

Case Study 1. Collaboration among Water Utilities: Japan Water Works Association

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1. Introduction

Japan Water Works Association (JWWA) plays an important role in the water supply industry in the country. This module explains the history of the organization, its roles, activities and financial structure. Table 1 summarizes the background on the founding of JWWA and its activities.

Table 1. History of Japan Water Works Association

Year	Activities	Social situation	Phase
1904	1st meeting of Federation of Water Authorities held under the theme of "Standardization of water testing methods" (5 attendees from 6 member cities)	Russo-Japanese War started	The early period of modern water supply development
1905	2nd meeting of Federation of Water Authorities (meetings were held annually until the 28th in 1931)	Russo-Japanese War ended	
1914	"Specifications for Cast Iron Pipe for Water Supply" (prior to JWWA standards) was established.		
1932	Water Works Association founded, held 1st board meeting and general assembly. The first issue of <i>Journal of Japan Water Works Association</i> was published. (132 member utilities)	Shanghai Incident	
1933	Standing committees were formed.		
1934	Inspection service for iron pipes started.		
1941		Japan entered WW II	Expansion of modern water supply system
1945		Japan surrendered	
1946	"Water Leakage Prevention Guidelines" was developed.	The GHQ occupation and chlorination of drinking water started	
1947	(298 member utilities)	Enforcement of the constitution of Japan	
1952		Enactment of Local Public Enterprise Act, US-Japan Status Treaty, end of the GHQ occupation	
1953	Printed and distributed "Water Supply Facilities Maintenance Manual" developed by the Ministry of Health and Welfare. Published "Seismic Design and Construction of Water Supply Facilities"	High Economic Growth	
1955	Joined International Water Supply Association (IWSA, current IWA) as a corporate member.		
1956	Water Works Association changed its name to Japan Water Works Association (605 member utilities)		
1957		Water Supply Act	
1958	Started training programs. Published "Guidelines for Water Supply Facilities Standards"		
1973	(1,438 member utilities)	Oil Crisis (called "Oil Shock")	Focus on the Maintenance and Management
1980	Published "Guidance for Seismic Design and Construction"		
1988	Cooperative research with American Water Works Association (AWWA)		
1991	Launched Training and International Department (Training Center, International Division)		
1995	Great Hanshin Earthquake emergency headquarters established.	Great Hanshin-Awaji Earthquake	
1996	Published "Report on Response to Earthquakes and other Emergencies"		

Year	Activities	Social situation	Phase
1997	Launched Quality Certification Center, started qualification certification service.		
2004	(1,902 member utilities)		
2006	Revision of " <i>Water Supply Facilities Maintenance Manual</i> " (5th edition)		
2007	Revision of " <i>Manuals for Earthquakes and other natural Disaster Emergencies</i> "	Chuetsu Offshore Earthquake	
2009	Revision of " <i>Seismic Design and Construction Guidelines</i> " (4th edition)		
2011	Established Emergency Management Headquarters for the Great East Japan Earthquake		
2012	Publication of " <i>Design Criteria for Water Supply Facilities</i> " (5th edition)	The Great East Japan Earthquake	
2013	Revision of " <i>Manuals of Emergency in Earthquake and Disasters</i> "		

* The items in red character are written in main text. The items in other colors are manuals and guidelines which are published and revised by JWWA.

2. Establishment of Japan Water Works Association

The Federation of Water Authorities, predecessor of Japan Water Works Association was established in 1904, as utilities struggled with efficient management during the early period of modern water supply development. Utilities came together for the first time to discuss water quality testing methodologies.

In Japan, the first modern water supply system was built in Yokohama in 1887, followed by ones at the Sasebo Naval Station and Hakodate City in 1889 and at the Kure Naval Station in 1890. Other developments followed in Nagasaki City (1891), Osaka City (1895), Hiroshima City (1898), Tokyo City (1898), Kobe City (1900), Okayama City (1905), and Shimonoseki City (1906).

At this very early stage, engineering expertise came from abroad. Japanese engineers with no knowledge of advanced water supply technologies learned from translated textbooks and by attending workshops organized among utilities.

Despite the challenges, a modern water supply system was established across the country. Outbreaks of cholera decreased but waterborne diseases were still prevalent, as slow sand filtration and pressurized distribution was used without chlorination at the time.

Each utility worked on its own to develop water quality standards and testing methods. There was a need to share the information among the utilities. The Federation of Water Authorities was established in 1904 as an initiative of utilities such as Tokyo City and Yokohama City, with no prompting by the national government. Its voluntary membership was open to cities with modern water supply systems. It evolved to become Japan Water Works Association that exists today.

At the first meeting of the Federation in 1904, five member cities attended and agreed on a set of water quality testing methods. At the next meeting in the following year, they discussed treatment and distribution technologies and administrative procedures. This voluntary formed federation became the foundation of JWWA, and its members were water utilities, which developed modern water supply system at the time.

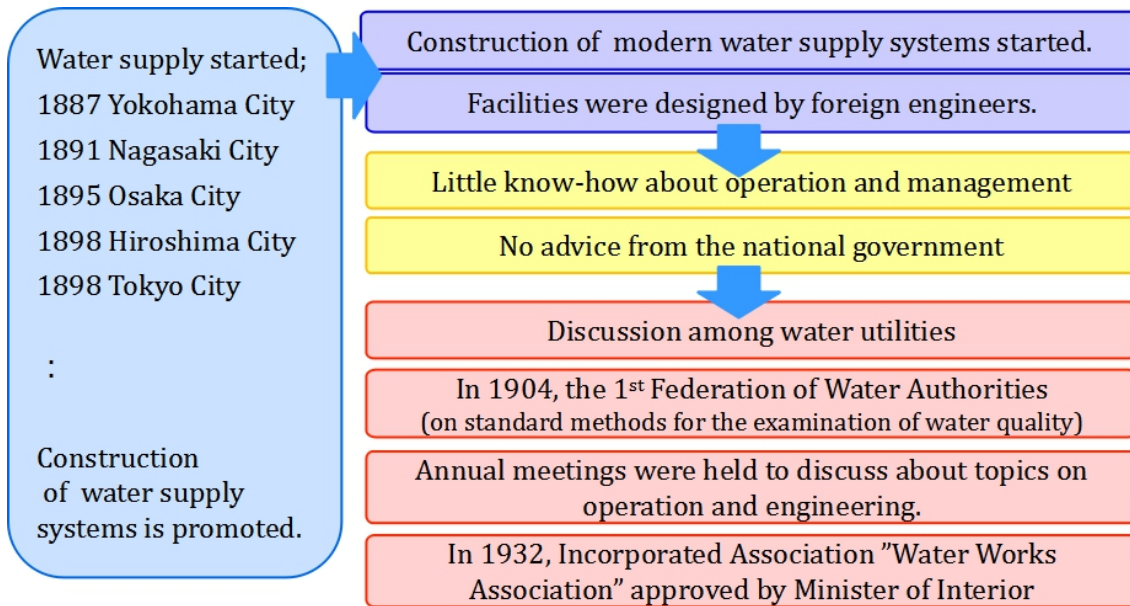


Figure 1. History of JWWA's Establishment



Source: JWWA, *One Hundred Years' History of the Federation of Water Authorities and Japan Water Works Association* (2004).

