

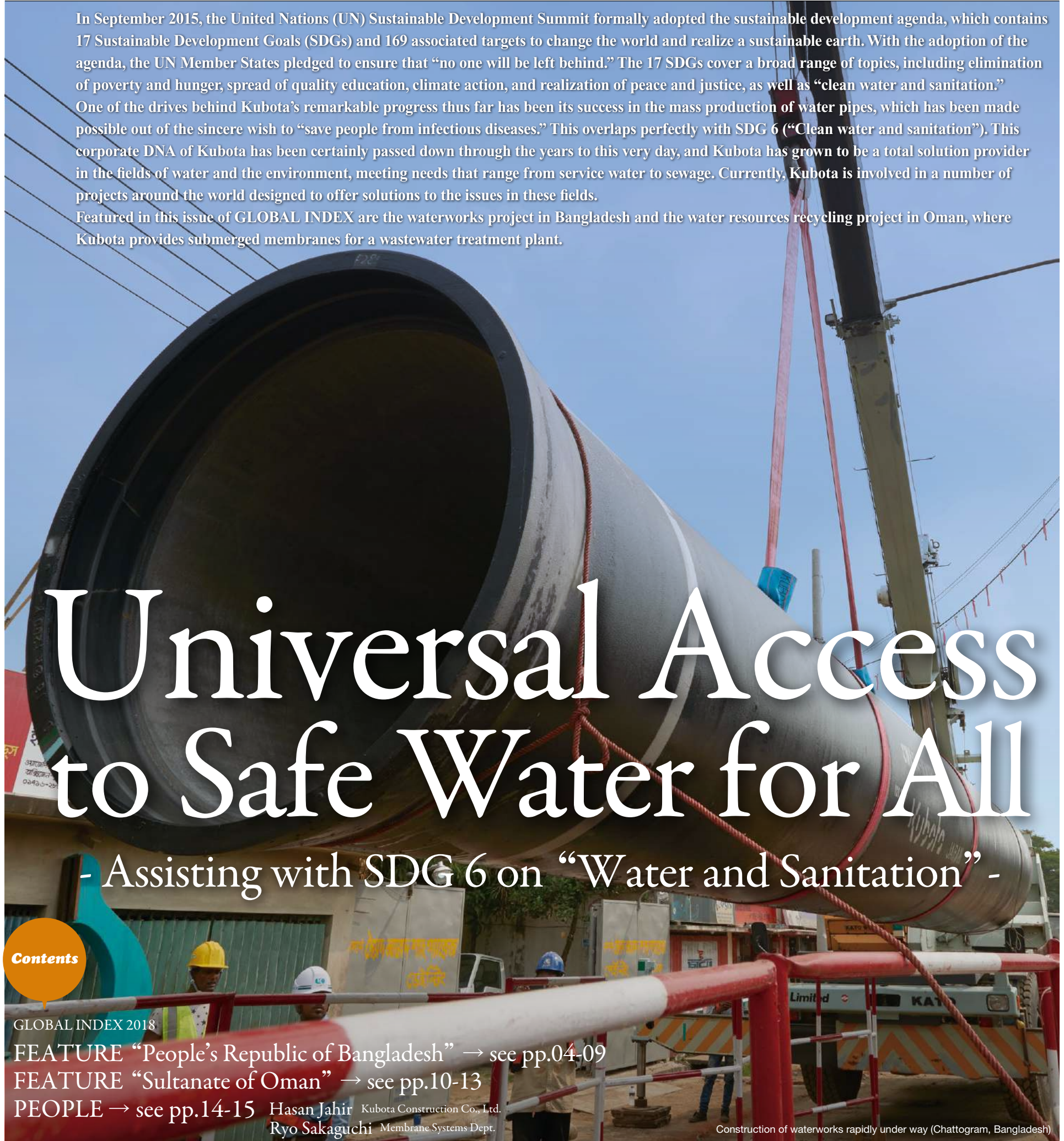
GLOBAL INDEX  
Expanding the future of food, water and the environment.  
Corporate Communication Department, Kubota Corporation  
December 2018



# GLOBAL INDEX

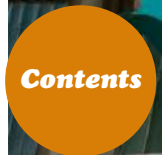
Expanding the future of food, water and the environment.

In September 2015, the United Nations (UN) Sustainable Development Summit formally adopted the sustainable development agenda, which contains 17 Sustainable Development Goals (SDGs) and 169 associated targets to change the world and realize a sustainable earth. With the adoption of the agenda, the UN Member States pledged to ensure that “no one will be left behind.” The 17 SDGs cover a broad range of topics, including elimination of poverty and hunger, spread of quality education, climate action, and realization of peace and justice, as well as “clean water and sanitation.” One of the drives behind Kubota’s remarkable progress thus far has been its success in the mass production of water pipes, which has been made possible out of the sincere wish to “save people from infectious diseases.” This overlaps perfectly with SDG 6 (“Clean water and sanitation”). This corporate DNA of Kubota has been certainly passed down through the years to this very day, and Kubota has grown to be a total solution provider in the fields of water and the environment, meeting needs that range from service water to sewage. Currently, Kubota is involved in a number of projects around the world designed to offer solutions to the issues in these fields. Featured in this issue of GLOBAL INDEX are the waterworks project in Bangladesh and the water resources recycling project in Oman, where Kubota provides submerged membranes for a wastewater treatment plant.



## Universal Access to Safe Water for All

- Assisting with SDG 6 on “Water and Sanitation” -



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FEATURE “People’s Republic of Bangladesh” → see pp.04-09  
FEATURE “Sultanate of Oman” → see pp.10-13  
PEOPLE → see pp.14-15 Hasan Jahir Kubota Construction Co., Ltd.  
Ryo Sakaguchi Membrane Systems Dept.

Construction of waterworks rapidly under way (Chattogram, Bangladesh)



FEATURE "Water and environmental infrastructure"

Expanding the future of food, water and the environment.

# Making a Difference in the World Through Water and Environmental Infrastructure - Affinity between Kubota's founder's aspirations and SDGs -



The embodiment of one of Kubota's time-honored technologies, this ductile iron pipe measures 9 m long and 700 mm in diameter. (Kubota Keiyo Plant)

## "Clean water and sanitation" Water resources growing harder to access

Sustainable Development Goals (SDGs) are a collection of concrete policies and actions set by the UN Sustainable Development Summit in 2015, which are outlined in the outcome document titled "Transforming our world: the 2030 Agenda for Sustainable Development (2030 Agenda)." Developed to succeed the Millennium Development Goals (MDGs), which are touted as the most successful global framework ever to combat poverty,

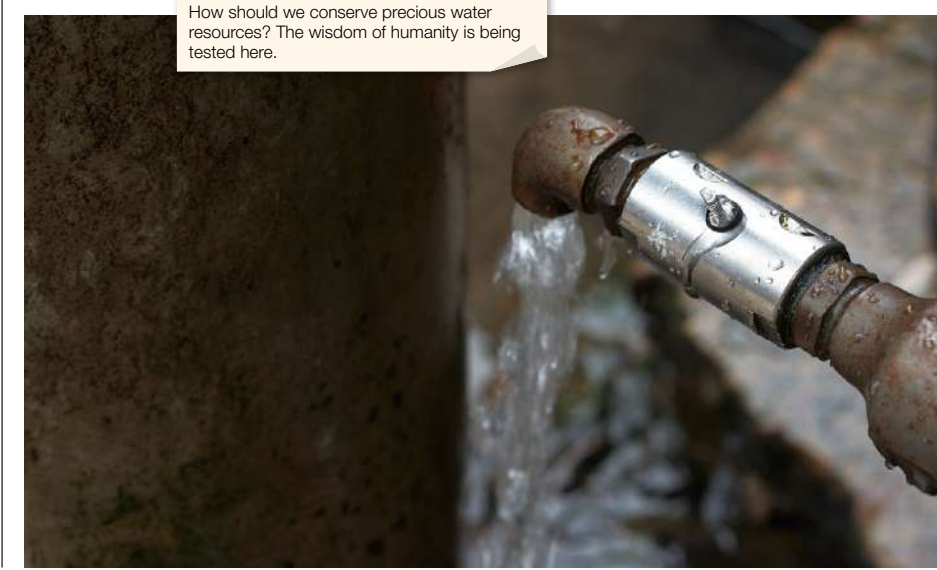
this new Agenda contains 17 field-specific SDGs with 169 associated targets (indicators) that the 193 UN Member States will be working on over the course of the years up to 2030. SDG 6 relates to "Clean water and sanitation." At present, the circumstances surrounding water resources continue to deteriorate around the world. Although one of the MDGs—to halve the proportion of those without access to safe drinking water between 1990 and 2015—was achieved in 2010, it was estimated that approximately 660 million people were still without access to basic water supply services as of 2015\*. Meanwhile, water demand continues to surge owing to the increasing population, economic development, and a higher standard of living. One report predicts that the global gap between existing accessible supply and 2030 water withdrawals could be as great as 40%<sup>2</sup>.

