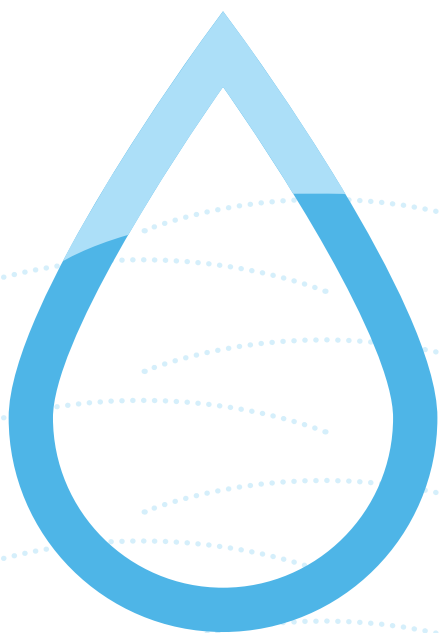


The world-renowned
water of Seoul

Arisu



Arisu is the old name for the Han River and
the current name of Seoul's brand of tap water.
It is a combination of Ari , a Korean traditional word meaning
'big' and Su , meaning 'water.'

Overview



Arisu is the tap water supplied to the 10 million people of Seoul.

The city's tap water, which boasts 108 years of history, is acclaimed as world-class tap water as a result of meticulous management and continued innovative efforts.

Arisu at a glance

As of the end of 2015

Supplied to a total of
10,300,000 people

Budget: **772** billion won
(2016)

Tap water pipeline
13,697km

Percentage of households
supplied with tap water: **100%**

Tap water rates: **569** won/m³
- Cost: **673** won/m³

Revenue water ratio: **95.2%**
- non-revenue water ratio: **4.8%**

Water production capacity:
4,450,000m³/day
- Highly purified water:
3,270,000m³/day

Daily average per-person
amount of water supplied: **301**l
- **334**l at maximum

102 distributing reservoirs
- Capacity: **2.42** million m³/day

Daily average production
amount: **3,170,000**m³/day
- **3,510,000**m³/day at maximum

6 water purification stations
- Two with a capacity of a
million tons or more

205 pumping stations

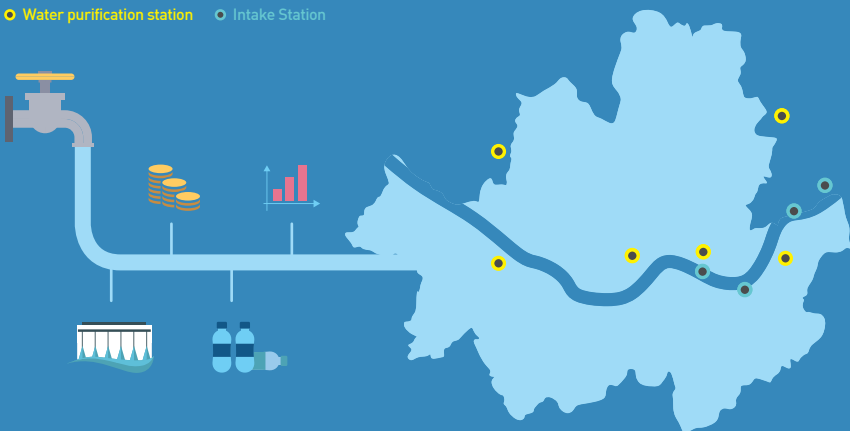
2,121,000 hydrants

2,117,000 water meters

Total asset amount:
5,427.5 Billion won

4 Intakes

● Water purification station ● Intake Station



People at Arisu

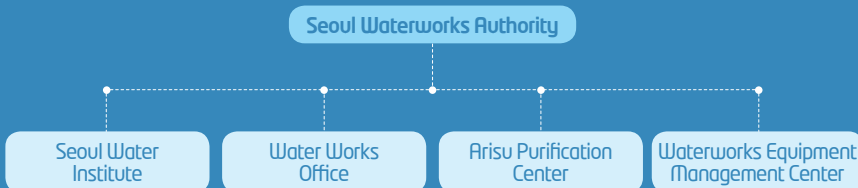
The Seoul Waterworks Authority of the Seoul Metropolitan Government is the country's largest tap water agency, occupying 20% of the country's tap water market. Since its launch in 1989, through efficient management and system improvements the HQ has become a much more efficient organization, and now has 2,000 employees.