Photo 1. Attendees of the 11th Meeting of the Federation of Water Authorities (1913)

When the Waterworks Ordinance was issued in 1890, the national government was preoccupied with other regulations and not able to provide guidance on water quality testing and other water supply management technologies to the utilities. Utilities had to solve their own water treatment, distribution, operational and management issues. They set up the platform for information exchange.

At early meetings, members discussed common issues concerning water supply management. The host city covered the cost of the annual meeting. After ten years, as the number of member cities increased to 48, the cost of meeting became too high to be covered by the host city alone. The Federation started to collect membership fees and hired full-time staff (full-time directors, retired utility staff) to organize the regular meetings.

The Federation obtained the Home Minister's¹ approval in 1932 to become a public interest incorporated association, and was renamed Japan Water Works Association.

¹ The Home Ministry was changed to the Ministry of Home Affairs in 1947.

3. Activities of Japan Water Works Association

(1) History of JWWA Activities

Japan Water Works Association engages in a wide range of activities, such as developing standards for materials and equipment, water quality testing, training, and quality certification. The activities are carried out according to requests from water utilities and the government.

The Federation of Water Authorities worked on matters regarding water supply management as the needs arose and based on requests from the utilities. In 1914, it designed the *Specifications for Cast Iron Pipe for Water Supply*, which later became JWWA standards. The standardization of the specifications of water pipes was very much needed by the utilities at the time.

JWWA published the first issue of the *Journal of Japan Water Works Association* in December 1932, the year it was granted the status as a public interest incorporated association. It contained research articles, reports on experiences of different water supply systems, and abridged translations of overseas materials. While the main focus is academic research, members also use it to exchange information on problems and solutions they encounter in their operations and management activities.

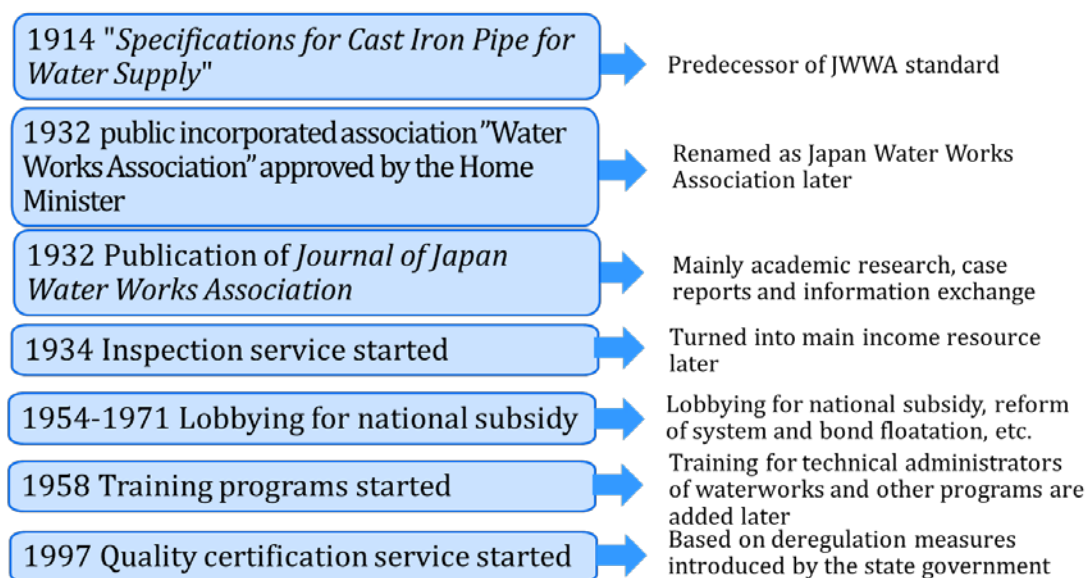


Figure 2. History of JWWA's Activities

Every utility on its own used to inspect manufacturing facilities across the country from which it sourced its products. In 1934 JWWA started to conduct product inspection on behalf of the utilities. This service represents a standardized approach to determining product quality and saves the utilities a lot of money and time. JWWA had to increase its staff dramatically to carry out this service.

After World War II, JWWA devoted substantial efforts in lobbying the government on behalf of the utilities. One such effort helped to reinstate subsidies in 1967 for development of water resources and construction of facilities, which were abolished since 1954. JWWA works with lawmakers and government agencies to support the utilities in implementing activities to meet policy objectives set out by the government.

JWWA made efforts to reinforce government administrative systems relevant to its members as well as successfully established water supply courses at universities in the countryside.

JWWA lobbied the Ministry of Home Affairs² to ease utilities' access to bond financing for capital requirements. They argued for extending the bond maturity period to match the useful life of water supply pipes. In 2001, a part of the Local Public Enterprise Act was revised, to declare a 40-year lifespan for domestic and industrial water service pipes of any material. Today, the bond maturity period for financing of water supply pipes is up to 40 years. JWWA submits requests from utilities to the government on matters such as interest rates and budget allocation.

The Water Supply Act (1957) requires every utility to have a qualified technical administrator. JWWA started to conduct seminars for the training of technical administrators at the request of the Ministry of Health and Welfare³ in 1958. Since then, JWWA has been organizing a wide variety of seminars and workshops.

JWWA increased its staff for product inspections as the economy entered into the period of high growth. The Water Works Engineering General Institute was established in 1994 for research and development of technical issues on water supply. The head of the institute was from one of water utilities, and the secretariat consisted of personnel on secondment or hired directly from the utilities. In 1970, JWWA had approximately 300 personnel, and material inspectors were located all over the country.