To overcome this critical situation, SDG 6 is focused on the field of water and sanitation to "ensure availability and sustainable management of water and sanitation for all." To achieve this goal, it is vital that we develop infrastructure, provide sanitation facilities, and expedite improvement of sanitary conditions at all levels. To mitigate global water shortage, those in the international community are urged to further collaborate with each other by allocating limited water resources both efficiently and appropriately, increasing the sustainability of water use, and supporting water treatment technology in developing regions, in addition to protecting and restoring water ecosystems.

\*1 UNICEF/WHO Joint Monitoring Programme  
<sup>2</sup> Charting Our Water Future, 2030 Water Resources Group



UN Sustainable Development Goal 6 deals with water problems, which are being addressed by the whole world.



How should we conserve precious water resources? The wisdom of humanity is being tested here.



The founder's aspiration of "saving people from the menace of infectious diseases" is still alive at the manufacturing site of iron pipes. (Kubota Keiyo Plant)

## Japan's first mass-produced cast iron pipes for water supply Kubota's founding business

Japan has not been without water problems in the past. The country has been challenged by all sorts of related problems, including prevalence of water-borne diseases, water restrictions due to drought, land subsidence as a result of excessive groundwater pumping, and water pollution in rivers and inland waters from domestic and industrial wastewater. Having overcome these challenges, Japan now boasts nearly 100% coverage of water supply, has managed to contain land subsidence, taken a series of measures to conserve the water environment, and is among the world's pioneers in efficient use of water resources. Kubota's contributions to resolve water

problems in Japan during its founding days deserve special mention. Between the 1870s and the 1890s, cholera was raging through Japan, claiming many precious lives. Cholera is a water-borne illness, and the lack of a viable water supply system was partly to blame for its prevalence. Out of the strong desire to "save people from the menace of infectious diseases," Kubota's founder Gonshiro Kubota made the supply of safe water a reality when he became the first in Japan to mass-produce cast iron pipes for water supply in 1893, thus paving the way to develop the modern water supply system that is still in operation now.

"Gonshiro once said, 'Create products with all your heart and soul and realize the commodity values of such products in correct definitions,' which reflects his wish to produce things that are of use to society. Do whatever pleases others, solves urgent problems, or meets immediate needs, even

though efforts to do so may not be spectacular or eye-catching. It was this aspiration of his that led to the creation of water pipes, engines, and farming machinery. The fact that these businesses still have a place in the market after so many years is evidence that Kubota is doing the right thing with its business." (Toshihiro Kubo, Representative



Ductile iron pipes awaiting shipment, through which "water of life" is supplied to people the world over. (Kubota Keiyo Plant)

Director and Executive Vice President, Kubota Corporation)

## An indicator to verify achievement of SDGs Provision of cutting-edge technologies and products

As water pollution problems surfaced in the 1960s when Japan was undergoing rapid economic development, Kubota was quick to establish the Water Treatment Business Division, which has since grown to cover a wide array of fields from water supply to sewage. Offering an unrivaled range of water-related products, including ductile iron pipes, pumps, valves, water purification systems, industrial wastewater / sewage treatment systems, and drainage systems, Kubota has played a key role in enriching the living environment for people the world over through the development of water and environmental infrastructure. More than 120 years have passed since the founder took on the challenge of domestic production of cast iron pipes for water supply. Throughout the years, Kubota has made it its mission to tackle social issues through its business. Here, one can see that Kubota's founding objectives and the global initiative of the SDGs have much in common.

"We can safely say that more than

a few of Kubota's businesses overlap with the SDGs. I believe the success or failure of the SDGs will be determined by the organizational strength, financial strength, and human resources of the private sector. Because the SDGs seek to solve issues for all humanity in order to realize a sustainable world, I have to admit that some of their aspects may not be viable for business enterprises. From the viewpoint of the sustainability of business as well as the sustainable development of target countries, however, we believe that we should introduce state-of-the-art technologies and products, because this will help us to contribute to industrial and economic development and provide solutions to social issues in such countries over the next ten to fifty years. We believe that this is what a private enterprise can do to help achieve the SDGs." (Kubo)



**Toshihiro Kubo**  
Representative Director and Executive Vice President  
GM of Water and Environmental Infrastructure Domain  
Kubota Corporation



FEATURE "People's Republic of Bangladesh"

Expanding the future of food, water and the environment.

# Steady Supply of Safe Water Needed Urgently - Karnaphuli Water Supply Project, Chattogram -



A ductile iron pipe for water supply (Chattogram, Bangladesh)

Pipes are carefully laid out one-by-one. Kubota also has unique knowhow in pipe connection.

Elevated highway in Chattogram, underneath which water pipes run

The Kubota brand earns immense credibility in Bangladesh.

## Bangladesh - An emerging country in South Asia achieving striking economic growth

Located in South Asia, the People's Republic of Bangladesh is home to the Ganges River, which pours into the Bay of Bengal. For its abundant crops made possible by its rich water resources, this region was once touted as the "Golden Bengal." Since that fertile time, the national economy stagnated, temporarily bringing the country to the last position in the list of less-developed countries in Asia. This has been due to inadequate infrastructure as a result of social confusions in the latter

half of the last century, including regional conflicts and independence movements, as well as inefficient government. This unfortunate situation changed positively since the turn of the new century, with the nation's economy recording 7.24% growth in fiscal 2017. Now, like many other countries in Asia, Bangladesh is counted among the fast-emerging economies. Behind this remarkable growth is the apparel industry, which accounts for over 80% of the country's exports, making Bangladesh the world's second largest exporter of clothing after China. With a population of approximately 160 million, Bangladesh is the eighth most populated country in the world. This huge population makes Bangladesh attractive both as a labor market and a consumption market, and the world has been looking intently at the country in recent years.

find it hard to maintain consistent access to safe water supply. It was against this background that Dhaka and Tokyo signed an agreement of ODA (Official Development Assistance) loan package in March 2013, which included target coverage of the water supply system in Bangladesh's major cities of Dhaka, Chattogram, Khulna, and Rajshahi from 65% in 2005 to 90% by 2025 and 95% by 2050.

## Laying 100km in total length of water supply pipes The first major infrastructure work in Bangladesh

A coastal city in southeastern Bangladesh, Chattogram is the second largest city after the capital Dhaka. Having the largest port in the country, the city has been a busy trading center for several thousand years. With the port still serving as a major channel for the country's international trade, Chattogram has a key position in terms of the national economy and trade. It is here that Kubota Construction Co., Ltd., a member of Kubota Group is involved in the Karnaphuli Water Supply Project. Kubota Construction Co., Ltd. has many achievements in infrastructure development especially



Takao Ochiai  
Executive Advisor  
NJS Consultants Co., Ltd.

on water supply and sewage systems in various countries around world such as Cambodia, Laos, Afghanistan, Iraq, Jamaica, and Yemen. This project represents Bangladesh's first major water-related infrastructure construction work<sup>3</sup>, with the laying of conveyance, transmission and distribution pipes accounting for 100 km in total length (first and second phases combined) as a purpose of collecting raw water taken from the Karnaphuli River that flows into the Bay of Bengal. After completion of this project (first and second phases), it is expected that the water supplied population coverage in Chattogram will increase from the current figure of 47% to 85%. The origin of the project dates back to 2008, when Kubota Construction was informed that "the Japan

International Cooperation Agency (JICA) was planning an ODA project to develop a water supply system in Chattogram, Bangladesh."

