1 household/1 month)

Monthly consumption expenditure	31,000 Baht
Monthly Water Tariff	316.46 Baht
Affordability	1.02 %

Metropolitan Waterworks Authority (MWA)

14 September 2018

## Questionnaire on Water Supply

Please fill in the blank in yellow and send this questionnaire back to below  
Email [kokusai@jwwa.or.jp](mailto:kokusai@jwwa.or.jp)

The items those are difficult to fill in may be left blank.

This questionnaire will be distributed at the Association Meeting on Tuesday,  
September 18.

As a reference, we attached the current status of Japan.

(Data as of the end of )

### <General Information>

#### 1. Number of Water Utilities

Bulk Water Supply	N/A
Water Supply	234 waterworks

#### 2. Who Supply Water (Organization Types of Water Utilities)

Central Government	26 %
Local Government	57 %
Public Corporation	N/A
Private Company Privatization Concession	N/A

#### 3. Who Regulate Water Utilities

Approve License to Supply Water	Ministry of Natural Resources and Environment
Water Quality Standards	Ministry of Public Health
System of Water Supply	Ministry of Natural Resources and Environment
Operation of Water Supply	Ministry of Natural Resources and Environment
Water Resource Development	Ministry of Natural Resources and Environment
River Control (Water Right)	Ministry of Natural Resources and Environment
Sewerage System	Ministry of Interior
Water Environment	N/A
Financial Management	Ministry of Finance
Water Tariff	N/A

4. Status of Water Supply (Data as September 2017)

Total Population	57,968 million
Water Supply Population	17,144 million
Coverage Ratio	19.92 %
Annual Water Supply Volume	1,838 million Cu.m
Member of Service Connections	4,288 million
Daily Maximum Water Supply Volume	5,289 million cu.m
Water Consumption volume per capita per day (including industrial use)	0.85 cu.m /connection/day

5. Challenges (See attachment)

- 1) convince Local Administrative who run their own waterworks system for the municipal which account for 58% of water meter in the country
- 2) Expand corporate member as this would also mean to get more involvement from private sector as to date we have very few corporate member
- 3) Recruiting members from AEC - 10 countries member

<Water Supply System>

1. Water Resources

Surface Water		
Natural Flow	800 million cubic meter	
Dam	887 million cubic meter	
Lake Water	47 million cubic meter	
Ground Water	25 million cubic meter	
Others	481 million cubic meter	
Total	2,022 million cubic meter	

2. Water Treatment Process

Only Disinfection	2 WTP	
Slow Sand Filtration	N/A	
Rapid Sand Filtration	Most of PWA WTP	
Membrane Filtration	2 WTP	
Total		

3. Length and Types of Pipes (km-s)

	DIP	SP	PVC	PE	SIS	Total
Water Intake	Km	Km	Km	Km	Km	Km
Pipe	%	%	%	%	%	%
Transmission	Km	Km	Km	Km	Km	Km
Main	%	%	%	%	%	%
Distribution	Km	Km	Km	Km	Km	Km
Main	%	%	%	%	%	%
Distribution	Km	Km	Km	Km	Km	Km
Branch	%	%	%	%	%	%
TOTAL	Km	Km	Km	Km	Km	Km
	%	%	%	%	%	100%

#### 4. Analysis of Water Supply Volume (IWA Water Balance)

				m <sup>3</sup> /year	%
System Input Volume	Authorized Consumption	Billed Consumption Metered Consumption Unmetered Consumption	Revenue Meter		
		Unbilled Authorized Consumption Flushing Pipe Reduced water volume due to deterioration of tap water quality etc.			
	Water Losses	Apparent Losses (Non-Physical Loss) Illegal water Metering Inaccuracy	Non-Revenue Water (NRW)		
		Real Losses (Physical Loss) Leakage on Mains Leakage/Overflow from Distribution Systems Leakage on Service Pipes			

## <Financial Management>

### 1. Water Tariff

Average unit cost per cubic meter	16.30 Baht
Average unit tariff per cubic meter	19.64 Baht

### 2. Composition of supply cost

Depreciation expenses	5,106,328 million Baht
Cost of receiving bulk water	6,974,807 million Baht
Personnel expenses	4,522,254 million Baht
Repair costs	1,180,358 million Baht
Interest expense	1,910,546 million Baht
Power cost	2,086,525 million Baht
Chemical costs	5,889,151 million Baht
Others	

### 3. Calculation Method to decide Water Tariff

Full Cost Recovery Method	%
Cash Flow Balance Method	%

### 4. Tariff Structure (Tariff Table)

Classified by Meter Size	%
Classified by Customer's Use	%
Others	%

### 5. Affordability (Water Tariff 1 household/ 1 month)

Monthly consumption expenditure	Your country's currency
Monthly Water Tariff	Your country's currency
Affordability	%

#### Attachment 5. Challenges

1. Provincial Waterworks Authority (PWA) always extends technical assistance to Local Authority to upgrade their water supply system. For the transferring of Local Authority water supply system to PWA, PWA will consider the possibility of investment cost. The transferred water supply system of Local Authority must not be burden of PWA in term of financial aspect.