Organization

1 HQ (5 divisions), **1** Research Institute, **8** Project Offices,
7 Centers (**6** Water Purification Centers and **1** Material Supply Center)

employees

2,006



Awards received in association with Arisu

- 2009. 06 UN Public Service Award
- 2010. 05 Korean Standard Service Quality Certification (in the area of public administration service)
- 2010. 09 IWA's Project Innovation Award
2010 International Business Awards
- 2012. 08 Quality certification by the National Sanitation Foundation (NSF)
- 2012. 09 IWA's Project Innovation Award
- 2015. 10 Korea Management Grand Award
- 2016. 03 Korea Premium Brand Award
- 2016. 04 Korea Creative Economy Award

History of Arisu

1900s

First introduction of tap water technology

1908 Seoul tap water first supplied to 125,000 people

1960s

Tap water facility expansion

Expansion and improvement of facilities to meet rapid increase in demand amid rapid urbanization and increase in population

1980s

Stabilized tap water supply

1989 Launch of Seoul Waterworks Authority
1991 Tap water ratio 100%
1996 Research of hi-tech water purification/treatment

2000s

Improvement of tap water quality

2001 Production of bottled Arisu water
2004 Registration of Arisu as a trademark
2007 Launch of the Arisu Quality Certification System
2008 Automated round-the-clock water quality monitoring

2010s

Strengthening international competitiveness

2010 Launch of the "Healthy and Good-Tasting Water" Project - Received Project Innovation Award from the IWA (International Water Association)
2012 The world's first bottled tap water to have its quality certified by the NSF - Won the project for provision of consulting for infrastructure construction in PMB Island, Brunei

Arisu, Safe and Good-Tasting Water

The tap water of Seoul boasts a meticulous water quality management and water-tight crisis management throughout the entire system, from the water supply source to faucets in households. The city's tap water supply system maintains the world's highest revenue water ratio through systematic water leakage management, despite unfavorable conditions associated with rugged topography and seasonal temperature differences. We are doing what we can to ensure a stable supply of healthy and clean water to ten million Seoulites.

High-quality technology and policies displayed by Arisu

Meticulous water quality management

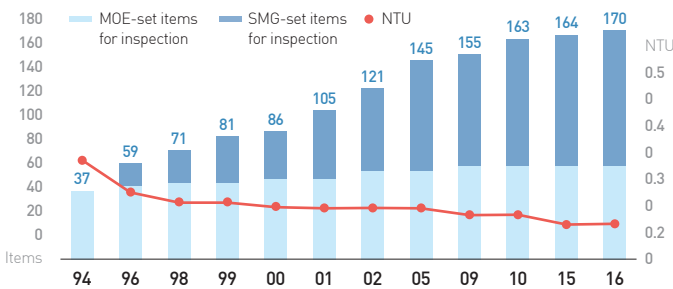
Seoul Arisu aims to be the safest drinking water in the world. We are carrying out 170-item water quality inspections, which is more than what is recommended by the WHO. We check water quality with a focus on five major items: residual chlorine, turbidity, hydrogen ion density, iron, and copper toward 300,000 households each year.

Number of items checked by major countries in water quality inspection

Category	WHO	Seoul	U.S.	Japan	EU
Items inspected	163	170	112	125	52

- Water quality inspection at water supply sources and intake points: 33 spots
- Operation of tidal water/odor warning system: real-time checking of inflow of pollutants
- Water quality inspection more stringent than what is recommended by the WHO: 164 items (2015) → 170 items (2016)
- Periodical water quality inspection at faucets to enhance the percentage of people drinking tap water: 450 spots (more than once a month)

