

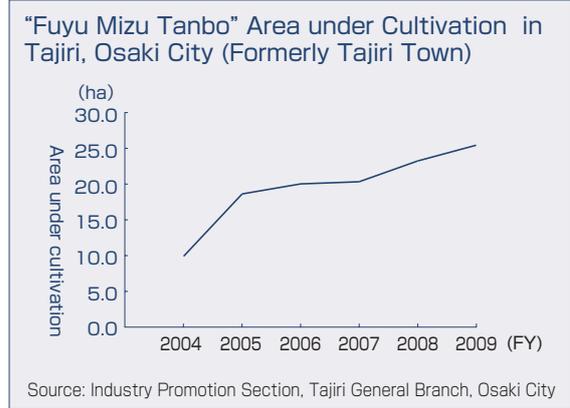
Column Restoration of Riparian Areas by “Fuyu Mizu Tanbo”

Around Izunuma and Uchinuma straddling Tome City and Kurihara City in the north of Miyagi Prefecture and also Kabukurinuma in Osaki City of the same prefecture, all registered wetlands under the Ramsar Convention, rice paddies after harvesting are flooded with water during winter. These paddies are called “fuyu mizu tanbo,” literally rice fields covered with water throughout winter.

The “fuyu mizu tanbo” rice-growing method is practiced across Japan, though on a limited scale, as an environment-friendly method as it does not use agricultural chemicals or other chemical substances.

Come spring, rice farmers can plant seedling without tilling as required in the conventional way of rice growing. Keeping rice paddies flooded during winter precludes the need to take in large quantities of water right before planting, thus avoiding concentrated water intake in a short span of time and promoting effective utilization of water resources.

These wetlands are wintering places for migratory waterfowls. Rice paddies flooded with water during winter offer good roosts for these birds, and they in turn play an important role in promoting biodiversity



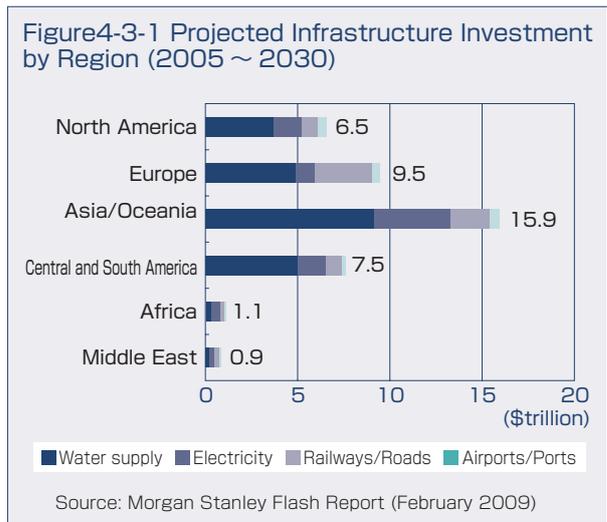
of rice paddies as their dung encourages propagation of microorganisms.

Rice fields adopting the “fuyu mizu tanbo” method are expanding, particularly around Kabukurinuma. This is not an easy way of growing rice, but expanding acreage evidently show rice farmers’ endeavors to coexist with nature.

Section 3 International Contribution and Water Business

1 State of Global Water Business

The world water business market is estimated to grow to ¥100 trillion by 2025, with \$22.6 trillion of investment in water-related infrastructure expected between 2005 and 2030, according to the Council on Competitiveness-Nippon (COCN) (Figure 4-3-1). While the market for the supply of membrane materials, an area Japan excels in, is only about ¥1 trillion, and the market for water purification systems, including membrane engineering, procurement and construction, is just about ¥10 trillion, the dominant area of the global water business market is management, such as facility management and operations for water intake, raw water transmission, water purification and water distribution. Japan has excellent technologies, but there are only a modest number of examples of Japanese entities moving into the water management market. Given successes of European and Asian companies in this market, it is desired that Japanese firms will also enter this vast and promising market aggressively. Japan has excellent technologies that contribute to environmental conservation and effective utilization of resources, including wastewater treatment and leakage prevention



technologies. It is necessary for Japan to promote efforts in the water business market going forward through deeper cooperation among the industry, academic and public sectors.