2. At present there are 12 private sector participation project (PPP) in PWA. Some project is a big burden of PWA in term of rate of return; So, we have no policy for PPP in the near future. If water supply is urgently needed in some area and PWA could not serve it, PWA will buy treated water from private sector for a short period to solve the problem.

3. PWA recruitment regulation does not serve for foreigner recruitment.



# Water Services Association of Australia

## About WSAA

### **Water Services Association of Australia**

**The Water Services Association of Australia (WSAA)** is the peak industry body representing the urban water industry. Its members provide water and sewerage services to over 20 million customers in Australia and New Zealand and many of Australia's largest industrial and commercial enterprises.



Based around our vision of 'customer driven, enriching life', WSAA facilitates collaboration, knowledge sharing, networking and cooperation within the urban water industry. We are proud of the collegiate attitude of our members which has led to industry-wide approaches to national water issues.

WSAA can demonstrate success in the standardisation of industry performance monitoring and benchmarking, as well as many research outcomes of national significance. The WSAA Executive retains strong links with policy makers and legislative bodies and their influencers, to monitor emerging issues of importance to the urban water industry.

WSAA was formed in 1995 as a non-profit organisation to foster the exchange of information between industry, government and the community, and to promote sustainable water resource management.

## WSAA's Executive Team



### **Adam Lovell, Executive Director**

Adam is the Executive Director of WSAA, a position he commenced in 2011. Adam provides national leadership in policy positions for the Australian urban water sector on issues including industry reform, liveable cities, water quality, climate change, customer engagement and asset management. Adam also holds a number of non-executive Board roles including the Global Water Research Coalition and the Water Environment and Research Foundation (USA).



### **Stuart Wilson, Deputy Executive Director**

The Deputy Executive Director supports the Executive Director in the development and implementation of the WSAA's strategic plans and policies, and provides leadership and direction to the WSAA team. Stuart leads WSAA's involvement in customer, regulation, competition, and structural change issues. Stuart is also WSAA's Company Secretary



### **Greg Ryan, Manager Utility Excellence**

The Manager Utility Excellence supports the development of industry wide programs in the area of asset management to increase utility knowledge, address critical knowledge gaps and develop options to address emerging issues in a way that minimises risk, enhances efficiency and optimises value to customers. A key objective is to position the industry for current and future challenges through the Utility Excellence Committee and associated networks, including overseeing the development of industry codes, relevant Australian Standards, and product appraisals.



## Activities

### **VISION AND OUTCOMES**

WSAA members have defined the vision and outcomes they want to achieve by 2030:

#### ***Customer driven, enriching life.***

The vision highlights the industry's commitment to anchor our services to customers' values, and to enrich communities where water services have broad economic, environmental and social values. To make this happen the focus will be on achieving four outcomes by 2030.

**Outcome 1:** The most efficient trusted and valued service providers in Australia

**Outcome 2:** A compelling voice in national policy making

**Outcome 3:** A valued partner in urban and land use planning to enrich communities

**Outcome 4:** Stewardship of the urban water cycle



## Contact

<b>Address</b>	<u>Melbourne Office</u> : Level 8   Suite 8.02   401 Docklands Drive   Docklands   3008 <u>Sydney Office</u> : Level 9   420 George Street   Sydney   NSW   2000
<b>Mail</b>	info@wsaa.asn.au
<b>Web</b>	<a href="https://www.wsaa.asn.au/">https://www.wsaa.asn.au/</a>
<b>Tel</b>	<u>Melbourne Office</u> : +61 (0) 3 8605 7666 <u>Sydney Office</u> : +61 (0) 3 8605 7666
<b>Twitter</b>	WSAA: @wsaa_water Adam Lovell: @admlovell





**Japan Water Works Association**

**4-8-9, Kudan-Minami, Chiyoda-ku, Tokyo 102-0074, JAPAN**  
**TEL +81-3-3264-2307 Email [kokusai@jwwa.or.jp](mailto:kokusai@jwwa.or.jp)**