Number of items checked in water quality inspection

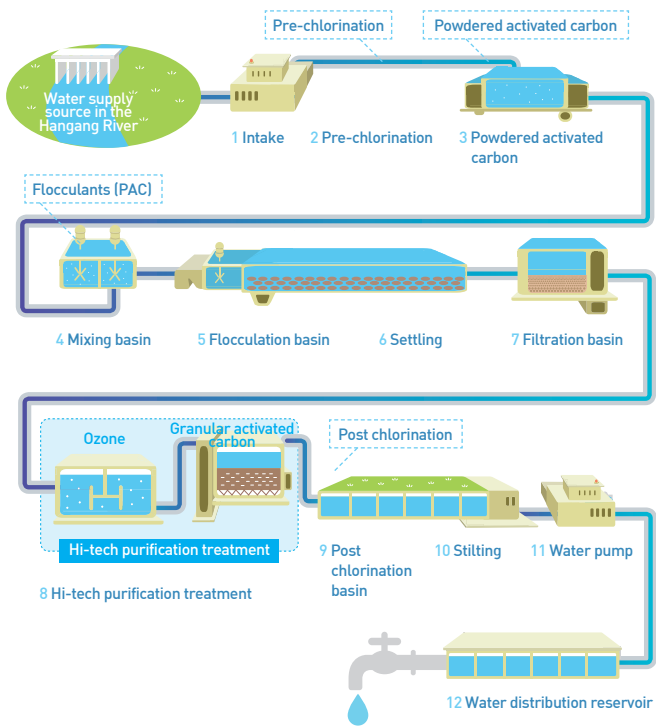


Guidelines for Safe and Refreshing Water

Category	Elements	Unit	MOE-set criteria	SMG-set criteria	Relevant factors
Health related elements	Minerals (Ca, Mg, Na, K)	mg/L	-	20~100	Essential elements for humans
	Total Organic Carbons	mg/L	5.0(an item for watching)	1.0 or less	Removal of disinfection residues for health
	Turbidity	NTU	0.5	0.3 or less	Removal of microbes for health
Flavor related elements	Residual chlorine	mg/L	4.0	0.1~0.3	Odor of chemicals
	2-MIB	ng/L	20(an item for watching)	8.0 or less	Bad odor
	Geosmin	ng/L	20(an item for watching)	8.0 or less	Bad odor
	Copper	mg/L	1.0	0.05 or less	Causing greenish color in water
	Iron	mg/L	0.3	0.05 or less	Causing reddish color, bad odor
	Temperature	℃	-	4~15	Suitable for drinking

High-end technology for making healthy and good-tasting water

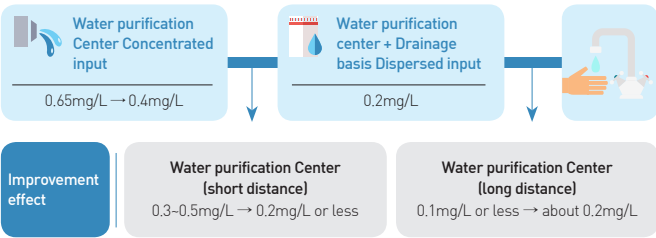
Hi-tech water purification system: Adopted in the six purification stations in Seoul
Inclusion of ozone and granular activated carbon in the treatment process to get rid of pollutants and unpleasant flavor/odor



- Inclusion of ozone and granular activated carbon in the purification/ treatment process for complete removal of 2-MIB and Geosmin and environmental hormones like antibiotics
- Production of cleaner and safer water with a treatment process using ozone featuring powerful oxidizing strength and activated carbon featuring excellent absorbing strength.

Chlorine dispersed input system

Making it possible to reduce chlorine odor drastically through (twice) dispersed input of chlorine disinfection to raise the percentage of people drinking from tap water.

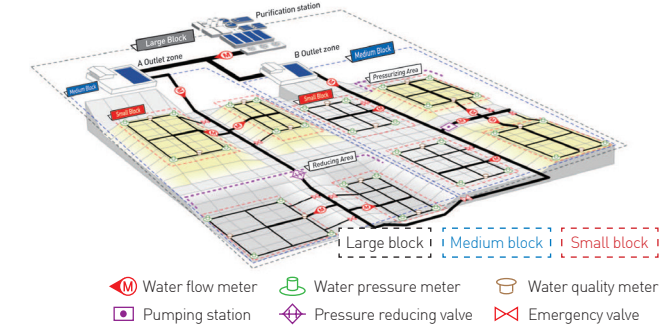


Membrane filtration water purification treatment

This is a method of purifying water by removing impurities from water with the use of membrane as a filtering material. It helps on costs by reducing the use of chemicals like flocculent by more than 50% and simplifies the requirements of operation and maintenance. The SMG had its water purification technology recognized by obtaining eight membrane filtration-related patents.