<sup>3</sup> Most of the water supply pipes in Chattogram were constructed under British rule. Leakage from obsolete pipes, contamination, and other problems caused as they source service water from underground, as well as almost-continuous water restrictions, have made water supply far from steady.

## A city in absolute chaos: Is the project feasible in Chattogram?

To determine the profitability of the project, Akira Shirai, then responsible for design and cost estimation at the Tokyo Regional Office (now Project Manager of the Karnaphuli Water Supply Project), was sent to Chattogram. Although he had been involved in a sewage system project in Yemen in the past, Shirai had since taken on duties at the Technology Research Center and elsewhere, and so it was his first time in a long time to set foot on foreign soil. However, he felt daunted upon his arrival.

"I had never visited the city, but what I saw in Chattogram was total chaos. Overwhelmed by massive waves of people and seemingly endless traffic jams, I was at my wit's end because I didn't know if and how it would be possible to execute the construction of a water supply system

there," recalls Shirai.

What Shirai saw then remains the same today. Some might call it "Asian vibrancy," but it would be more appropriate to describe it as "chaos in tumult." After the most careful consideration, Shirai submitted a report after returning to Japan to the effect that the company should go ahead with the project, as it would be feasible with Kubota Construction's technology for civil engineering work and Kubota Corporation's cast iron pipes. However, more than a few opposed his proposal and insisted not to involve in this project due to the high risk. This project was the largest ever for Kubota Construction, and the cost of the construction work alone was comparable to Kubota Constructions total yearly turnover in Japan at the time. There was also a country-risk stemming from the national instability of Bangladesh. Should an unforeseen event falter the project, the company might face survival risk. At the end of the day, however, Shirai managed to have his opinion heard.

"I was under pressure due to the uncertain future of the project, but my thought process was simple: if we construct a water supply system, water can be supplied, which should realize a better living environment. I was also convinced that we had to do this because only we could do it. Of course, I carefully considered the profitability of the



Akira Shirai  
Project Manager, Karnaphuli Water Supply Project  
Executive Officer, Kubota Construction Co., Ltd.

project before I made my decision." (Shirai)

Thus, the project began. The first hurdle it faced was an international tender.

## Submitting a tender for a strict and fair international bidding Emphasizing high engineering prowess

Though the project was to be funded by the ODA, the JICA drew up a master plan with support from a consulting service (or an "engineer"). The responsibilities of such engineer would cover a broad spectrum, including creation of projects and discovery of issues, preparation and investigation, and both basic and detailed design. Other important responsibilities include selection of subcontracting construction companies and monitoring of construction work progress. Appointed to be engineer for the Karnaphuli Water Supply Project was NJS Consultants Co., Ltd. of Japan, which had experience in offering consulting services to water supply infrastructure projects

around the world. It should be noted that it was not mandatory for NJS Consultants to subcontract the construction job of an ODA project to a Japanese company, despite it being funded by a yen loan, and instead a suitable construction company would be determined by a strict and fair international bidding. Thus, NJS Consultants' task was to examine engineering capabilities and other parameters of construction services bidding from various countries and make a proper assessment.

"In any such project, the single most important thing is to pick a service that offers high engineering expertise and cost performance. Kubota Construction pointed out emphatically that this project would require a very high level of engineering, as pipework with large-diameter pipes involved extreme difficulty. It was also vital for the service to have everything needed to do the job. We, too, felt that Kubota Construction's engineering technology stood out from the other bidders from various countries. Kubota Construction eventually made a successful bid, and we highly rate their construction work that followed, the progress of which earned our complete confidence." (Takao Ochiai, Executive Advisor, NJS Consultants Co., Ltd.)



**FEATURE “People’s Republic of Bangladesh”**

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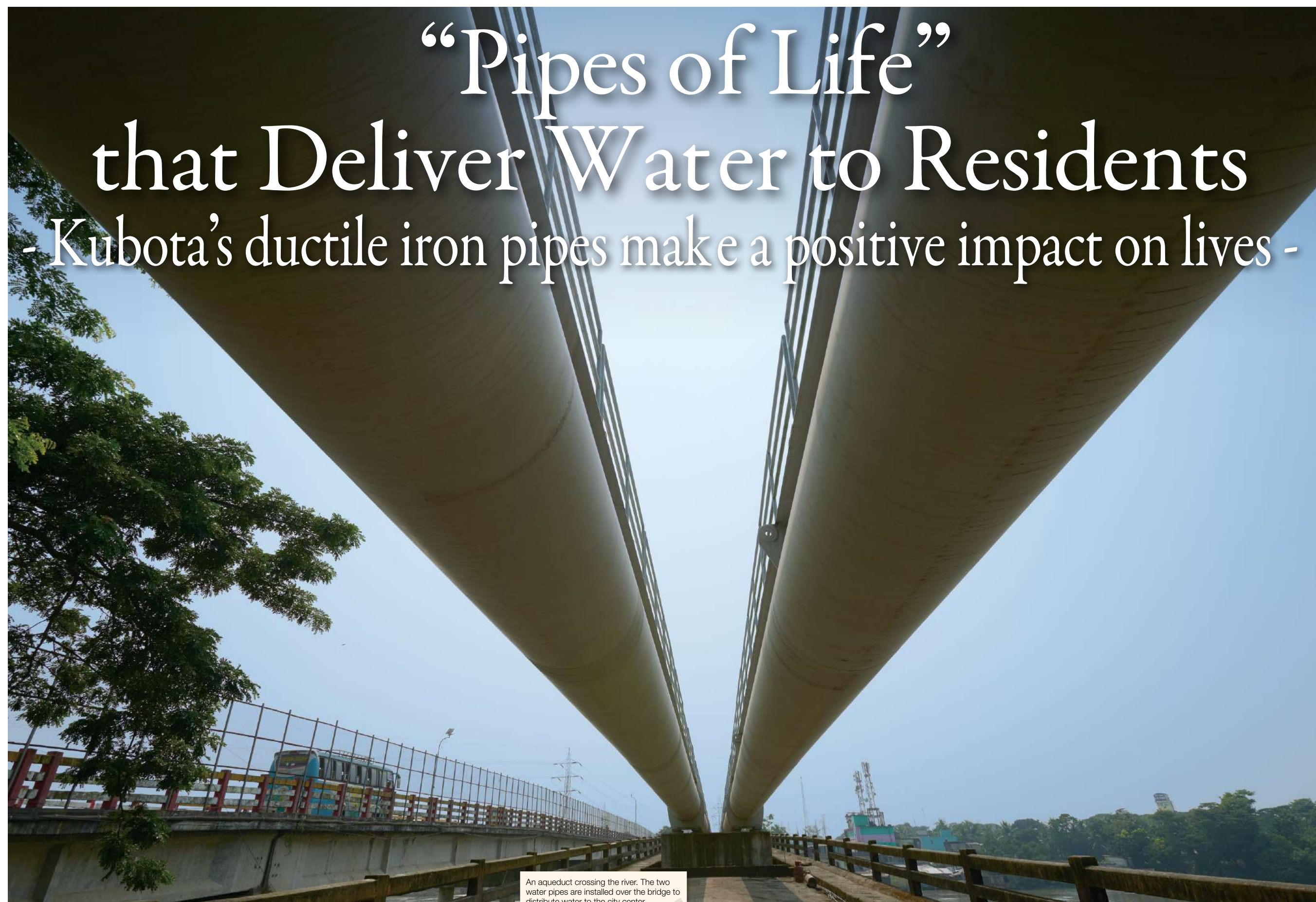
Optimal construction methods for a challenging civil engineering undertaking in urban settings have won much acclaim.