The regulations on service connections were revised as a part of the deregulation measures introduced by the government in 1996. In response, JWWA opened the Quality Certification

² The Ministry of Home Affairs was merged into the Ministry of Internal Affairs and Communications with other ministries in 2001.

³ The Ministry of Health and Welfare was merged with the Ministry of Labour to form the Ministry of Health, Labour and Welfare in 2001.

Center and started quality certification of service connection facilities in 1997.

(2) Committees

JWWA has committees and task forces dedicated to specific fields to keep abreast of global trends on technological and administrative issues.

Among the committees, the most notable ones are the Management Standing Committee, the Engineering Standing Committee, and the Water Quality Standing Committee. They conduct research on water utilities management, water supply technologies, and water quality management. Sometimes specific committees and task forces are established under this framework to coordinate research and development.

Other committees include the Publications Committee, the Inspection Committee, the International Committee, IWA (International Water Association) Japan committee, and the ISO/TC224 Japan National Committee. In addition, special task forces are formed on an ad-hoc basis.

The members of these committees are experts from water utilities of large cities. Their travel expenses for attending committee meetings are paid by their employers. Their participation is voluntary based on their interest in improving the water supply systems in Japan.



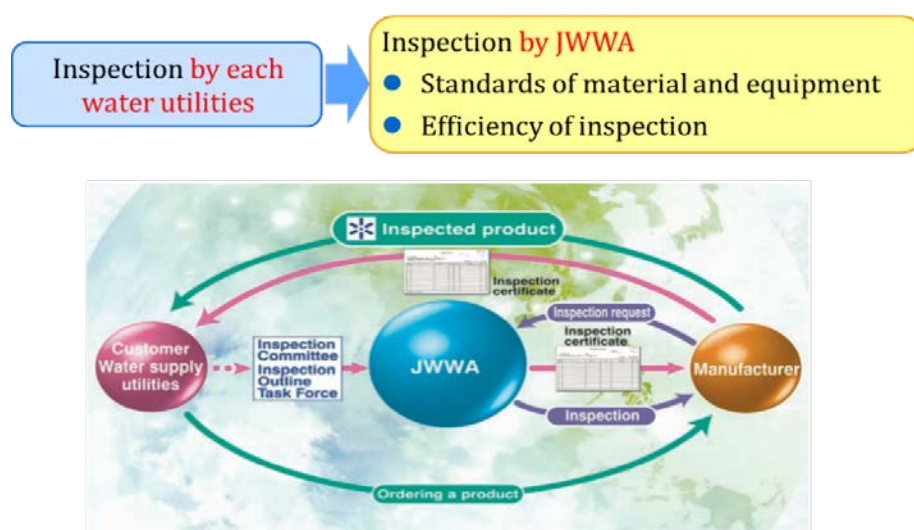
Figure 3. Activities of Committees

(3) Product Inspection Service

JWWA conducts factory inspections to confirm that products meet JIS (Japanese International Standards) and JWWA standards and order specifications. This service improves the business efficiency of member utilities and generates revenue for JWWA to support other activities.

In spite of the specifications (mostly for iron pipes) set by the Federation of Water Authorities in 1914, the quality of materials and equipment was still not always uniform. Each water utility conducted its own factory inspections of the products they ordered. Independent inspections were felt necessary also because city logos and control numbers were specific to orders from each utility. These inspections were eventually brought under one operation managed by JWWA. This resulted in huge cost savings for the utilities, and at the same time, standardized and improved the efficiency of the inspection process.

The JWWA inspection service became even more practical when the industry started to adopt a wide range of new materials. JWWA organized the standards for the new materials and set the required inspection process as the technology advances. JWWA has been conducting strict and fair inspections, to ensure that the supply of quality materials and equipment meets the requirements specified in the Water Supply Act.



Source: JWWA, *Profile Public Interest Incorporated Association Japan Water Works Association*, http://www.jwwa.or.jp/jigyoku/kaigai_file/JwwaProfile2015.pdf

Figure 4. Inspection System for Water Supply Materials and Equipment

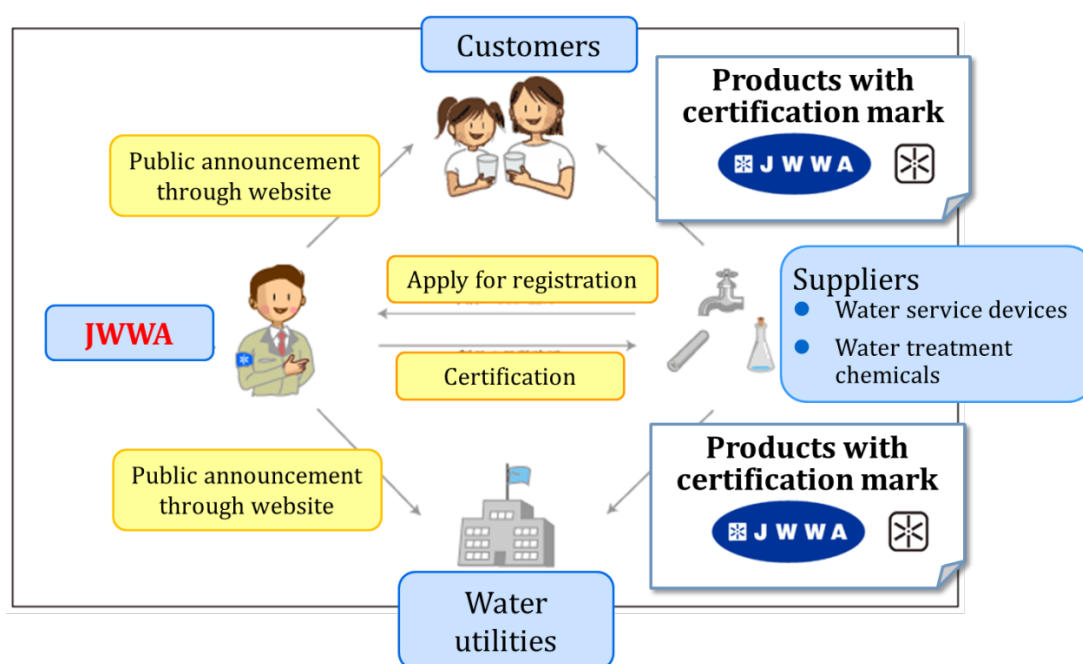
JWWA is a registered certification body recognized by the Japan Industrial Standards (JIS), based on the “Conformity assessment - Requirements for bodies certifying products, processes and services” (ISO/IEC 17065/JIS Q 17065). The inspection fee paid by the manufacturer is a source of revenue for JWWA.

