

Water Resources: Challenges and Opportunities for Japan

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- ▶ With demand for water expected to continue to increase in line with global population and economic growth, scarcity of water resources is likely to become an even more acute issue.
- ▶ Insufficiency of water resources has serious negative impact on both society and the economy.
- ▶ Businesses are required to understand their dependence on water resources and the impact of their operations, and to properly manage the risks surrounding water resources, while at the same time pursuing business opportunities that contribute to solving water resource problems.

This summer, various regions of the world were hit by extreme weather events. While some regions experienced heavy rainfall, such as Pakistan, which suffered severe flooding that submerged about a third of the country, some regions experienced severe droughts.

Europe, which experienced a record heat wave this summer, is one such region. The European Commission's European Drought Observatory reported that drought conditions in Europe in August were at their worst level for the last 500 years. In China, droughts also occurred in the middle and lower reaches of the Yangtze River, mainly due to a strong heat wave. Water shortages due to these kinds of droughts have a serious impact on the surrounding areas.

The impact of climate change has been pointed out as a cause of these droughts and other extreme weather events. The Sixth Assessment Report of Working Group II published by the UN Intergovernmental Panel on Climate Change (IPCC) reports that anthropogenic climate change is worsening the frequency and intensity of extreme weather events.

Japan is a country with abundant water resources with high rainfall, but it is by no means immune to these types of water resource problems which have been occurring in many parts of the world. This is because Japan is also indirectly dependent on overseas water resources through imports. Food uses large amounts of water in the production process, and Japan, which has a low food self-sufficiency rate compared to other major industrialized countries, relies heavily on imports from overseas. The water resources needed to produce food and other foreign imports to Japan are known as virtual water. According to estimates by the Ministry of the Environment, virtual water in Japan in 2005 amounted to approximately 80 billion m³ (Figure 1). Japan will inevitably be affected if the production of goods imported to Japan is hampered by the water shortage problems occurring around the world.



Yoshihito Edamura,
Economist

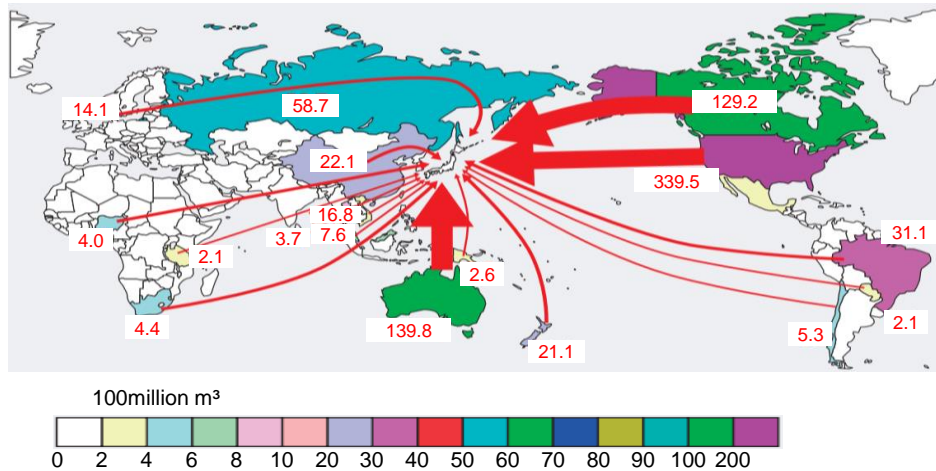


Setsuko Yano,
ESG Macro Research Analyst

**“ Risks to water
resources ”**

Figure 1: Import Amounts of Virtual Water to Japan in 2005

100million m³ per year



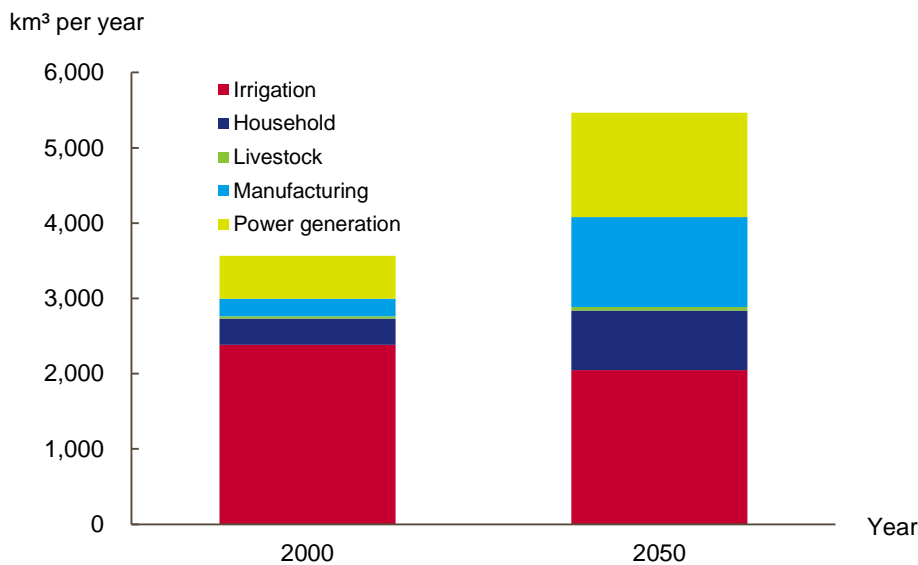
Source: Annual Report on the Environment, the Sound Material-Cycle Society and Biodiversity in Japan 2013 published by Ministry of the Environment

It is estimated that 1.4 billion km³ of water exists on Earth, of which only about 0.01% is fresh water easily accessible to people. According to the OECD, global water demand in 2000 was approximately 3,600 km³ per year, with the largest use irrigation, accounting for about 67% of the total (Figure 2). Looking back at past water consumption trends, total global freshwater use has increased around six-fold over the last 100 years and is still increasing at a constant rate each year. The continuing upward trend in water demand is due to economic development, changes in consumption behavior and a growing global population. These trends are expected to continue moving forward; the OECD predicts that global water demand in 2050 will be around 55% higher than in 2000.