The tender for the project was made in two stages, involving technical and price evaluations, respectively. Only the bidders that successfully passed the initial technical evaluation stage qualified for the price evaluation. As the sole bidder who passed the technical evaluation for both the first and second phases of construction projects, Kubota Construction successfully proceeded to the price evaluation, where it agreed on bid prices with the employer to win the tender. So, how was Kubota Construction able to pass the technical evaluation? According to Shirai, on top of its urban setting, in which people and vehicles were constantly coming and going (adding to the difficulty of engineering work), the sites for the water supply project in Chattogram had a three-type of difficulties: Spring water during earthwork, soft ground and congestion of buried objects. From the very start of the project, it was bound to be rough going, with the need for advanced engineering capabilities. In anticipation of the difficulties, Kubota Construction prepared a package of optimal construction methods carefully chosen to accomplish the difficult tasks, including a water bridge construction method as well as a pipe jacking method, together with its reliable piping engineering. The advanced level of Kubota’s technical capabilities secured the winning bid. Eng. Mr. A. K. M. Fazlullah, Managing Director of the Chattogram Water Supply and Sewerage Authority (CWASA), who is the representative of the employer, had been involved in the development of the water supply system in the city of Chattogram for more than 40 years, and he claims that Kubota’s technologies and products caught his attention from early on.

“In the 1980s, when I was involved in the very first project in Chattogram that took water from the river for water supply, I had a chance to visit one of Kubota’s plants in Japan while I was visiting water pipe suppliers candidate for the project. There, I encountered water pipes of the best quality manufactured with cutting-edge technologies. The bid went to Kubota, who supplied its water pipes to Chattogram for the first time. We were highly satisfied with Kubota’s products. The ongoing project involves a high degree of difficulty, too, using large-diameter water pipes to span along rivers and to under-cross the river and railway tracks, but I was impressed that Kubota Construction came up with viable solutions made possible by their ample experience. I have to admit that some government officials were reluctant because of the cost, but I persuaded them into approving Kubota Construction’s proposal, saying I would take total responsibility for the selection.”

Feeling their way through numerous hardships to accomplish large-scale construction work

In August 2011, Shirai arrived in Chattogram as Project Director, one year before the construction of water supply pipes with the total length of 68 km (first phase\*) began in August 2012. Most of



An aqueduct was installed over the old bridge, and pedestrians use a new bridge beside it.

“Even before construction work began, buried objects troubled us. We began

investigating what was buried as part of the test excavation, not knowing what we would end up discovering as gas pipes, existing water pipes, and communication pipes had been set up all over in a disorderly fashion since the start of British rule. Whenever we found something buried underground, we would ask the corresponding authorities to do something about it, but some road administrators did not allow us to excavate, which made it difficult to go on with



**A.K.M. Fazlullah**  
Managing Director  
Chattogram Water Supply & Sewerage Authority

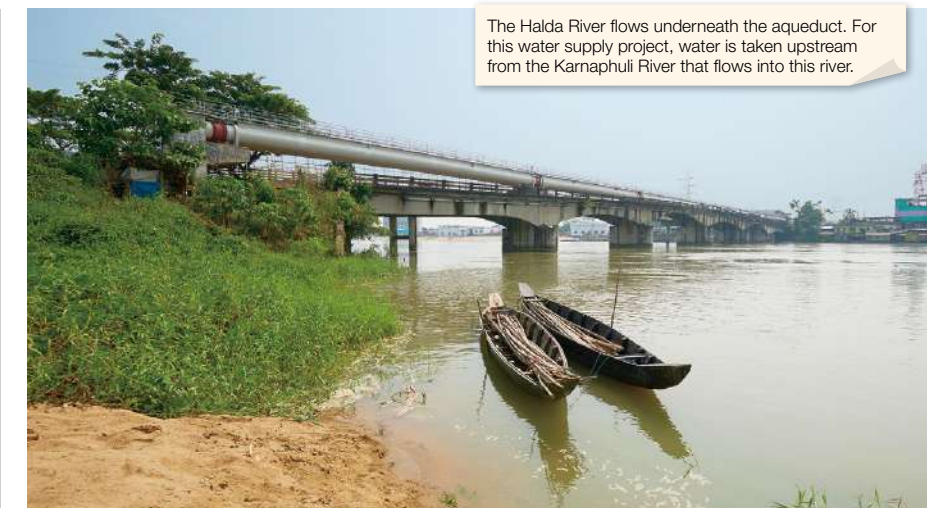
construction work. In retrospect, the key to smooth progress in the construction process was obtaining understanding and consent from those concerned through tenacious negotiations.” (Shirai)

The construction that followed proved a real challenge: the pipes were laid down at from 15 to over 30 sites simultaneously, with around 500 workers engaged in the work on any given day. At locations along busy roads, traffic was backed up as vehicles



**Toyohide Kurimoto**  
Construction Manager  
Karnaphuli Water Supply Project  
Kubota Construction Co., Ltd.

were limited to moving one way only. This resulted in a gradual shift to nighttime work at places with heavy traffic until some 80% of the construction was conducted during the night. Meanwhile, engineers from Kubota Construction steadily implemented technologies that they had proposed in their tender. To prevent elbows of the ductile iron pipes from being removed after connection, they applied advanced piping technologies, “restraint coupling”. At a site where they had to span a river, they adopted a special



The Haida River flows underneath the aqueduct. For this water supply project, water is taken upstream from the Karnaphuli River that flows into this river.

“pipe aqueduct” technique, which reinforced the bridge piers of an existing road from the submerged portions upward and used the resulting structure to connect a pipeline of approximately 220 m in total length over the river. Then, at sites where it was necessary to cross underground waterways or railway tracks (where excavation of the ground was not allowed), they used the pipe jacking method to push forward

sheath pipes as they drilled underground like a tunnel, thereby laying down ductile iron pipes steadily. As they proceeded, they encountered numerous factors unique to Bangladesh that hindered the construction, including flooding following heavy rainfall during the rainy season that they had never experienced in Japan and *hartal* (or “general strike”) due to political instability. While solving these physical issues one by one,

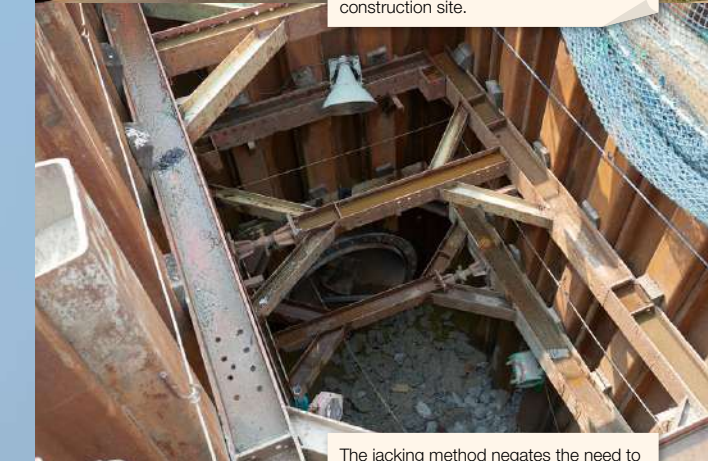
# “Pipes of Life” that Deliver Water to Residents - Kubota’s ductile iron pipes make a positive impact on lives -



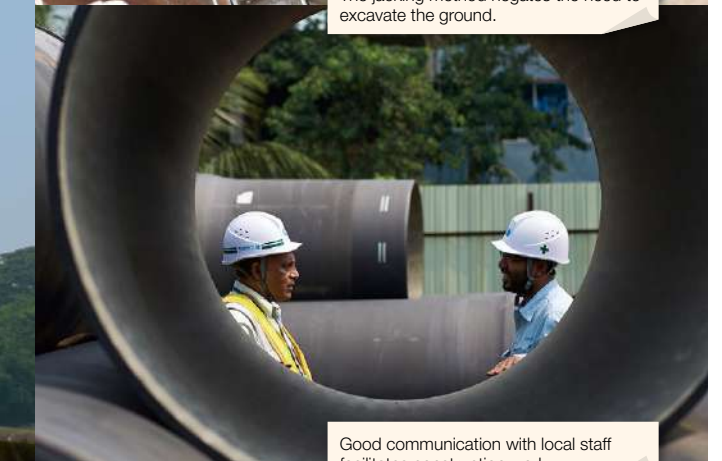
Due to its heavy traffic, the Oxygen Junction posed the biggest bottleneck for second phase work.