(4) Quality Certification Service

JWWA conducts quality certification of water supply equipment and chemicals. JWWA evaluates the products' compliance to standards specified in the Ordinance of Ministry of Health, Labour and Welfare. Products that meet the standards are registered before they come on the market.

The Ministry of Health, Labour and Welfare sets the standards for water supply devices and materials used in water supply operations. These standards include device/equipment structure, types of material, performance (e.g. proof pressure, elution rates), and quality (e.g. amount of impurities in chemicals such as chlorine). All materials must comply with the standards.

The JWWA Quality Certification Center was established in 1997 to check whether water supply related products meet the standards specified by the Ordinance of the Ministry of Health, Labour and Welfare. It evaluates the products based on requests from manufacturers and registers the products that meet the standards. The registered products are then checked for their quality. Approximately 2000 products per year pass the check and receive the certification stamp.



Source: JWWA, *Business outline*, http://www.jwwa.or.jp/Center/02gyom/main02_1.html

Figure 5. Quality Certification Process

(5) Training Programs

JWWA provides training programs to develop human resources in the industry.

The training programs started in 1958, and since then have expanded to cover subjects in the operational and the technological aspects of the water supply industry. Today, there are 14 programs and 48 sessions, attended by more than 3,000 fee-paying participants every year. These programs are not limited to JWWA members and are open to workers from small-scale water utilities and administrative personnel from local governments. They contribute to improved administrative and engineering capabilities of water supply businesses across the country.

Table 2 shows the training programs provided annually by JWWA. Other programs are added when there are changes in the Water Supply Act or the Drinking Water Quality Standards.

Since 1968 JWWA started to provide training programs for developing countries as requested by JICA. As of 2011, the total number of participants from 92 countries reached 548.

Table 2. Training Programs Conducted by JWWA (in 2016)

	Title	Target Participants
Administrative	Workshop for appointed waterworks managers	Waterworks managers of regular members and supporting members
	Workshop for newly appointed waterworks managers	Newly appointed waterworks managers of regular members
	Workshop for administrative tasks of waterworks managers	Administrative managers and assistant managers (or equivalent) of regular members and supporting members
	Workshop on administrative tasks in waterworks	
	1) Management section Course A Course B 2) Labor section	Administrative personnel of regular members (under 3 years of experience) and supporting members Administrative personnel of regular members (over 3 years of experience) and supporting members Mid-level administrative personnel of regular members and supporting members
	Workshop for late payment management	Personnel engaged in tasks related to bill collection, of regular and supporting members
	Seminar on consumption tax practice	Administrative personnel of regular members and supporting members
Administrative and technological	Seminar on the basics of waterworks	Newly appointed administrative and technological personnel of regular and supporting members
Technological	Workshop for water technology manager	Technical Administrator for Waterworks of regular members and supporting members
	Workshop on water leakage prevention	Technological personnel of regular members and supporting members
	Workshop for technological practice for water treatment plants and other facilities	Technological personnel of regular members
	Workshop for water engineers Course A Course B	Technological personnel of regular members (under 3 years of experience) and supporting members Technological personnel of regular members (over 3 years of experience) and supporting members
	Specialized workshop for water engineers	Mid-level technological personnel of regular members
	1) Design, construction, maintenance and management of water transmission and distribution facilities 2) Advanced water treatment 3) Water service devices 4) Water quality management 5) Water purification facilities 6) Machinery, electricity, and instrumentation facilities	
	Workshop for water engineers, by regional block	Water engineers in cities/towns/villages nationwide and supporting members
	Workshop for the qualification of Technical Administrator for Waterworks	Personnel recommended by her/his immediate manager
	Workshop of water plumbing techniques	Personnel engaged in plumbing or supervising work at water pipes laying
	Workshop for piping design	Personnel in charge of designing the layout of water pipes
	Certification and registration of Water Facilities Managing Engineer	

Source: JWWA, *Training Programs*, http://www.jwwa.or.jp/kensa_index.html

(6) International Activities

JWWA represents Japan in the International Water Association (IWA) and contributes to international cooperation by providing training, dispatching senior technical experts and supporting the establishment of waterworks association in developing countries.

JWWA joined the International Water Supply Association (IWSA) as a corporate member in 1955. JWWA's international activities became well-established when it opened its headquarter office to coincide with the 12th IWSA World Congress held in Japan in 1978. JWWA joined IWSA's Asia-Pacific Group (ASPAC) and conducted cooperative research with the American Water Works Association (AWWA). It established its International Committee in 1987 and an International Department that engages in activities of International Exchange Fund and training programs.

After the International Association on Water Quality (IAWQ) merged to form International Water Association (IWA) in 1999, JWWA participated at IWA board meetings as the Japanese representative in coordination with the Japan Society on Water Environment.

JWWA provides overseas training and sends senior technical experts to developing countries under its own projects and JICA initiatives. It also works with developing countries to establish waterworks associations.

(7) Design Criteria for Water Supply Facilities

JWWA developed the *Design Criteria for Water Supply Facilities*. The document is revised every 10 years and contributes to the standardization of water supply facility design.

Although water supply is indispensable for healthy living, there were no criteria for the design and construction of facilities to ensure reliable supply of safe water until 1955. National standards with a universal set of criteria and minimum requirements were thought to be useful for designing of water supply systems.

JWWA published the *Water Supply Facilities Standards* in October 1955. Adding detailed instructions and illustrations, the *Guidelines for Water Supply Facilities Standards* was published in the first edition of *Design Criteria for Water Supply Facilities* in November 1958. An expert working group revises the document every 10 years. The *Design Criteria* is an

important reference and guide for small- and medium-sized cities where there are few specialized engineers. It contributes to the standardization of water supply facilities nationwide.

In revising the *Design Criteria*, JWWA not only accommodates the requirements of the Ordinance of the Ministry of Health, Labour and Welfare, but also takes into account latest developments including changes in the social environment, water quality issues, and technical needs such as the seismic retrofitting or rebuilding of facilities. JWWA emphasizes flexible requirements to accommodate characteristics in terrain and population density, needs of residents, or capacity for incorporating new technologies in the future. These principles are reflected in the 2012 version that contains the latest technical information.