The world's highest revenue water ratio (95.2%)

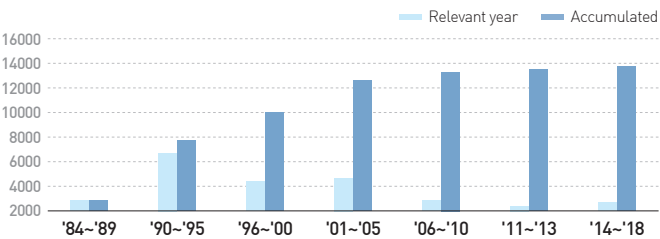
Turing tap water pipelines into blocks
Turning tap water pipelines into 100 small, medium, and large blocks to make it easier to detect leakages and analyze water consumption



Overhaul of tap water pipelines

Old pipelines are replaced with durable and rust-resistant stainless steel and ductile cast iron pipelines (97% of old pipes by 2015).

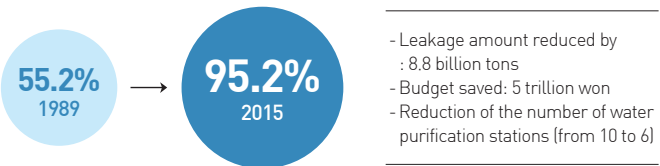
Record of old tap water pipelines replaced



Scientific water supply management

Accurate control of inflow/outflow water amount, using water flow meters and relevant inspection systems

Effects of improvement in revenue water ratio



Membrane filtration water purification treatment (pressurized, immersed)

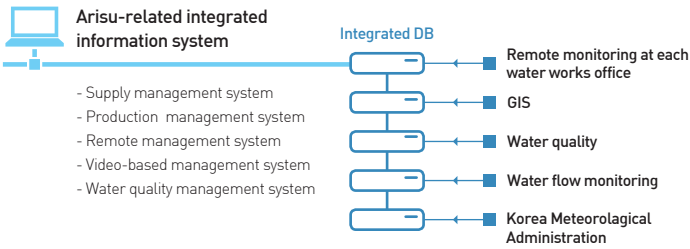




Scientific and systematic operation system based on information technology

Arisu-related integrated information system

This system makes it possible to monitor tap water facilities with surveillance cameras and hold video conferences between water works offices in case of an incident. It can go a long way to reduce production cost through integrated operation of the operation systems at different water works offices.



Seoul Water Now System

Being able to cope with a crisis situation through real-time water quality inspection/management in all areas, ranging from water supply source to purification stations.

Tap water-related GPS (Global Positioning System)

Contribution to prevention of incidents through accurate analysis of information on tap water facilities in Seoul

- Scope of collection of materials : Intakes, water purification stations, basic environment-related facilities, Source water protection areas
- Major functions: Designation of source water collection areas, designation of source water protection areas, water quality management, provision of information on areas subject to interruption of water supply, setting up a plan for leakage protection projects, forecast of required water supply amount



Mobile Arisu

Going a long way to enhance the image of Arisu through smooth communication with people by listening to their complaints on a real-time basis and providing tap water-related information, including notices of interruptions in water supply and warnings against freezing of water meters in winter.

Arisu-related patented technology

- International patent for up flow-type ozone-contacting reservoir for removal of residual ozone(China and Japan)
- Operation mode selection device using water quality grading code of membrane separate purification stations
- Flocculation-based pre-treatment process control device by means of continued monitoring of membrane fouling index of hi-tech purification devices
- Optional hi-tech pre-treatment membrane filtration treatment device using automated control
- Method of testing membrane integrity using reduced surface tension in hi-tech purification devices
- Selection of pre-treatment process for coding inflow water quality and membrane separate hi-tech

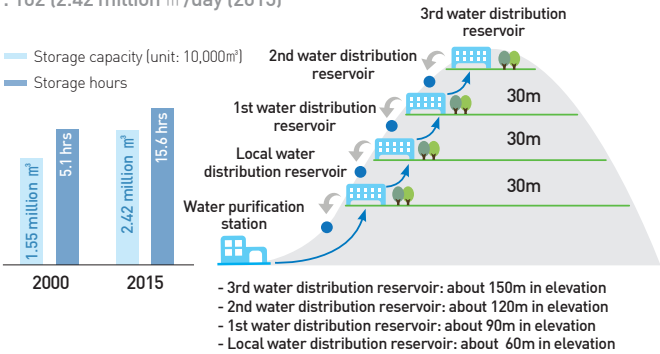
- purification treatment technology
- Pretreatment automatically controlled pressurized-type MF (membrane filtration) and discharging water collection-based submerged-type MF purification technology
- Purification technology, using submerged-type precision filtration membrane
- Baffle used to prevent formation of stagnant water in a clear water reservoir or a distribution reservoir
- Method of preventing corrosion of water supply pipelines, using milky lime sludge
- Method of preventing corrosion of water supply pipelines
- How to supply tapped water, with corrosion put under control