Vehicles come and go constantly by the construction site.



The jacking method negates the need to excavate the ground.



Good communication with local staff facilitates construction work.

they were faced with a non-physical issue—the level of construction management skills of Bangladeshis who were involved in the construction work.

\*4 The first phase of construction was jointly conducted between Kubota Construction Co., Ltd. and Marubeni Corporation.

Training Bangladeshi engineers  
Ensuring thorough safety management and increasing safety awareness

In January 2013, the project was joined by Toyohide Kurimoto (Construction Manager and Deputy Project Manager). Although initially arriving in Chattogram to provide temporary support, he was persuaded by Shirai to stay involved in the construction work until the end of the entire period. The work for the project would take place at several different sites, at each of which Kurimoto and other Japanese engineers would be separated from each other to



# FEATURE "People's Republic of Bangladesh"

supervise the work. At each construction site, Bangladeshi managers oversaw construction work to manage workers on the field. As soon as Kurimoto arrived on site, he felt it imperative to help improve the skills of Bangladeshi managers and to train people.

"The reality was, even those who majored in civil engineering at universities lacked the skills or knowhow required for construction work management. I believe that all Japanese members shared the anxiety that they wouldn't be able to complete the work if they did not increase the overall level of construction management by local staff members. So, we began by training them on the most basic construction management skills. What was important was to have them understand what we think and for us to understand what they think. We made it a point to communicate our thoughts and ensure that they understood and consented to them. Through such down-to-earth, persistent approaches, we trained field managers, who then helped subcontracting construction services—which provided the workforce—to develop. I believe that such efforts were instrumental in achieving smooth progress in the project." (Kurimoto)

The dedicated endeavors of Kurimoto and other Japanese engineers to develop Bangladeshi workers were definitely of help in improving the overall construction management and engineering skills of the local people. If Bangladeshi workers shared what they had learned with their people in future generations, they could facilitate the future development of infrastructure in the country. In addition to cultivating local human resources, they put a great deal of effort into safety management training. Safety management represents the most basic of basic skills in construction work, but there were "no laws concerning safety or safety training" (Shirai) there. So, they urged local workers to wear protective clothing, helmets, and safety shoes. By sending repeated reminders, they were able to raise the overall level of safety awareness among the local workers. Furthermore, at every milestone in the project, they organized a "safety convention" to draw people's attention to and educate workers on safety awareness, and thus successfully completed the first phase of construction without a single accident.



Service water supports people's lives. This everyday scene is the very source of Kubota's motivation.

## 100-km-long water pipes set in place to deliver water of life to 2.7 million residents in Chattogram

The first phase of construction was brought to completion in November 2015. They successfully received



Stable supply of safe water benefits food production as well.



\*5 The second phase of construction was performed by a joint venture between Kubota Construction Co., Ltd. and Kolon Global Corporation of South Korea.

orders for the second phase of construction, which started in November 2016\*. Planning of the second phase had started while the first phase was in progress, with the aim of further increasing water supply capabilities in order to serve the demands of Chattogram, whose population was and is expected to grow further. As in the first phase of construction work, ductile iron pipes with a total length of 35 km were supplied by Kubota. It won the second

phase tender because of its highly acclaimed construction plan that would make the best of the experiences and technological knowhow gained through the first phase. High confidence in Kubota's ductile iron pipes, coupled with Kubota Construction's advanced water supply construction technology, overwhelmed other bidders in the technical evaluation. Despite the occasional hardships like those experienced during the first phase, the work of the

second phase proceeded very smoothly, with 90% of the work (31.5 km) finished by October 2018. When the second phase is completed, the coverage of water supply for the entire Chattogram city should be increased to 85%, providing many families in the city with access to safe water via faucets. The 100-km-long water pipes Kubota Construction will have constructed should serve as "pipes of life" that bring a bumper crop to the

people in Chattogram. With the scheduled completion of the second phase in October 2019, Kubota Construction's mission will come to an end. Having been involved in the project for ten years, Project Leader Shirai looks back on the time with his heart full. "We've done a good job," was his candid remark.

"Be like Chattogram or any country or region, we do what we are supposed to do. We put everything we have into doing it. For this particular project, our consistent efforts resulted in the supply of safe water, which brings joy to many people. I am convinced that this has been another good job of ours." (Shirai)

For this project, Kubota Group companies teamed up with each other as they tapped into the collective strength of the Group. With the ultimate mission of supplying safe water to people the world over, the Kubota Group is ready to take the next step, equipped with high quality materials and reliable construction technology.

\*5 The second phase of construction was performed by a joint venture between Kubota Construction Co., Ltd. and Kolon Global Corporation of South Korea.

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# Underpinning the Global Water Infrastructure - Ductile iron pipes: Kubota's manufacturing started here -



Manufacturing of ductile iron pipes starts by carefully selecting and then melting scrap iron with minimal impurities (Kubota Keiyo Plant).

Developing the world's first commercial ductile cast iron, "the third iron"

Originally established as a foundry, Kubota achieved a major breakthrough when it became the first in Japan to mass-produce cast iron pipes for water supply in 1893. This legacy business now forms a part of the Pipe System Division, whose mainstays include ductile iron pipes. You might wonder, "What is ductile cast iron?" As one of the variety of cast metals, cast iron offers superior material properties to steel, such as earthquake performance, damping properties, anti-wear performance, and moldability, but has its own weakness—fragility. Invented in the U.S., ductile cast iron does not have this weakness, and it demonstrates strength and extensibility comparable to those of steel. Hailed as the "greatest discovery of the century" or "the third iron," ductile cast iron was extremely hard to make, and its practical application was regarded as very challenging. Then in 1954, Kubota surprised the world when it successfully manufactured large-diameter ductile iron pipes for the first time ever, followed by mass-production three years later. Ductile iron pipes have since spread

rapidly, being chosen for water and sewage lines and other infrastructure projects around the world.

Keiyo Plant—A mass-production center for the world's longest 9m-long ductile iron pipes

Kubota manufactures ductile iron pipes at two locations: the Hanshin Plant in Hyogo Prefecture and the Keiyo Plant in Chiba Prefecture. The Keiyo Plant, in particular, is the only facility in the world capable of mass-producing 9m-long iron pipes, which were used for the Karnaphuli Water Supply Project. It shipped a total of 8,814 ductile iron pipes for the project. At the helm of this manufacturing endeavor was Manager Kazuhiro Yamato of the Ductile Iron Pipe Production Section.

"Because the cast iron pipes that we make will be used to supply safe water, we felt a sense of responsibility for providing products with reliable quality. The part of the manufacturing process that affects safety of water most is the internal coating process, during which we rotate pipes at high speed to evenly apply cement



Top: Each ductile iron pipe is subject to rigid quality checks after production. Kubota Keiyo Plant (left) and ductile iron pipes in neat rows (right). The pipes are shipped overseas from Kubota's dedicated port by the plant.

mortar to form a thin coat inside the pipes. The coat prevents the pipes from being corroded. We did not make any compromises in quality while meeting rigorous specifications, and so we are confident that we provided pipes of the highest quality in the world." (Yamato)

The Karnaphuli Water Supply Project represented a large-quantity order of a total extension of over 100 km. To meet the delivery requirements, they had to run both day and night shifts during peak demand. At one point, production equipment experienced unexpected trouble as it was exposed to a thermal load for many hours, but everyone at the plant got together to address the case, and they managed to produce all of the orders.

"We take pride in being the direct successor of the founding business. No matter how the business environment changes, the founder's spirit and passionate devotion to manufacturing have been steadily passed down to us. With his passion in mind, I am determined to contribute to a better society through manufacturing." (Yamato)

Kubota's efforts to solve the water problems of the world start from the manufacturing site.