Table 4-3-1 ODA Disbursements for Water Supply and Sanitation Sectors

FY	Disbursements by aid type		Technical cooperation		Contributions to multilateral institutions	Total
	Grant aid	Yen loan	Provided by			
			JICA	other ministries		
2003	187.67 (22.7)	1,956.52 (35.1)	11.56 (0.8)	— (—)	— (—)	2,155.75 (27.6)
2004	200.62 (24.3)	2,040.48 (31.2)	10.10 (0.7)	— (—)	— (—)	2,251.20 (25.5)
2005	235.16 (29.2)	1,783.37 (31.5)	12.40 (0.8)	— (—)	— (—)	2,030.93 (27.6)
2006	216.04 (12.1)	3,385.17 (40.1)	8.95 (0.1)	— (—)	— (—)	3,610.16 (30.8)
2007	245.56 (6.9)	2,542.61 (26.9)	7.82 (0.3)	6.74	32.58 (3.7)	2,835.32 (20.7)

Note 1: Grant aid and yen loans are on an exchange of note basis. Technical cooperation covers the acceptance of trainees, sending of experts and provision of equipment, on the basis of actual expenses of JICA.
 2: Figures in parentheses other than those in the total column indicate the ratio (%) to the sum of ODA by each type of aid.
 3: Figures in parentheses in the total column indicate the ratio (%) to the cumulative total of all types of aid.
 4: Figures for grant aid are for disbursements of non-project grant aid from FY2003 through FY2006 and for disbursements of project-type grant aid in FY2007 aid (non-project grant aid, grant aid to support community development, grant aid for security, such as antiterrorism, grant aid for disaster prevention and support for disaster-hit areas, grant aid for fisheries and grant aid for research support).

Source: Ministry of Foreign Affairs, "Japan's ODA White Paper 2008 Statistics and Reference Materials"

Figure 4-3-2 Contract Type and Responsibilities of the Private Sector for Water Supply and Sewerage Projects in the Global Water Business Market

Contract type	Content	Supervision and regulation	Facility ownership	Service level decision	Fee decision	Operation	Investment	EPC (Engineering, Procurement & Construction)	Operation	Maintenance	Customer management
Concession	Gives the private sector the authority to operate water projects, and commissions the entire project, from facility construction to operation, to the private sector										
Affermage	Facility developed by the public sector is leased to the private sector on a long-term basis and the operation is commissioned										
PFI	Facility construction and funding is outsourced to the private sector, but the public sector takes charge of operations										
Operation and management	Comprehensive outsourcing of management and operations as labor alternative for 5 to 10 years										

Source: Prepared by Ministry of the Environment based on the Council on Competitiveness-Nippon (COCN), "Project Report on Technologies for Water Treatment and the Effective Use of Water Resources"

2 What Japan Can Do for the World

Compared with countries in the world constantly feeling water stress, we in Japan are given to losing a sense of crisis over water as we have relatively free access to water in our daily livelihood. However, as discussed in subsection 4 of Section 1, we should not forget the fact that our social and economic activities depend on the rest of the world for water almost in the same quantity of water we consumer at home. We must recognize that Japan's active international contributions to other countries in the world are essential in terms of the stable supply of water and lead to the protection of our daily livelihood.

What, then, can Japan do by way of contributing to other countries in the world? Japan suffered from serious pollution in the past. Knowledge and technologies we have accumulated in the process of overcoming pollution problems one by one cannot be matched anywhere in the world, and the wealth of these experiences should prove massively helpful in the transfer of technologies to and human resources development in developing countries. Public-private cooperative efforts to utilize Japan's excellent technologies and experiences also can be expected to greatly help expand business opportunities. Until now, Japan has been helping countries with which it has close relations through ODA-based infrastructure

projects undertaken by Japanese water supply corporations and the waterworks industry (Table 4-3-1). From now on, Japan should make further international contributions beyond the ODA framework, with Japanese water supply-related companies sharpening their international competitiveness and expanding their overseas businesses.

Developing countries where water-related infrastructure is under development have strong needs for post-construction maintenance and sound management services. However, since Japan's water services have long been undertaken mainly by publicly-operated corporations, private-sector companies, despite their strength in element technologies such as facility design and construction, have only limited experiences in integrated maintenance, management and operations of water facilities and are often disqualified in competitive international tenders. In fact, in water infrastructure projects funded with Japan's ODA, European and U.S. companies come in at the stage of commissioning private-sector entities for maintenance, management and operations of water supply facilities. Japanese companies cannot immediately respond to these developments in recent years (Figure 4-3-2).



In order to bring Japan’s advanced technologies and knowhow to the world, it is necessary to transfer operation and maintenance knowhow accumulated by

municipalities that have undertaken water supply services to private-sector companies. To do this, joint initiatives between the public and private sectors are essential.