The *Design Criteria* are based on the know-how of experienced utilities, and have contributed considerably to the development of small facilities in rural areas that do not have adequate knowledge in water supply management. The Design Criteria represent the cumulative knowledge and experience in constructing high standard facilities relevant to utilities of any size.

Column: Revisions of the *Design Criteria for Water Supply Facilities*

Design Criteria for Water Supply Facilities has been revised five times since 1958:

Guidelines for Water Supply Facilities Standards 1958

Guidelines for Water Supply Facilities Standards 1966

Design Criteria and Guidelines for Water Supply Facilities 1977

Design Criteria and Guidelines for Water Supply Facilities 1990

Design Criteria for Water Supply Facilities 2000

Design Criteria for Water Supply Facilities 2012

The Ministry of Health, Labour and Welfare Ordinance issued (in April 2000) for the law on Preparations of Related Laws for Promoting Decentralization, specifies performance based technological requirements for water supply facilities. The year 2000 version of the *Design Criteria* was prepared to give utilities more concrete criteria for water supply facilities design.

(8) *Water Supply Facilities Maintenance Manual*

The *Water Supply Facilities Maintenance Manual* published by JWWA provides updated information on maintenance and management to its members.

The Water Supply Act specifies that the water utilities should continuously and reliably supply clean, safe, abundant and affordable water to consumers. The water supply facilities must be kept in the best condition through appropriate daily maintenance to fulfil this mandate. JWWA publishes the *Water Supply Facilities Maintenance Manual* to provide the basic standard requirements on maintenance and management.

In the 1950s there were several outbreaks of waterborne infectious diseases of the digestive system due to inadequate maintenance and management of the water supply system. The Ministry of Health and Welfare prepared the *Water Supply Facilities Maintenance Manual*, as a measure to prevent future accidents. JWWA printed and distributed the first edition in 1953 and was put in charge of subsequent revisions and publications. The manual was first revised in 1959 and the 5th edition was published in 2006. The latest issue covers topics on third-party commission system allowed under the amendment of the Water Supply Act, revision of Water Quality Standards, enhancement of water quality control, and advanced water treatment technologies such as membrane filtration. The 6th edition is under preparation as of 2016.

(9) *Seismic Design and Construction Guidelines*

JWWA developed the *Seismic Design and Construction Guidelines for Water Supply Facilities* and contributed to the improvement in earthquake-resistant of water supply facilities. The contents are revised regularly to reflect lessons learned after major earthquake occurrences.

Japan is one of the most earthquake-prone countries in the world. Before 1953, no information was available in Japan on earthquake-resistant construction for water supply facilities. On the request from water utilities, JWWA published the *Seismic Design and Construction of Water Supply Facilities* in 1953, and contributed to improving the seismic capacity of these facilities. The guidelines have been revised four times, incorporating the experiences from each earthquake incident. Notably, the *Seismic Design and Construction Guidelines for Water Supply Facilities 1997*, included the analysis of the observations of the 1995 Great Hanshin-Awaji Earthquake, and greatly contributed to the country-wide

development of earthquake-resistant water supply systems.

Its latest edition was published in 2009, and the next revision is under preparation which would incorporate the knowledge obtained from the 2011 Great East Japan Earthquake and the 2016 Kumamoto Earthquake.

(10) Disaster Response

When a catastrophic disaster occurs, JWWA liaises with affected utilities to assist with their recovery through systematic coordination of its members.

Since the Great Hanshin-Awaji Earthquake, JWWA has been enhancing its disaster response coordination. In 1996, it published the *Report on Response to Earthquakes and Other Emergencies* based on the experience of emergency support activities. The report sets the rules for support activities among water utilities across the country.

These rules were developed into the *Manual for Earthquakes and Disasters Emergencies* 2008. The manual drew on experiences from the Chuetsu, Noto and Chuetsu offshore earthquakes and called for the establishment of a system in which the Ministry of Health, Labour and Welfare, prefectural and municipal governments, and JWWA would coordinate activities for swift, effective and well-organized response. JWWA uses the knowledge obtained from the Great East Japan Earthquake of March 2011, for the revision of the manual and training programs on responses to natural disasters affecting a wide region.

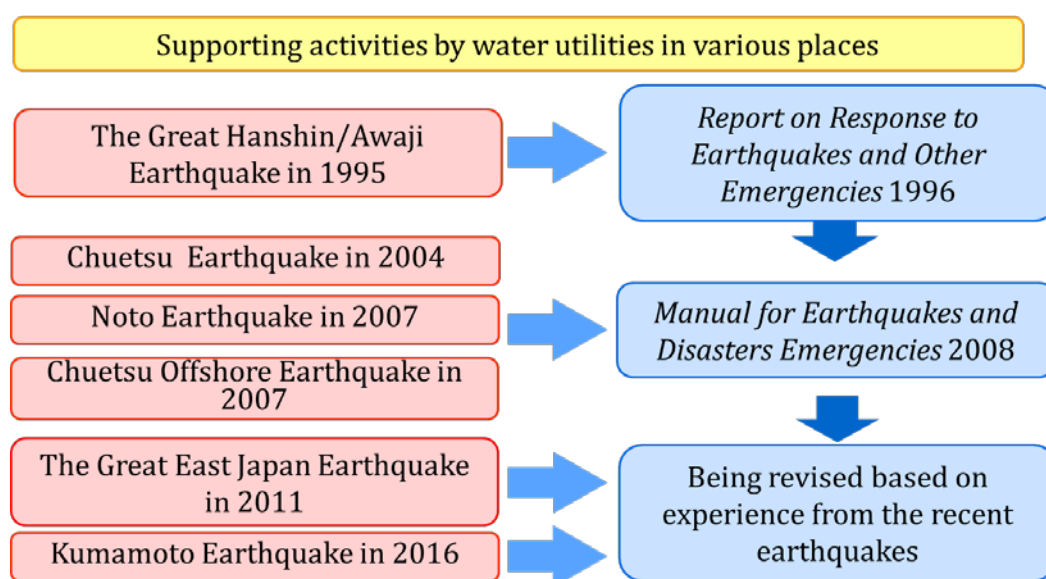


Figure 6. History of JWWA's Disaster Response Effort

“Suido Ikka” (Water Works Family)

The term “Suido Ikka” (Water Works Family) is used when talking about how water utilities nationwide help facilities and regions affected by a natural disaster by dispatching personnel and/or water trucks to provide emergency water supply. In the Nihon Suido Shimbun, the headline of the article on the April 2016 Kumamoto earthquakes, read: “Hurry, ‘Suido Ikka,’ to the Disaster-Hit Area! – Utilities Nationwide Formed an Aid Team.”