Kazuhiro Yamato  
Manager, Ductile Iron Pipe Production Section  
Keiyo Plant, Pipe System Division  
Kubota Corporation

Akinori Azuma  
Foreman, Mid- and Large-Diameter Pipe Workshop  
Ductile Iron Pipe Production Section  
Keiyo Plant, Pipe System Division  
Kubota Corporation

Because ductile iron pipes are made of waste materials (i.e., scrap iron), the components of the melted iron are always slightly different. To adhere to a specific level of quality, they needed to conduct fine-tuning depending on the conditions of raw materials, and this provided Yamato and his team with a chance to show off their expertise. Furthermore, the ductile iron pipes manufactured for the project measured up to 9 m in length, 1.2 m in diameter, and 4 t in weight, and their sizes brought its own challenges. Immediately after casting them, the larger their scale, the more likely they were to be warped or bent under their own weight, and advanced technology was required to minimize such deficiencies.



FEATURE "Sultanate of Oman"

Expanding the future of food, water and the environment.

Pro-Japan Oman seeks to distance itself from dependence on oil

The Sultanate of Oman is an Islamic country on the eastern edge of the Arabian Peninsula, facing the Persian Gulf and the Indian Ocean. Not many Japanese know about this Middle Eastern country; however, the people in Oman feel kinship with Japan partly because Sultan Qaboos often cites Japan as a model for their national development. Economically, too, Japan is important for Oman as they export approximately 16.6% of their oil to Japan, the nation's second largest export destination after China\*. Ever since the country began producing oil in 1967, the Omani economy has prospered by maintaining a sole focus

on oil—that is, deriving nearly all of its income from oil exports much like the other oil-producing countries in the Middle East. Due to a decline in oil prices over the past few years, however, Oman is facing financial difficulties. Furthermore, its oil reserves are estimated at 5.6 billion barrels, with the ratio of reserves to production being rather small at 14.6 years<sup>7</sup>, which makes a departure from dependence on oil an urgent requirement.

This being the case, Oman has recently changed course and is seeking sustainable development with earnings from oil and gas. In its long-term national strategy, Oman Vision 2020, it listed a variety of themes, such as stabilization of private income and maintenance of economic growth, development of human resources, expansion of job opportunities for the Omani people,

and development of the private sector through promotion of investments. Also on the list is the privatization of the sewage treatment systems, and sewage treatment is a national priority.

\*6 Ministry of National Economy, Sultanate of Oman (2009)
\*7 BP Statistical Review of World Energy 2017 (2016 data)

The water situation in the desert No rivers, and annual precipitation of 100 mm

Oman's total area is approximately 310,000 km² (making it three-fourths the size of Japan), 82% of which is covered by sand/dirt deserts. Classified as existing within a desert

climate, the country does not have any rivers. Annual precipitation is very low, with 100 mm for the national average. Of this water, some 80% of the rainfall evaporates, 5% pours into the sea, and 15% accumulates underground. Because of this climate, Oman suffered chronic water shortages until a breakthrough, when its first seawater desalination plant was constructed to start supplying water to the capital Muscat in 1976. Subsequently, seawater desalination plants were constructed at various locations in the country, while a water supply network was developed to supply safe water to the people. As the population keeps growing in rapidly urbanizing Muscat and other cities, however, the country is faced with the serious challenge of wastewater treatment. This is not unique to Oman, as the issue of wastewater treatment has surfaced in fast-urbanizing regions of the world.

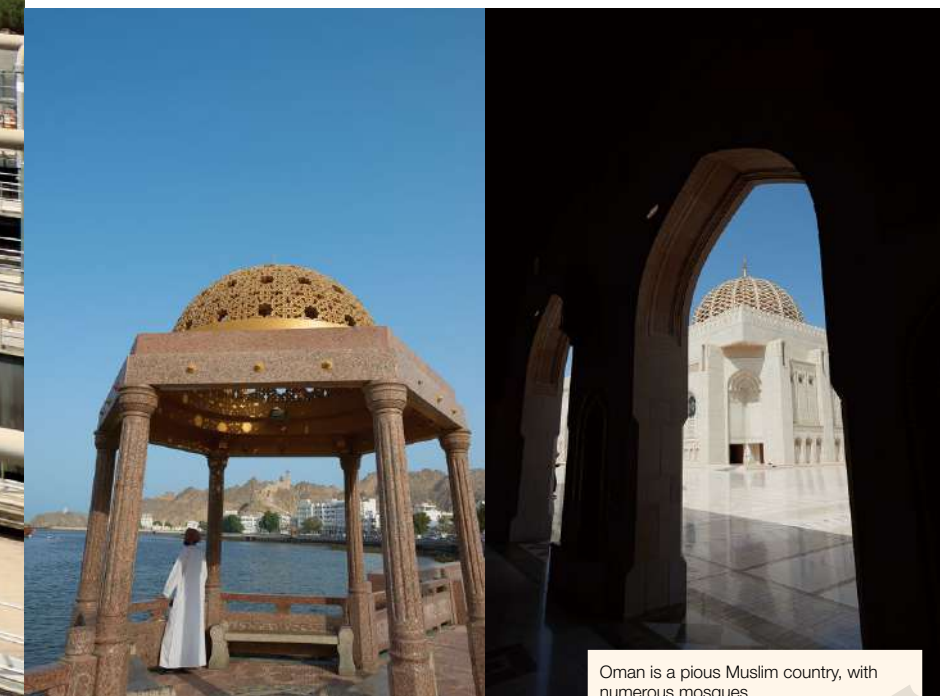
Nevertheless, the situation is particularly serious in desert countries such as Oman, where water is an extremely precious resource. In order to recycle this limited resource without wasting it, an advanced wastewater treatment system was required.

Introducing the Membrane Bioreactor method for sewage treatment plants KUBOTA Submerged Membrane Unit™ in operation

The Al Ansab Sewage Treatment Plant (STP), Muscat, Oman—Here, the Membrane Bioreactor (MBR) method is used to treat wastewater. MBR is an advanced wastewater treatment technology



Top: Remains of a gun battery. Located at the eastern tip of the Arabian Peninsula, Oman has long been a strategically important position. Bottom: The capital Muscat is undergoing rapid urbanization. Traffic jams occur frequently these days.



Oman is a pious Muslim country, with numerous mosques.

# The Imperative Need to Recycle Limited Water Resources - Al Ansab Sewage Treatment Plant, Oman -



A bird's-eye view of Al Ansab STP, which looks like a water recycling plant built in the desert



Mahmoud El Sayed Abou El Soud General Manager, Operation and Maintenance, Haya Water



Haya Water



A queue of tankers carrying wastewater brought in from Muscat. Development and spread of sewage lines is an ongoing challenge.

that combines biological treatment using microorganisms and solid-liquid separation using membranes. Despite its compact size, the system generates clean processed water and achieves simple maintenance. A pioneering manufacturer of MBR using flat sheet, Kubota has shipped its KUBOTA Submerged Membrane Unit™ to over 6,000 facilities around the world. At Al Ansab STP, too, KUBOTA Submerged Membrane Unit™ have been in smooth operation since 2010 (the first phase of construction), thus playing a strong role in recycling processed water. More recently, a new project has been kicked off—renewal and expansion of the country's sewage treatment plants. Haya Water is Oman's national corporation responsible for construction, management, and operation of Al Ansab STP and a wastewater plants in Muscat. General Manager Mahmoud El Sayed Abou El Soud of Operation and

Maintenance, Haya Water, spoke about the background of the new project.

"Rapid development of residential land and commercial facilities has brought with it a higher volume of wastewater, and we find it increasingly difficult to deal with the situation using existing treatment plants alone. Expansion of treatment capacity thus poses an urgent issue and, as a solution to this, we decided to renew and expand our sewage treatment plants (in the second phase of construction). In Muscat, we source service water from desalinated seawater and underground water, the latter of which comes from a very small amount of rainfall. We are also implementing projects for efficient use of rainwater, such as construction of a dam to hold rainwater to have it permeate underground reservoirs. Still, the fact remains that we are experiencing water shortages. We

believe that it would be a giant step forward in resolving the water problems in Muscat to expand treatment capacity with the possibility in mind of treating the ever-increasing volume of wastewater properly for recycling. This is why we initiated the project."