3 Japan’s Technological Prowess

In some Asian cities, for example, large amounts of sewage sludge or food waste and other wastes are disposed by landfill without incineration, giving rise to sanitation problems. As they are sources of methane gas, projects to reduce sludge and wastes, recycle them and collect methane gas for reducing carbon dioxide emissions can earn emissions credits under the Clean Development Mechanism (CDM) of the Kyoto Protocol. Japan has the advanced bio-recycling technology that covers from water treatment to energy collection. The business model for constructing and operating a string of facilities for adequate water treatment, biomass recycling and biomass power generation can be expected to grow going forward (Figure 4-3-8). Japan ranks the world’s top-tier league in water treatment technology. In particular, Japanese membrane technology for seawater desalination commands a large share of about 70 % in the world (Figure 4-3-3).

Reverse osmosis (RO) membranes by a Japanese manufacturer have been adopted at a total of 100 plants in 26 countries/areas in the world by March 2009, and the combined desalination capacity of facilities using its RO membranes exceeds 15 million cubic meters a day (equivalent to the quantity of domestic water consumed by over 60 million people) (Figure 4-3-4). The manufacturer estimates that the desalination process using RO membranes consumes less than one-fifth of heat, power and other energy required by the conventional evaporation method. Assuming that the use of RO membranes spreads at the same rate as in the five years from 2010, desalination using RO membranes are estimated to reduce carbon dioxide emissions by some 100 million tons by around 2020 (Figure 4-3-5).

As a result of continued efforts to develop the RO membrane technology, energy consumption in the desalination process was reduced to about one-sixth, to less than the cost of the evaporation method. Thus, the RO membrane technology is expected to produce the co-benefit of water quality improvement and emissions reduction as a measure to cope with global warming (Figure 4-3-6).

Japan also has a broad range of technologies that can greatly contribute to water infrastructure development in the world, including the heat pump technology that focuses on the thermal potential of groundwater and Johkasou technology quite useful in wastewater treatment. The heat pump is the technology to move heat from one location at a lower temperature to another location at a higher temperature using heat media and semiconductors, etc., commonly adopted in refrigerators and air conditioners. In particular, Japanese companies excel in the heat pump technology to use groundwater, whose temperatures are stable throughout the year, as the heat source. As for Johkasou, the installation of Gappei-shori-Johkasou (which treat kitchen and toilet waste) is required when introducing flush toilets in areas

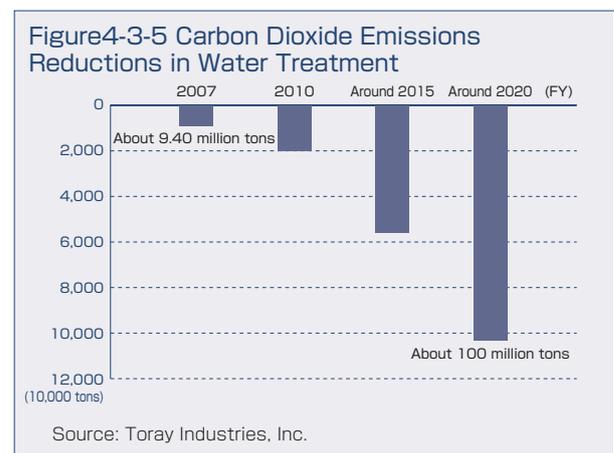
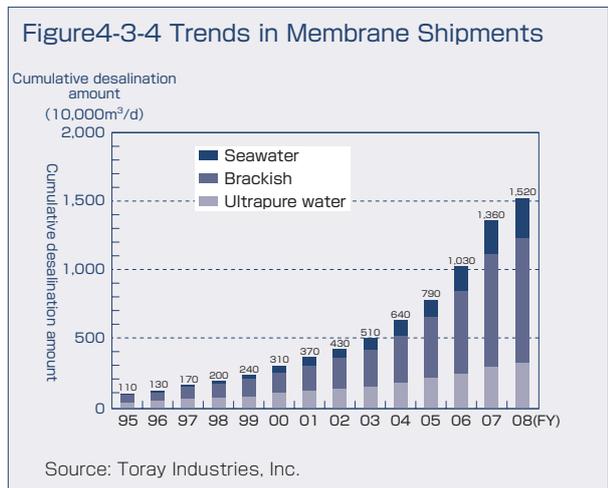
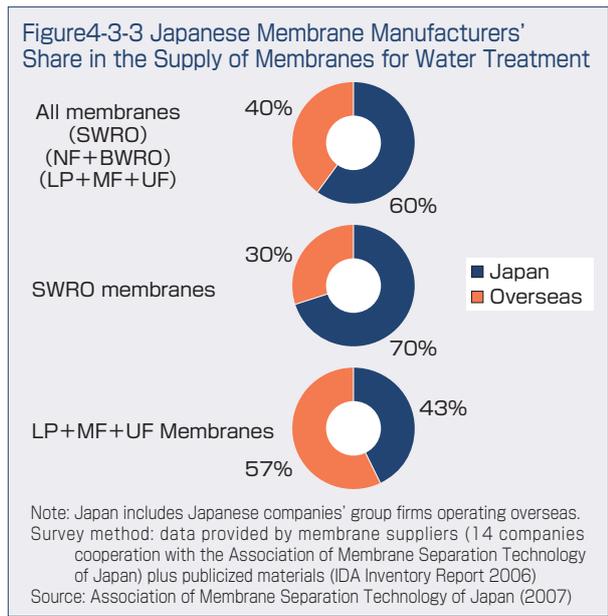
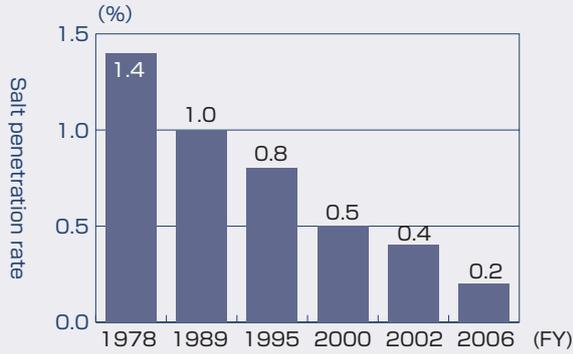