Uninterrupted tap water supply

Operation of an uninterrupted tap water supply system by increasing the number of water distribution reservoirs

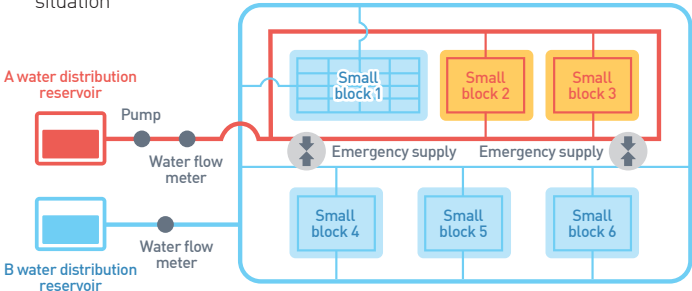
Helping prevent water pipe rupture and makes it possible to continue uninterrupted tap water supply for up to 16 hours even in the case of an incident.

The number of water distribution reservoirs increased to : 102 [2.42 million m³/day (2015)]



Establishment of dual pipeline system

pipeline system between water purification stations to cope with a crisis situation



Arisu making waves worldwide

We at the SMG are pushing forward with collaborative projects with cities around the world to share our years of accumulated experience in water supply operation and high-end technologies. We were awarded a project for provision of consulting concerning infrastructure development in PMB Island, Brunei in July 2012, and are carrying out water supply-related projects in 20-plus countries, including Peru and Vietnam. Our partner countries welcome our efforts for mutual collaboration in water supply-related projects.



A project for provision of consulting concerning infrastructure development in PMB Island, Brunei



Awarded the project in July 2012
Client The Brunei Industrial Development Authority
Project amount 13.5 billion won
Project period 2012~2018
Method of promotion
 formation of a consortium including private businesses
The SMG's role
 Supervision and operation together with Saman Co.

Project content

Consulting on the development of infrastructure, including bridges, access roads, tap water pipelines, communications, and power lines on PMB Island

- Construction of 2.8km-long bridges and 5.0km-long access roads
- Supply of potable water (400m³/day) + industrial water (2,000m³/day)

Major water supply-related projects carried out by the SMG in foreign countries



Water supply projects carried out by the SMG in cooperation with private businesses

- A project for provision of consulting concerning infrastructure development in PMB Island, Brunei (2012)
- Feasibility study designed to improve the performance and revenue water ratio of a water purification station in Java, Indonesia (2014)
- Feasibility study for improving water supply facilities in Port Moresby, Papua New Guinea (2014~2015)



Diagnosing water supply facilities in cities of foreign countries using Korean experts

- Dispatching experts to cities (including the following) in foreign countries to diagnose their water supply facilities and provide consulting
- Port Moresby, Papua New Guinea (2012 and 2014)
 - Hải Dương Province, Vietnam (2015)



Signing MOUs with cities of foreign countries for collaboration in the water supply sector

- Eight institutions, including the Metropolitan Waterworks Authority of Bangkok



Provision of support for water supply facilities in underdeveloped countries

- 2013 - Chanchamayo, Peru
- 2016 - Thừa Thiên-Huế Province, Vietnam



Carried out a training session on water supply policy for relevant officials from cities in foreign countries

- Three times a year for water supply-related officials and engineers (six night/seven day-schedule for each team of approximately 15 people)
- Introduction of the SMG's water supply-related policies, inspection of relevant facilities, discussion on how to increase collaboration



Operation of the Arisu Globalization Forum

- The forum is composed of experts and scholars with research expertise on the promotion of water supply works in foreign countries

Project for improvement of water supply facilities in Chanchamayo, Peru (ODA)



Project period 2013~2018

Project characteristics

The SMG's first project for provision of support for a city in a foreign country using ODA

Status of promotion

Phase-1 of the project completed with SMG technology and Korean-made materials; People of San Ramon can now safely drink tap water.