Presently a Director of Kubota Membrane Europe Ltd. (KME), Hidehiko Sakayama has been involved in the Al Ansab STP project as a salesperson. Sakayama was appointed as a person in charge of the Middle East in 2007 and was stationed at the Dubai Branch from 2008. Several years later, he was at the sales front of the Al Ansab STP project. The first phase of construction was already underway at that time, and Kubota had delivered its KUBOTA Submerged Membrane Unit™. He assumed the position immediately before the sewage treatment plant became operational.



FEATURE "Sultanate of Oman"

Expanding the future of food, water and the environment.

KUBOTA Submerged Membrane Unit™ Recycle Water - The largest MBR sewage treatment plant in the Middle East -

Directly approaching the end user A committed support stance

Usually, Kubota's direct customers are engineering companies. They receive orders for the entire scope of construction work from an end user like Haya Water, design facilities, procure necessary materials, and carry out construction in accordance with specifications. As such, Kubota's salespeople visit engineering companies to demonstrate the superiority of KUBOTA Submerged Membrane Unit™ and to encourage prospective clients to adopt Kubota products for their projects. Here in the Middle East, which represents a promising market, Kubota has managed to receive orders for the first phase of construction by following a similar sales style. For the second phase, however, the company changed its approach to try a new sales style for the project. That is, Kubota addressed head-on issues with the sewage treatment facility that was already in operation, and it offered committed support to the end user.

"In the past, when we offered aftersales support, we contacted end users through our local partner engineering companies. This time, however, we decided to make contact directly with Haya Water, the end user of the project. Haya Water is indeed an important customer, which should promise future business for Kubota. We also pride ourselves in having more knowhow about MBR than any other engineering services. After the first phase of construction had been completed, we invited all the departments concerned in the company to offer all-out support, so that we could make all possible preparations before starting operations and doubly ensure we would receive subsequent orders. I believe this approach won us solid credibility from Haya Water." (Sakayama)

Joining salesperson Sakayama as an engineering specialist was Toshiyuki Shibata of the Development & Engineering Group of the Membrane Systems Department, who began visiting Muscat

intermittently from around 2012, two years after the plant started running, to offer technical support.

"I took extra care to help the client understand Kubota's membranes thoroughly by showing them proper use of the membranes and by providing guidance on operation procedures and optimal maintenance techniques. Due to the nature of the KUBOTA Submerged Membrane Unit™, the way they are used and operated can greatly affect their stability and durability. We also made it a rule to carefully respond to all sorts of problems that occurred at the plant by staying in close proximity to Haya Water, with the hope that we would be able to build friendly relationships. For example, one time the treatment capacity dropped significantly. This was not attributable to our membranes but to external factors; nevertheless, we compiled a highly detailed investigation report, and we offered instructions on the appropriate way to clean the membranes. I'm sure that such everyday support has earned us credibility." (Shibata)

Working directly with the end user to offer all-out support—The decision and its implementation led Kubota to clearly differentiate itself from competitors and eventually win orders for the second phase of construction.

Making the most of existing facilities to reduce cost and construction period

Soon it was time to submit a concrete proposal for the second phase of construction. Sakayama's team came up with a plan to replace the KUBOTA Submerged Membrane Unit™ in the existing eight membrane tanks with larger ones with a higher treatment capacity. This would minimize the need to establish new facilities (only four new membrane tanks needed to be installed) and shorten the construction period, thus significantly reducing total cost.

In the fall of 2015, Kubota successfully



Ruel B. Tumimbang Head, STP & Pump Stations Haya Water

Hidehiko Sakayama Director Kubota Membrane Europe Ltd. (KME)

received the orders for the second phase of construction. The work that started subsequently was not easy. While replacing KUBOTA Submerged Membrane Unit™, sewage treatment had to continue. There was no way that the plant could be brought to a halt. So, they carefully mapped out a plan and detailed process and involved those from relevant departments, including the KUBOTA Submerged Membrane Unit™ manufacturing department and construction work department, and the work progressed

steadily. Haya Water's General Manager Mahmoud explains why they decided to go with KUBOTA Submerged Membrane Unit™. "Compared with the products from competing suppliers, KUBOTA Submerged Membrane Unit™ are resilient and highly durable. Other advantages over competing products included ease of cleaning and other maintenance processes. On top of such competitive advantages, we sincerely appreciate their membrane replacement

plan, which minimizes costs. After having won the orders, they have also been responsive to our detailed needs by, for example, reducing the impact on ongoing sewage treatment to a minimum. As I have described, Kubota's support left nothing to be desired, before or after they received the orders. Whenever we have an issue, they send specialists that come flying to us. From my perspective, Kubota's staff are already members of Haya Water. We cannot thank them enough."

Other employees of Haya Water, including Ruel B. Tumimbang, Head of STP & Pump Stations, share this sentiment of his.

"We are highly satisfied with Kubota's technical support, technical solutions, and other forms of support. We would like this close relationship to continue as long as the plant is in operation. We also eagerly anticipate them to help us expand this superior technology of MBR all over Oman."

Calling on all of Kubota's knowledge and knowhow to solve the water problems of the world

Having begun in early 2016, the second phase of construction was completed in May 2018 and the plant was duly put into use. With this, the plant's sewage treatment capacity was increased substantially from 57,000 m³ to 125,000 m³ per day, making Al Ansab STP the MBR plant with the largest capacity in the Middle East. Nevertheless, there remained some issues to address, such as how to use treated water. At present, 60% of the treated water is used to water plants and the rest is discharged into the sea. Only when treated water is put to efficient use, rather than merely treating sewage, can we see the path open up for the recycling of water resources to solve water problems. General Manager Mahmoud talked about their outlook on efficient use of the limited water resources.

"It really is a shame that we have to dump 40% of the treated water into the sea. We are planning to put this resource to various uses, such as providing water for agricultural use, watering sports facilities, replenishing water for cooling buildings, and supplying water for roadwork. We do have other issues to resolve, such as a large psychological barrier among the people about recycling sewage, but we are hoping to take action to recycle 100% of the treated water in the near future."

Reflecting on this project, Sakayama says it was special for him. "To win the orders for this project, we had to assemble all the knowledge and knowhow on membranes that Kubota has to offer. I was able to get a strong companywide response from this project, through which we motivated and involved people in order to bring out Kubota's resources for success. Going forward, we are planning to move one step further from the membrane sales business to develop business with a broader perspective, possibly doing something with plants as well." (Sakayama)

Meanwhile, Shibata continues to keep himself busy visiting his customers for periodic support. "In Japan, for the sake of environmental conservation, sewage is treated to result in clean water and discharged into the sea and rivers, but the need to recycle treated water is high overseas. Thus, I believe that making recycling a viable option will lead to a solution to water stress. To make this a reality, KUBOTA Submerged Membrane Unit™ are highly useful, and I want people living in regions around the world that are under water stress to understand this." (Shibata)

Having had its efficacy proven in this project, the MBR is definitely a key technology for mitigating water shortages. As the MBR is expected to spread further around the world, Kubota is ready to tackle global water problems by making full use of its technology and knowhow, which includes the supply of KUBOTA Submerged Membrane Unit™.



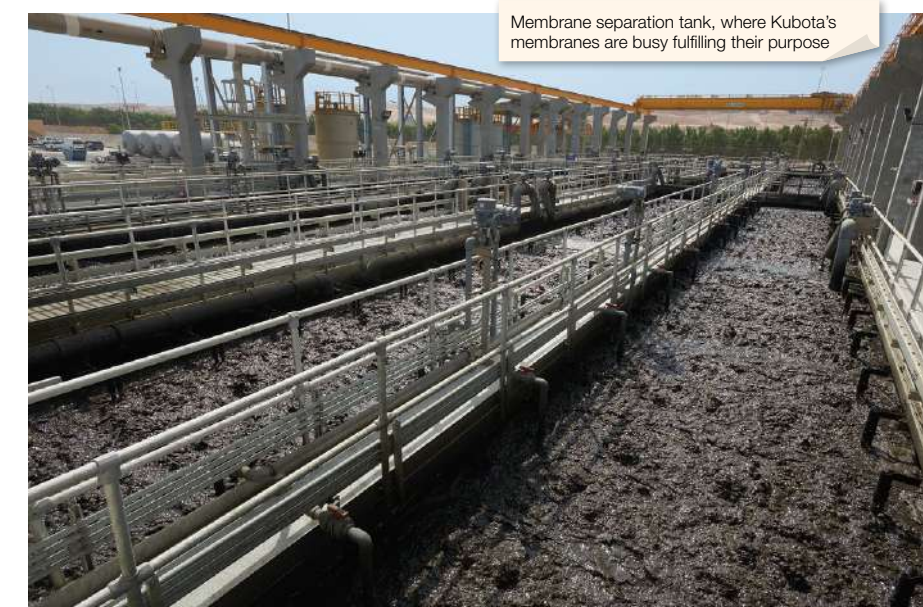
Toshiyuki Shibata Development & Engineering Group Membrane Systems Department Kubota Corporation



Recycled water is used to water plants in parks and gardens.