This is an affectionate reference to the water supply services, noting the importance of the service to people’s everyday lives, the shared goal to provide stable reliable supply of safe water and the extraordinary mutual support among the utilities. This was exemplified during the period of rapid economic growth, when the personnel from different water utilities worked as one team, for one goal. JWWA is the embodiment of the idea of “Suido Ikka.”

Member utilities are organized systematically under the JWWA umbrella, with utilities in each prefecture belonging to prefectural branches, which are in turn grouped into 7 regions, except for Hokkaido which operates as a regional branch⁴.

When a catastrophic disaster occurs, JWWA headquarters gathers information on the situation and the needs for support through its regional branches, which in turn obtain the information from the prefectural branches. At the prefectural level, major local branches stay in contact using satellite telephones and pass relevant information to the regional level. This efficient flow of information contributes to the ability to carry out broad-based support activities effectively.

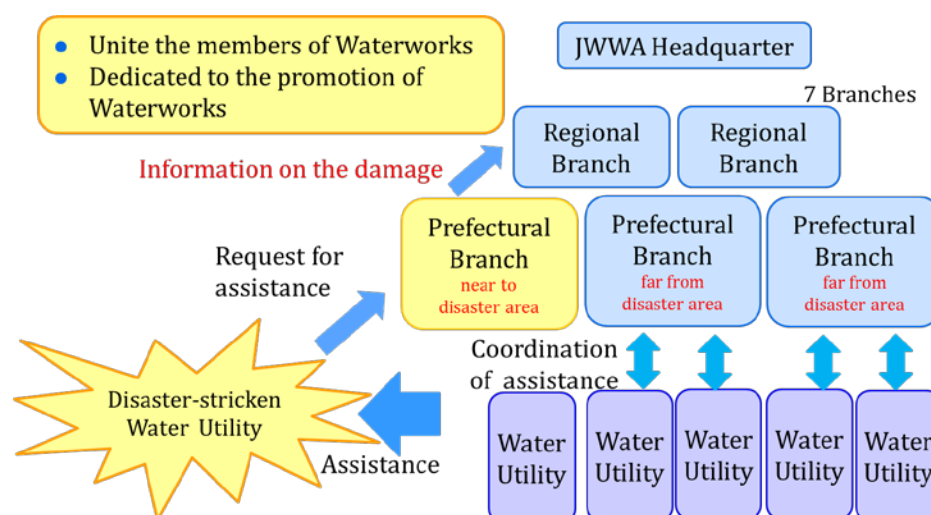


Figure 7. Assistance in the Water Works Family Scheme

⁴ Prefecture is the first level of administrative division of Japan. There are 47 prefectures in Japan and some prefectures form one region. The largest prefecture, Hokkaido forms Hokkaido region by itself.

Emergency Response for the Great East Japan Earthquake

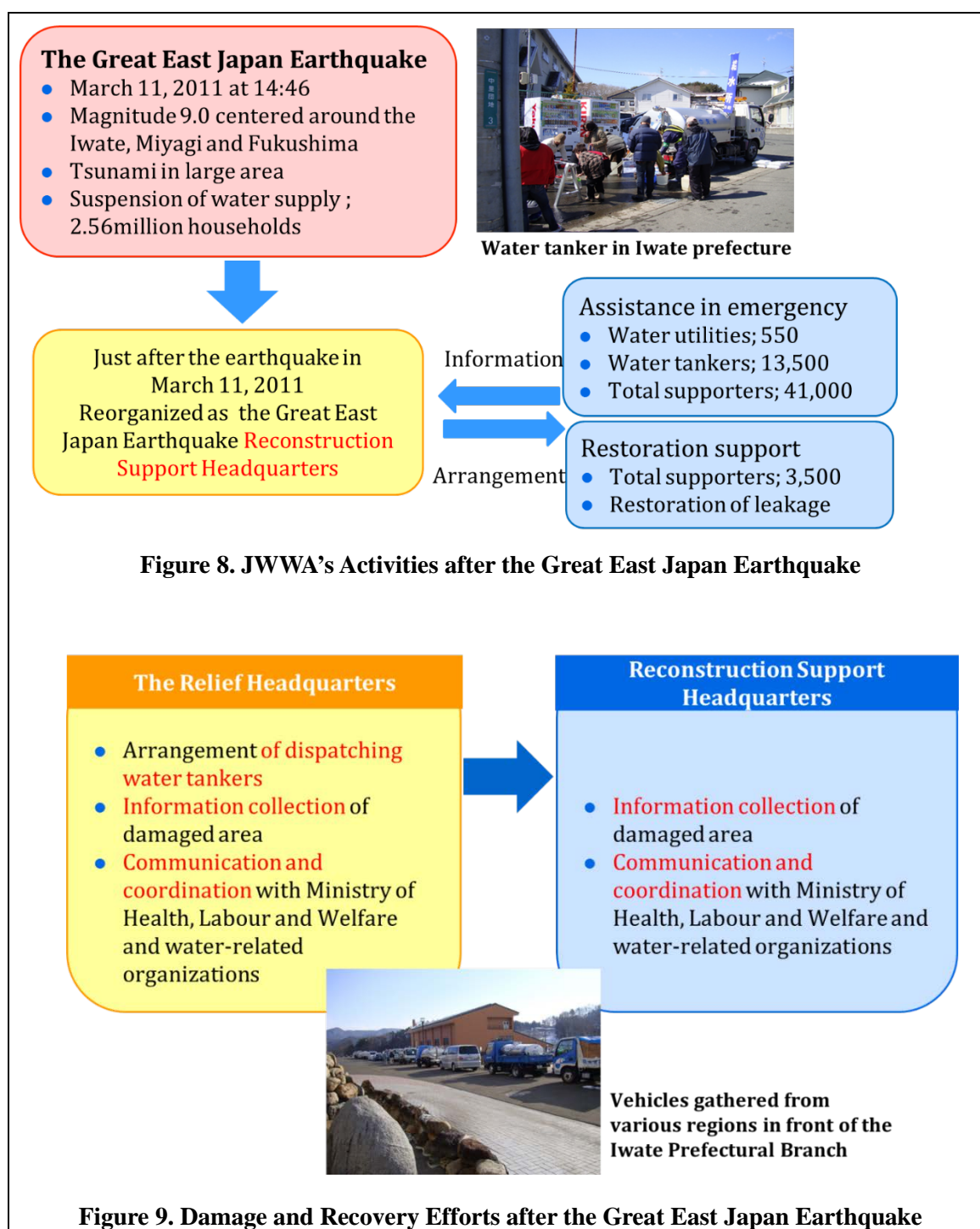
JWWA set up the "Great East Japan Earthquake Relief Headquarters" immediately after the earthquake hit at 2:46 PM on Friday March 11, 2011. JWWA worked all day and all night, gathering information from the affected utilities, arranging water trucks to be dispatched, and coordinating relief activities with the Ministry of Health, Labour and Welfare and other water-related organizations. As the lead agency of the region, Sendai City Waterworks, was damaged by the disaster, JWWA stepped in as Relief Headquarters.