Project content

- Phase-1 (2013~2015) - Improvement of water supply facilities in San Ramon: repair of intake facilities (3,530m³/day), improvement of water conveyance lines (HDPE 3,091m), construction of a water purification station (3,000m³/day)
- Phase-2 (2016~2017) Improvement of water supply facilities in La Merced
- Phase-3 (2018) Improvement of water supply facilities in Pichanaki

Seoul Waterworks Public Private Partnership(SWPPP)

We at the SMG operate a council of private/public sector ventures (with leading private businesses participating) making forays worldwide. The 33 participating private businesses specializing in five sectors are working collaboratively with us for the exploration of overseas projects, setting up appropriate strategies, and exchanging information.

Private businesses taking part in the SWPPP

Consulting

	GCUS Engineering Studio	02-2633-4953 namasiteel@naver.com	Development of water supply/sewage projects, consulting
	Rothwell Water Tech Glocal rothwell.co.kr	070-7011-5403 northpole.kr@gmail.com	Water works project management, technological development, consulting
	East West EnC Co., Ltd ewenc.co.kr	070-4849-5166 yonghee05@hanmail.net	Attraction of overseas investors, consulting

Design

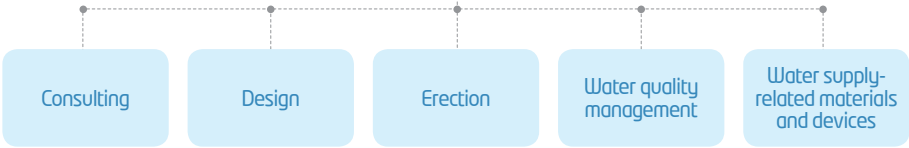
	PYUNHWA Engineering Consultants LTD. pec.kr	031-420-7382 kmlee@pec.kr	Construction business consulting, design, supervision
	Dohwa Engineering Co., Ltd. dohwa.co.kr	02-6323-3413 leesi@dohwa.co.kr	Construction business design, management, EPC, O&M
	DONG MYEONG Engineering Consultants&Architecture dmecc.co.kr	02-6211-7435 sigipus66@naver.com	General architecture, water supply/ sewage design
	Saman Corporation samaneng.com	02-3424-4290 port9@hanmail.net	General engineering, construction business management, CM, survey, operation, management
	SOOSUNG ENGINEERING Co.,LTD. soosungeng.com	02-2142-9320 overseas@soosungeng.com	construction business consulting, design, supervision
	Korea Engineering Consultants Corp. kecc.co.kr	02-2049-2610 dochoongho@hanmail.net	construction business consulting, design, supervision, contractual work
	Hankuk Engineering Consultants hankukeng.com	031-420-5803 pdheuy@empal.com	construction business planning, design, management

Erection

	DAELIM Industrial Co.,Ltd. daelim.co.kr	02-2011-8656 20140182@daelim.co.kr	Design, erection, project exploration, planning, investment, financing, operation, management
	KDC Korea Development Corporation kdc.co.kr	031-420-9956 jtlm0219@kdc.co.kr	Civil engineering work; industrial plant construction
	Doosan Heavy Industries & Construction portal.doosan.com	02-513-7592 kyunghyun.byun@doosan.com	Water industrial plant
	DAEWOO E&C daewooenc.com	02-2288-2889 taehoon.kim@daewooenc.com	General construction
	SanYang Construction Co.,Ltd.	02-553-9270 san9270@hanmail.net	General construction