In addition to this increase in water demand, the aforementioned effects of climate change and other factors mean that water scarcity will become even more acute in the future: the OECD estimates that the proportion of the world's population living in river basins under severe water stress will reach more than 40% of the world's population by 2050.

“ Global water use”

Figure 2: Global Water Demand and Outlook



Source: OECD "Environmental Outlook to 2050"

These water shortages have significant negative impact on society. The UN has identified access to water as a human right that is fundamental to the health, dignity and prosperity of all people. However, only 74% of people globally have access to safely managed drinking water, while for 11% of people it takes more than 30 minutes to obtain safe water or the water they use is unsafe or surface water. For these reasons, Goal 6 of the Sustainable Development Goals (SDGs) includes ensuring access to safe water and sanitation for all people worldwide (Figure 3). In addition, conflicts over water resources are occurring in many parts of the world due to problems such as water resource allocation (e.g. excessive abstraction of water from lakes, rivers and groundwater in upstream areas). If water resource shortages become more serious in the future, the negative impacts on society and people over these water resources will also increase.

On the other hand, water scarcity also has a negative impact on the economy. The World Bank estimates that water scarcity could push down economic growth rates in some parts of the world by up to 6% by 2050. The International Food Policy Research Institute (IFPRI) also estimates that 45% of global GDP will be at risk of water scarcity by 2050 if water management continues in a business-as-usual manner and water productivity (GDP per unit of water) does not improve.

“Social and economic impacts of water scarcity”

Figure 3: SDGs 6 "Clean Water and Sanitation"

6.1	By 2030, achieve universal and equitable access to safe and affordable drinking water for all
6.2	By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
6.3	By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
6.4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity
6.5	By 2030, implement integrated water resources management at all levels, including appropriate cross-border cooperation
6.6	By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
6.a	By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programs, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
6.b	Support and strengthen the participation of local communities in improving water and sanitation management

Source: Global Compact Network Japan

Issues surrounding water resources can be a serious risk for companies. CDP and Planet Tracker, international environmental NGOs, have identified and organized water-related risks that can lead to companies' assets becoming stranded assets into four categories: physical risks, regulatory risks, reputational and market risks, and technical risks (Figure 4).

Although the issues surrounding water resources tend to focus on the negative aspects, we also think investors should be aware that the flip side is high potential for solutions that contribute to resolving water resource issues. In this context, companies will be required to assess their dependence on water resources and manage risks appropriately, while at the same time pursuing business opportunities that contribute to solving the underlying issues. In the final section we will explore potential opportunities for Japanese companies.

“Businesses and water resources”

Figure 4: Water related Stranded Asset Risks
Physical risks

Flooding, drought, declining water quality, ecosystem vulnerability, increased water scarcity and/or stress, and inadequate infrastructure

Regulatory risks

More stringent water withdrawals and/or discharge permits, mandatory water efficiency, recycling, conservation, or process standards, regulatory uncertainty, and higher water prices

Reputational and market risks

Community opposition, increased stakeholder concern or negative stakeholder feedback, litigation, and changing consumer behavior

Technological risks

Data access/availability, transition to water-efficient and low water intensity technologies and products – where companies may be left behind if not adopting these new technologies – and unsuccessful investment in new technologies

Source: "High and Dry: HOW WATER ISSUES ARE STRANDING ASSETS"
issued by CDP, Planet Tracker

NOTE: Water related: This covers a wide range of water-related risks, such as flooding, as well as scarcity of water resources.

Stranded assets: assets subject to unforeseen or premature write-offs or write-downs.

Having explored the risks associated with water resources, companies around the world naturally regard the water treatment business as a major business opportunity and are aiming to increase their profits in the markets they are involved in. Looking at the business potential of countries around the world, there is a positive correlation between GDP per capita and water and wastewater penetration rates. Companies are required to take an individual approach for each market and in particular, we see the potential for tremendous business opportunities in emerging markets where water and wastewater penetration rates are improving. In developed markets, demand for renewal and advanced technologies such as digital transformation can be expected. Although the global position of Japanese companies in the water business as a whole is not considered to be high, the water membrane treatment market is the market in which Japanese companies have the largest share. As the rapid increase in global population and other factors make it more difficult to secure 'water quantity' and 'water quality' through natural purification alone, membrane treatment technology for high-quality, high-speed and energy-saving processes is considered an essential technology for the future. Within this field, leading Japanese companies such as Toray Industries, Toyobo, Mitsubishi Chemical and Asahi Kasei hold the top shares of the water treatment membrane market. At present the contribution to sales and profits from these business lines is currently limited, however the annual rate of profit growth is expected to increase steadily and we believe investors will want to focus their attention on this area from a long-term perspective.

**“Water business potential
and Japanese companies”**

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