Figure4-3-6 Progress in Seawater Desalination RO Membrane and Technology and Comparison of Energy Consumption and Desalination Cost

1. Improvement of RO membrane performance (decline in the salt penetration rate)

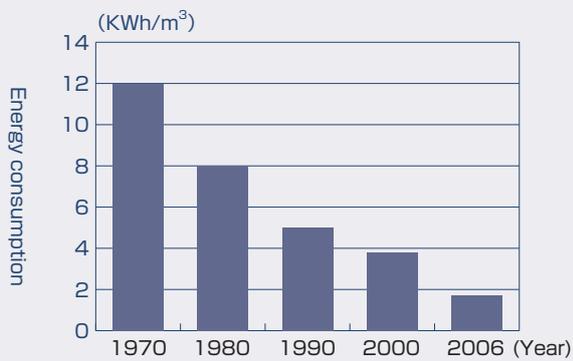


IDA news Water, 15, 9-10 (2006).

2. Improvement of RO membrane desalination performance and cost reduction by mass production

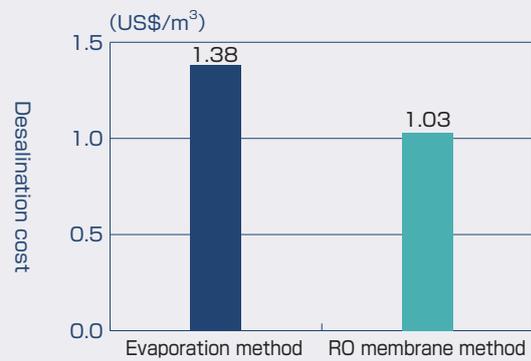


3. Reduction in energy production



D&WR, 16 (2), 10-22 (2006).