Co-chair of the private/public sector venture

Seoul Waterworks Authority



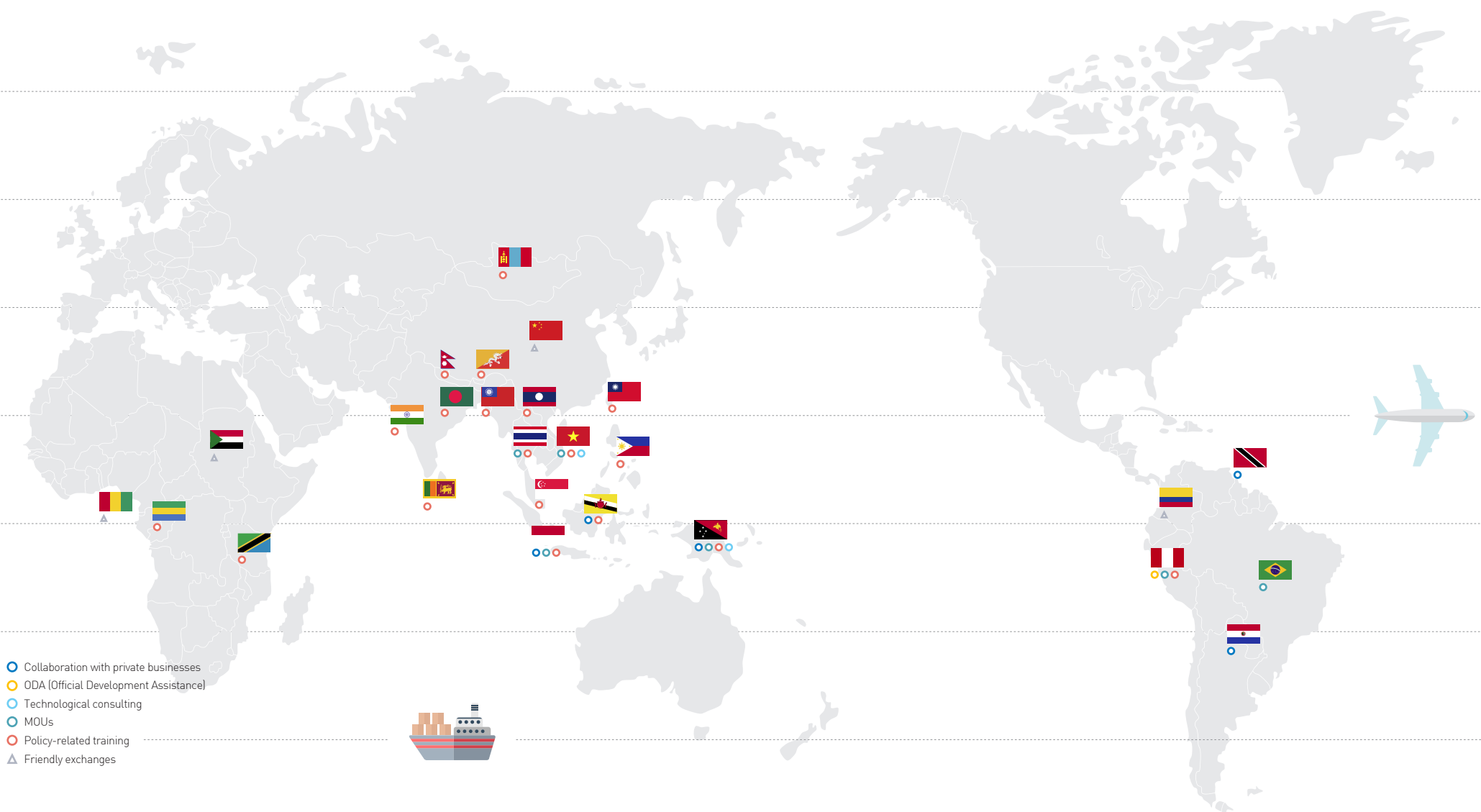
<http://cafe.daum.net/seoul.waterworks>

Water quality management

	GeoMarine Corporation geomarine.kr	02-422-8384 lakeflo@geomarine.kr	Water supply/sewage design, contractual work, water supply source pre-treatment, water quality management, plant for removing green/red tide
	Da All.Eng. Co., Ltd daalleng.kr	02-859-8491 tyshin12@hanmail.net	Online water quality measuring equipment (for turbidity, pH, residual chlorine, conductivity, dissolved oxygen, etc.)
	Toray Chemical Korea Inc. toray-tck.com	02-3279-7359 ben.hur@toray-tck.com	Separation membrane for water treatment, water filter (RO, NF, UF, MF)
	DAEYANG ENBIO CO.,LTD dyenbio.com	02-6309-7700 4rang0518@hanmail.net	Sewage treatment plant operation and management
	Water Resources Engineering Corporation wareco.co.kr	031-724-5325 kwon8801@hanmail.net	Water supply pipeline diagnosis equipment (pipe inspection cameras)
	CHUNG-HO ENVIRONMENT DEVELOPMENT cheongho.net	062-526-9640 si@cheongho.net	Water purification, artificial wetlands, water circulation devices