An extremely wide area was affected, 2.56 million homes had no water supply. A large number of water trucks were needed. 41,000 personnel and 13,500 vehicles from approximately 550 utilities (official members of JWWA) were sent over 5 months (more than 150 days) to provide emergency water supply.

In addition, approximately 3,500 personnel from utilities nationwide were dispatched to provide recovery assistance, such as repairing water leaks, in coordination with other organizations.

After the initial phase, JWWA continued to support the affected area by transitioning its activity from "response" to "reconstruction."

From September 2011 to February 2012, JWWA technical officers visited and surveyed the needs of the utilities in the 3 most affected prefectures. Officers from other utilities were sent to the affected facilities that requested assistance under the coordination of "The Liaison Council for Supporting the Restoration of Water Supply Affected by the Great East Japan Earthquake" led by the Ministry of Health, Labour and Welfare.



4. Financial Structure of Japan Water Works Association

(1) Membership Fees

JWWA membership fees partially finance the organization's activities. Fees vary according to the size of the member utility.

JWWA has honorary, regular (water utilities), special (academics specialized in water supply), and supporting (private companies related to water supply) members.

The annual membership fee for special members is at the fixed rate of 14,000 JPY; supporting members' fee ranges from 200,000 JPY to 1,000,000 JPY. As of FY 2016, there are 407 special and 543 supporting members. Total revenue from membership fees is about 200,000,000 JPY per year.

The annual membership fee for a regular member consists of the base amount of 43,000 JPY and a contribution amount based on the size of the utility. For example, for a utility serving a population of 13,000, with annual revenue water of 1 million m³, the membership fee would be 73,000 JPY. For another utility serving a population of 300,000 with annual revenue water of 30 million m³, the membership fee would be 420,000 JPY. The annual fee for the largest utility in Japan, the Bureau of Waterworks, Tokyo Metropolitan Government is approximately 5.5 million JPY. The membership fee reflects the considerable differences in local conditions, population densities and other characteristics, and the size of the operation.

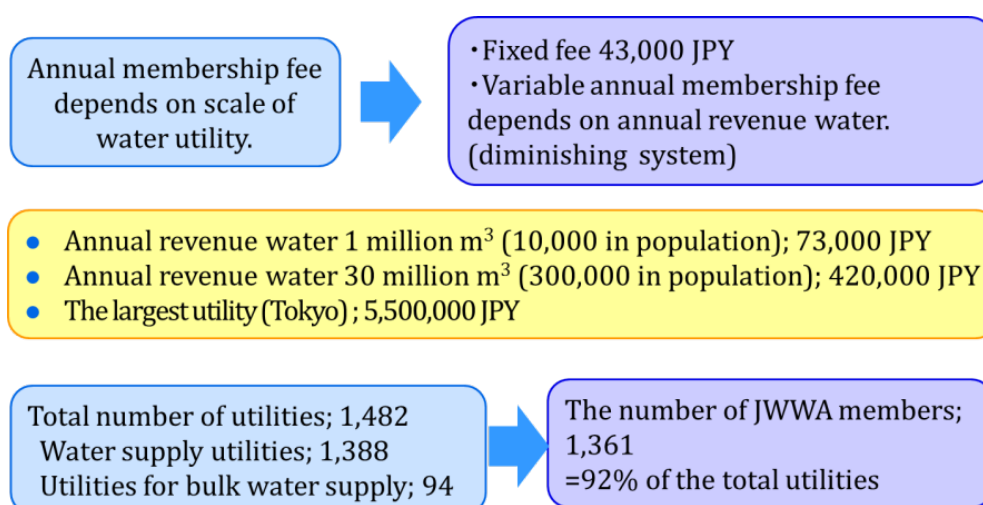


Figure 10. JWWA Membership Fees

As of 2016, there are 1,361 regular members, representing 92% of 1,388 water supply utilities and 94 bulk water supply utilities.

(2) Changes in Revenue Sources

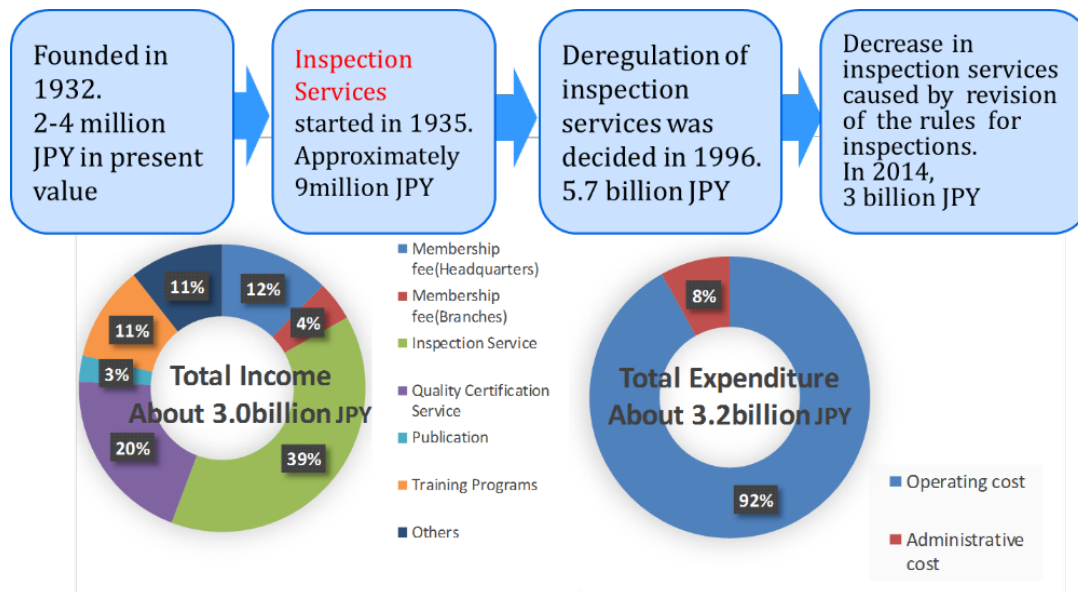
The income of JWWA was approximately three billion JPY in FY 2015. Membership fees made up 16% of the income, while 39% was from inspection services and 20% from certification services.