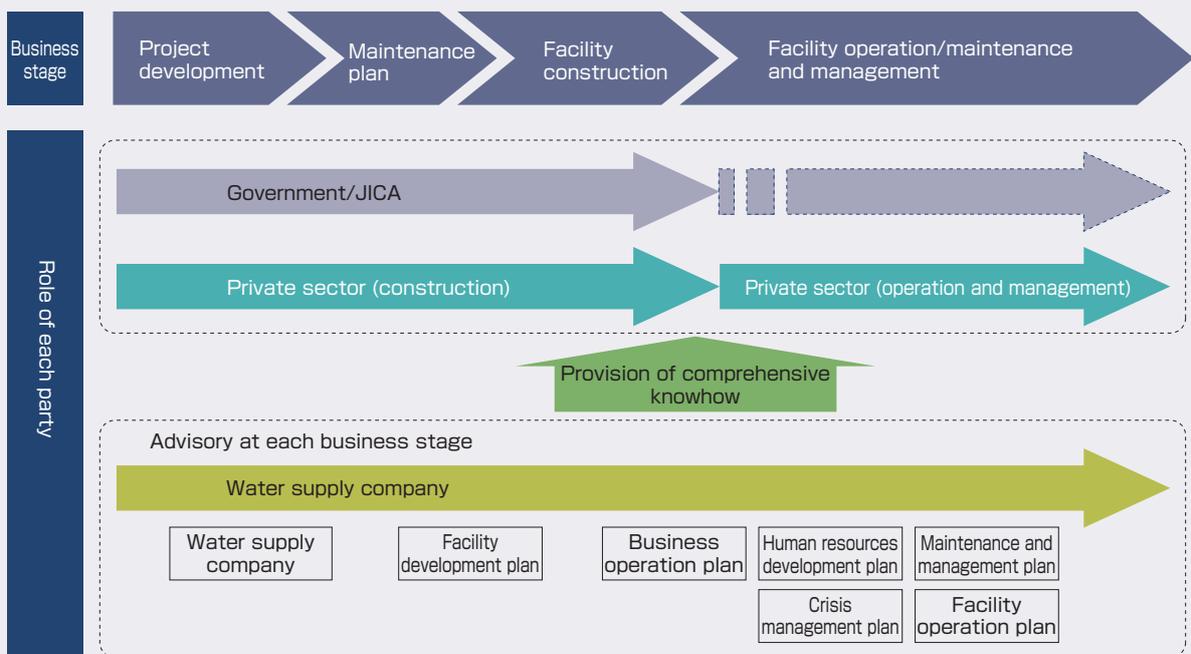
4. Comparison of desalination cost in the Middle East



Global Water Intelligence, August (2006).

Source: Toray Industries, Inc.

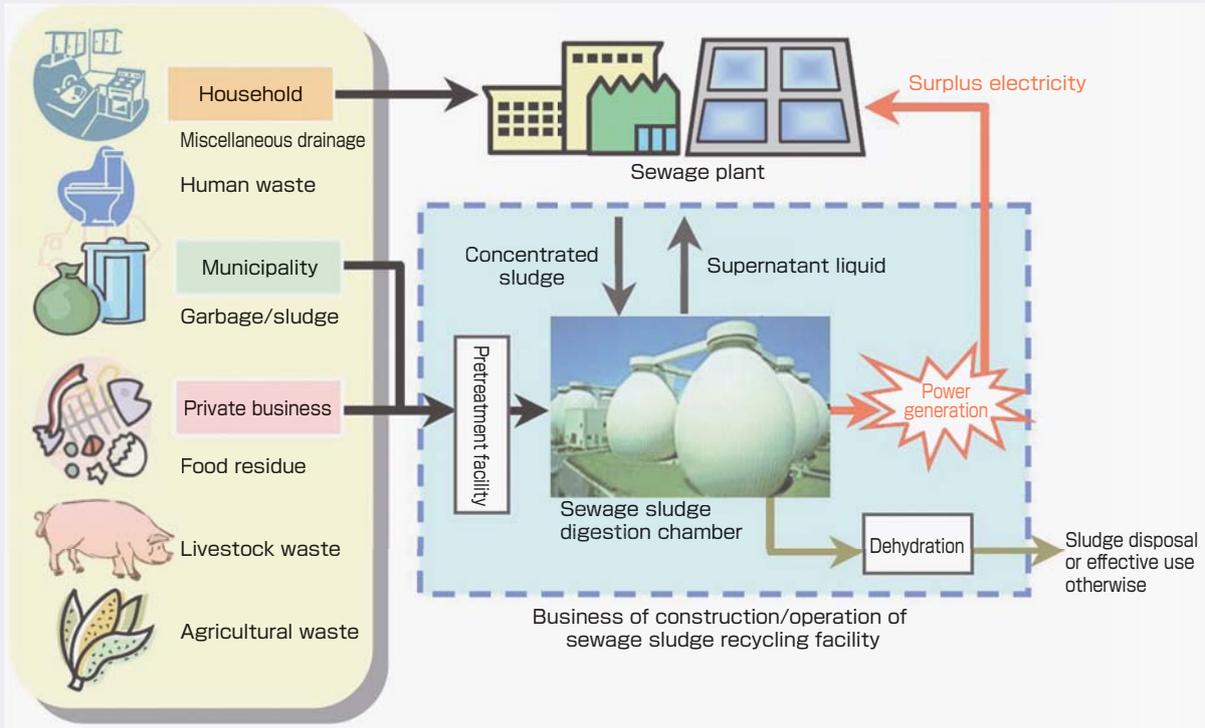
Figure4-3-7 Image of International Contribution as a Water Supply Company