Water supply-related materials and devices

	SEOKWANG MFG.CO.,LTD. skvalve.co.kr	031-709-1430 skvalve@chol.com	Butterfly/ball valves
	GoBee Co., Ltd. ab3p.com	02-585-9190 gobee.info@gmail.com	Multiple-walled earthquake-resistant water pipes
	SAMJIN PRECISION CO.,LTD samjinvalve.com	042-672-3600 dhchoi@sjv.co.kr	Valve parts
	SHIN AN CAST IRON Co.,LTD. shinanpipe.co.kr	043-743-1090 shinan1090@daum.net	Ductile cast iron pipe and accessories
	SSENG sseng.co	051-304-3531 pdj@sseng.co, lwj@sseng.co	Pore control fiber filter, container-type water treatment facilities
	JAINECHNOLOGY jain.co.kr	02-856-4114 bkkim390@gmail.com	Water flow meter (ultrasonic, portable, solar energy)
	PPI PIPE SYSTEM ipvcpipe.com	031-463-6300 hongsw@ppinet.co.kr	PVC water supply/sewage pipes, standpipe (firefighting)
	HITEC EPC CO.,LTD. hitecepc.com	02-3012-2900 ysoo5712@hitecepc.com	Water meter, automated water meter, remote automated meter reading system
	HANGUK BIG TECHNOLOGY CO.,LTD. leak.co.kr	031-611-9852 leak@leak.co.kr	Leakage detection equipment/system, technological diagnosis
	Korea Cast Iron Pipe kcip.co.kr	02-565-4900 kcip1@hanmail.net	Ductile cast iron pipes, steel pipes for water works
	HANSEO PRECISION METER Co.,LTD hsmeter.com	031-997-1445 hanseo@hsmeter.com	Water meter, hot water meter, heat meter
	HYORIM INDUSTRIES INC. hyorim.co.kr	070-7492-2320 leejm@hyorim.co.kr	Water supply/sewage materials and equipment



Projects currently promoted	Completed projects	Consulting on water supply-related technology	MOUs signed for collaboration	Training session for water supply-related policies
<p>PMB Island, Brunei Provision of consulting for infrastructure development - 2012~2018</p> <p>Chanchamayo, Peru Improvement of water supply facilities (Phase-2 for La Merced) - 2016~2017</p> <p>Cities in Vietnam Improvement of water supply facilities - 2016</p>	<p>Java, Indonesia Feasibility study for improvement of a water purification station - May 2014 ~ Dec. 2015</p> <p>Port Moresby, Papua New Guinea Feasibility study for improving water supply facilities - July 2014 ~Mar. 2015</p> <p>Chanchamayo, Peru Provision of support for water supply facilities (Phase-1: San Ramon) - 2013~2015</p>	<p>Port Moresby, Papua New Guinea - 2012 and 2014 (twice)</p> <p>Thừa Thiên-Huế Province, Vietnam - 2015</p> <p>Hải Dương Province, Vietnam - 2015</p>	<p>- Metropolitan Waterworks Authority Bangkok, Thailand (May 2012)</p> <p>- City of Ribeirão Preto, Brazil (June 2012)</p> <p>- City of Mogi Mirim, Brazil (June 2012)</p> <p>- City of Pícsi, Peru (June 2012)</p> <p>- City of Chanchamayo, Peru (June 2012)</p> <p>- PNG Waterboard Services, Papua New Guinea (July 2012)</p> <p>- Java Waterworks, Indonesia (September 2014)</p> <p>- Thừa Thiên-Huế Province Waterworks, Vietnam (March 2015)</p> <p>- Junin Province, Peru (April 2015)</p>	<p>16 countries in Asia (59 people) Vietnam (14), Indonesia (9), Bangladesh (10), Philippines (4), Nepal (2), Laos (2), Taiwan (3), Brunei (3), Cambodia (2), Singapore (2), Mongolia (2), Myanmar (2), Thailand (1), India (1), Bhutan (1), Sri Lanka (1)</p> <p>One country in South America (16 people) Peru (16)</p> <p>Two countries in Africa (3 people) Tanzania (2) and Gabon (1)</p> <p>One country in Oceania (2 people) Papua New Guinea (2)</p>

The water made by Seoul
supplied around the world

Arisu

**The Seoul Waterworks Authority of
the Seoul Metropolitan Government**

51, Seosomun-ro, Seodaemun-gu, Seoul

[Phone +82-2-3146-1206 Website www.arisu.seoul.go.kr]