When JWWA was founded in 1932, the total revenue was approximately 43,488 JPY, equivalent to a present value of 2-4 million JPY. As a private organization, it receives no financial support from the government. The revenue tripled when JWWA started the inspection services in 1935 and increased further during the period of water supply system expansion after WWII. The membership fees and inspection charges were revised several times to keep pace with the rise of labor and material costs.

In 1996, total revenue peaked at approximately 5.7 billion JPY, with 4.2 billion from inspection services, 10 times as much as membership fees. In 1997, the regulations on water supply devices were revised as a part of the deregulation policies of the government. The resulting changes include the following: the existing model-approval and inspection systems for water supply devices were abolished; the standards for structures and materials were clarified; and the standards for performance were established. The Ordinance of the Ministry of Health, Labour and Welfare regarding the standards for structures of water supply devices was issued. At the same time, economic and social stagnation continued and public works spending was drastically reduced. As the income from inspection services dropped significantly, by 2015 JWWA's total revenue declined to approximately 3.0 billion JPY, with 2.35 billion from inspection services, 508 million from membership fees, and other revenues.

Administrative overhead accounted for about 250 million JPY and the total expenditure of 3 billion JPY. The organization runs a deficit despite cost cutting adjustments.

In spite of the overall deficit, revenue generating services such as training programs and inspection services are covering the costs of a variety of public-interest activities.



Source: JWWA, http://www.jwwa.or.jp/about/disclosure_pdf/h27_yosan.pdf

Figure 11. JWWA Breakdown of Revenue and Expenditures (2014 financial statement)

5. Other Organizations in the Water Supply Sector

In Japan, there are other organizations which are engaged in dissemination of technical information, research, and training related to water supply. There are also professional newspapers dedicated to the sector.

In Japan, other organizations in the water industry include the Japan Small Scale Water Works Association, the Japan Water Research Center (public interest incorporated foundation), and the Federation of Japan Water Industries, Inc.

The Japan Small Scale Water Works Association is made up of municipal governments with small-scale public water supply systems. Establishing water supply system for small towns and villages can be a challenge for local governments. The Association helps these towns and villages join effort in lobbying for government subsidies. The association prepared the *Practical Handbook for Water Supply*, an annual publication on application for subsidies, and is used by many utilities, not just small-scale ones.

The Japan Water Research Center is an incorporated foundation formed by the merger of the Pipeline Research Center (founded in 1988) and the Water Purification Process Association (founded in 1991). It engages in information gathering, surveys, research and development, and promotional activities. The Center works with water utilities, private corporations, administrative agencies, non-profit organizations, and academic researchers to solve common problems and share information on the issues related to water supply technologies.

The Federation of Japan Water Industries, Inc. consists of major corporations and organizations in the water supply industry in Japan. This organization indirectly supports the activities of corporations that provide technologies, products, and know-how to the drinking water, sewerage and industrial water supply. It promotes technological cooperation among private entities, such as bringing different disciplines together to solve issues in the water industry, coordinating cooperation among organizations; collecting information on technology development and management, and providing information on products and technologies to customers.

Other organizations related to water supply include: the Japan Water Plumbing Engineering Promotion Foundation, which aims to improve the technologies of water plumbing engineering; and the Japan Finance Organization for Municipalities, which is involved in the issue of local bonds for capital financing of water facilities construction.

Apart from professional and special interest organizations, there are two weekly newspapers dedicated to information on water supply. The *Nippon Suido Shimbun* (Japan Water Supply News) and *Suido Sangyo Shinbun* (Water Supply Industry News) report on matters such as latest regulatory changes and introduction of new technologies in the water industry.

6. Lessons Learned

The following Japanese experience could be useful for other countries.

- **(Cooperation among Water Utilities)** JWWA was founded through discussions among water utilities on water quality, and operation and management of water supply. Cooperation among members plays a critical role in sharing knowledge and experience and mutual support in case of disaster response.
- **(Communication between Government and Utilities)** JWWA plays an important role in facilitating communication between the national government and water utilities, e.g. it disseminates and draws its members' attention to national policies and lobbies for government support on behalf of the utilities.
- **(International Activities)** JWWA participates at IWA board meetings in coordination with the Japan Society on Water Environment. JWWA contributes to overseas training, dispatches experts and supports establishment of waterworks associations in developing countries.
- **(Materials and Equipment Quality)** JWWA develops standards for materials and equipment, and guarantees their high quality level with its inspection and quality certification services.
- **(Publication of Guidelines)** JWWA publishes the "*Design Criteria for Water Supply Facilities*," "*Water Supply Facilities Maintenance Manual*," and "*Seismic Design and Construction Guidelines for Water Supply Facilities*" to provide the latest information to water utilities. These publications have contributed to stable operation of water supply nationwide even in rural areas.
- **(Disaster Response)** Natural disasters occur frequently in Japan. JWWA organizes disaster response activities and makes valuable and significant contribution to effective emergency response and restoration of damaged utilities.
- **(Financial Structure)** JWWA's revenue comes from membership fees and revenue generating services such as inspection and certification, which contribute substantially to its sound financial foundation. The income generating services contribute to the improvement of the water supply industry. However, the income from these services is declining because of recent regulatory changes. The revenue sources of the association need to be diversified in order to mitigate the risk caused by changes of regulations and business environment.