Source: Japan Water Works Association (JWWA), "Report by the Study Group on Security of Water Supply (March 2009)"



Figure4-3-8 Model of Construction/Operation of Sewage Sludge Recycling Facility Using CDM Project



Source: Council on Competitiveness-Nippon (COCN), "Project Report on Technologies for Water Treatment and the Effective Use of Water Resources"

Column Major Players in the Global Water Market

The water business market is expected to continue expanding going forward, including privatization of water supply and sewerage businesses, and maintenance and management services for existing facilities. Currently, a handful of conglomerates, called "water majors," dominate the world's privatized water supply and sewerage market.

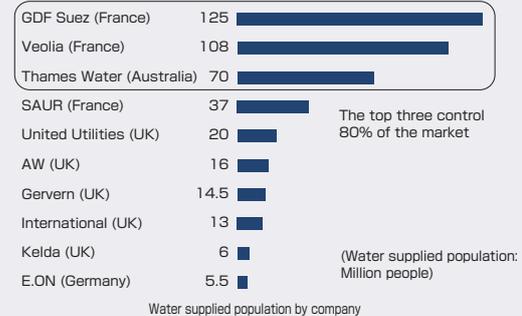
Veolia of France is the company whose predecessor was Compagnie Generale des Eaux, founded in 1853 as a water supply firm. As of 2008, Veolia Water, the Veolia group's general water business subsidiary, provides water to 80.5 million people and operates water purification facilities at 5,176 locations.

GDF Suez, also of France, originally started water supply and sewerage services in Cannes, France, in 1880. In 1997, it merged with Compagnie financiere de Suez and changed its corporate name to Suez Environment. As of the end of 2008, the company provides water to 76 million people and operates water purification facilities at 1,746 locations.

Thames Water was born out of London's Thames waterworks department in the 1980s when the British government deregulated the water supply and sewerage market following the power and gas services. It is the giant company that single-handedly undertakes the 100% privatized water supply market in Britain.

Current State of the Global Water Supply Market

Domination of the global water supply market by the top three



Source: Council on Competitiveness-Nippon (COCN), "Project Report on Technologies for Water Treatment and the Effective Use of Water Resources"

These three companies alone are believed to cover about 80% of the water supplied population in the world's privatized water services.

One of the reasons behind their huge market shares is said to be the support provided by their home governments. In France particularly, then President Jacques Chirac reportedly put his efforts into the French firms' advances into overseas water businesses, earning himself the nickname of "the world's top water business salesman."

without public sewerage systems, rural community sewerages, community plants or other wastewater treatment systems. The penetration rate of this Gappei-shori-Johkasou is almost 10% in Japan at present. Gappei-shori-Johkasou use microorganisms to purify sewage from homes. The importance of these Johkasou is being recognized anew from the viewpoint of protecting the natural environment as final effluent adequately treated

in Gappei-shori-Johkasou can be recycled back to communities.

Despite the world-leading technologies described above, Japan has yet to enter the global water business market on a full scale. For its advances in the global market, the public and private sectors need to cooperate as mentioned in 2 above (Figure 4-3-7).

Conclusion

In Chapter 4, we discussed the role Japan should perform in conserving water resources that are limited and unevenly distributed on the earth. Compared with countries constantly in the state of water stress, Japanese people, thanks to Japan's advanced water supply technology and systems, tend to become unconscious of the preciousness of water, the resource that is directly linked to our subsistence and livelihood. But we should not forget that economic and social activities in Japan depend on the rest of the world for water in the amount equivalent to water consumed at home. In return, Japan can contribute to solving the issue of securing sanitary water around the world by appropriately taking advantage of its clean water supply and wastewater treatment technologies while paying due heed to intellectual

property rights. Needless to say, water is the subject of business in the international community. Japan's position in the global water business market warrants no optimism, as competing technologies, while inferior to Japanese technologies, may be more price competitive, and Japan has only a modest track record in the market for maintaining and managing water treatment systems that is far more massive than that for element technologies where Japan particularly excels. But we see the promising spouting of seeds there. We need to push forward with the conservation of the water environment and the promotion of water businesses further with the cooperation of all parties concerned and greater support from the government.