The largest MBR sewage treatment plant in the Middle East, combining biological treatment using microorganisms and solid-liquid separation using membranes



Membrane separation tank, where Kubota's membranes are busy fulfilling their purpose



PEOPLE

### Kubota's Professionals Tackling Global Challenges

All Kubota people have a passion to be of service to people the world over and constantly challenge themselves to making this a reality. Two such professionals talk about their global challenges in Bangladesh and Japan.

## Global Work Style 1 Supplying Safe Water to his Home Country of Bangladesh—Taking on the Heavy Responsibility of a Pivotal Role in the Project



### Hasan Jahir

Manager  
Overseas Department  
Kubota Construction Co., Ltd.  
Joined the company in 2012

to realize the importance of earning the trust of my negotiating partners. I tried to build up a relationship of trust that they could confidently think, "If Hasan says that, it must be needed." One of the greatest impressions moment always recall my mind when we put together the tender documents on the table for the second phase of Karnaphuli Water Supply Project construction with other members. We held extremely detailed discussions in terms of both technical (engineering) and financial (cost) aspects to finalize a tender document that we could submit with confidence. All the more because of this, I had a great feeling of achievement when we won the tender.

The project provided a chance to provide valuable gifts to his home country

This is my first experience to involve in such a large project. I truly felt the joy of work from my heart to have this opportunity to become involved in the development of water infrastructure in my home country, Bangladesh. Also, I feel strongly satisfied with lasting gifts in terms of products, technologies, and non-physical aspects that I have been able to give to my home country through this project, including the facts that the concept of safety management has begun taking root among Bangladeshi construction works and that Bangladeshi who were involved in this project have demonstrated their talents at other construction sites. If you look around Bangladesh, there remain many areas where the water environment is still wretched. I hope to offer my services to the development of water infrastructure in my home country again, if and when I have a chance to do so. At the same time, as a member of the Kubota Group, I am ready to go anywhere in the world to play an active role in solving water problems at various regions may have.

### From Bangladesh to Japan Joined Kubota with a wealth of knowledge

I was born and raised in Bangladesh. Bangladesh has fertile land with abundance greenery and many rivers and canals. However, the majority land of the country is within the delta, and so we have had frequent flooding of rivers, it has cost an extensive damage. I decided to pursue a career in civil engineering because I wanted to do something about the flood control for my country. I was admitted at a university in Bangladesh but wanted to learn civil engineering in Japan, which is well-known for its superior civil engineering technology, and so I moved to Japan in 1989. After studying the Japanese language for two years, I took a general entrance examination and was admitted to a Japanese university, where I majored in civil engineering. After graduating from the university, I worked for a Japanese civil engineering company for six years. During my service there, I presented a paper on geotechnical engineering at an academic conference, which drew the attention of a professor at a U.S. university. I was invited to undertake research at a graduate school in the U.S. for two years. After I returned to Japan, I worked for a construction company and a consulting firm. Through

referrals from an acquaintance of mine, I was asked if I would be interested in the Water Supply Project in Chittogram, which was being carried out by Kubota Construction. I took this opportunity that I could do something to solve water problems in my country, I decided to join them, and they sent me to Chittagong right away. That was back in 2012.

Working to build trust as a Bengali-speaking negotiator

I was expected to facilitate communication using the local language of Bengali to ensure that the construction proceeded smoothly.

My responsibility was to negotiate with Bangladeshis, including government officials, the employer (CWASA), local residents, and construction workers. For example when we needed any changes or additional construction work, I need to explain to the employer about the necessity of the work to obtain their understanding and consent for the associated costs and other matters, which required tenacious negotiations. On the other hand, the Japan side needed to understand Bangladeshis, including their national characteristics, values, and culture, as well as their belief in Islam. Strongly feeling the importance of my job, as well as my mission and responsibility, I negotiated with many people in various situations. While doing so, I was made



Expanding the future of food, water and the environment.

## Global Work Style 2 Delivering Kubota's Membranes to Countries in Southeast Asia Aided by Pivotal Trust Relationships with Customers

### Ryo Sakaguchi

Development & Engineering Group  
Membrane Systems Department  
Kubota Corporation  
Joined the company in 2016

Studied rivers in Vietnam at graduate school Determined to contribute to environmental improvement

My research theme at graduate school was water pollution in rivers in Vietnam and solutions to improve the hygienic conditions of the people living near them. While doing a field survey in Vietnam, I learned that those who discharge liquid waste into rivers are not the only ones who are affected, but also those who are not directly involved in the river pollution fall victim to damage in terms of both the environment and good hygiene. This kind of environmental problems occurs frequently in developing countries, and I myself wanted to do something to help improve the situation. To do so, I decided to get out of the academic world and seek opportunities in a field in which I could help improve people's living environments through business undertakings. In the area of water treatment, Kubota boasts a long track record overseas, mainly in developing countries, and I found a great opportunity in them and decided to join. The Membrane Systems Department, with which I am affiliated, markets membrane filtration equipment for wastewater treatment (KUBOTA Submerged Membrane Unit™). My responsibility there is to take advantage of my engineering background to contact customers in Southeast Asian countries and elsewhere to persuade them to use Kubota's membranes in their wastewater treatment facilities.

Sharing issues with customers Seeing things from their points of view

Once I visited a Vietnamese plant engineering company to pitch Kubota's products for their new wastewater treatment plant. When doing some research prior to the visit, I realized that they had once used Kubota's products but that an operational problem left them with a negative impression of Kubota. So, I looked into the causes of the problems that they had experienced to come up with improvement plans. When I visited them, I asked them to give me time to discuss what was needed to do to solve the problems. Through this experience, I think I was able to earn their trust in me



and share their goal by seeing things from their point of view to understand where their problems lay. After that, we have had plenty of inquiries about future projects, and we hope to take orders from them going forward. I was made to realize the importance of sharing issues and seeing things from the same perspective, thus fostering a relationship of trust.

Turning attention to the broader spectrum of the world Taking the All-Kubota approach

To win high recognition for Kubota, including its services and technologies, you really have to build a relationship of trust as you closely engage with your customers face-to-face and explain your products and technologies. I feel satisfied when, as a result of such an approach, they acknowledge the Kubota brand and the benefits of its products as "beneficial." Going forward, I will visit more customers to gain wider experience in demonstrating how to use our products and providing technical services, that should help me to hone my communication and presentation skills. At present, Kubota's membrane business offers total solutions that combine sales of membranes and engineering (design and construction of plants), mainly

for facilities in Japan. I hope that in the future, Kubota will be able to offer total packages of water treatment business around the world. So far, Kubota's membranes have been introduced to approximately 6,000 facilities, about 2,000 of which are overseas. In order to realize my student-days aspiration of contributing to the betterment of the living environment for people in developing countries, I am determined to help expand Kubota's wastewater treatment business while remaining aware of countries and regions across the whole world.



Visiting a palm oil factory in Indonesia, which considers introducing the MBR to their wastewater treatment. Sakaguchi is at the far left.





For Earth, For Life  
Kubota

# Kubota × SDGs

## When It Comes to Producing Sustainable Water, Leave It to Kubota



Often called the “watery planet,” Earth abounds in water, but approximately 97.5% of the water resources on this planet are seawater. Much of the remaining water resources are retained in glaciers or deep underground, making the water that we can use for human life a meager 0.01% of the total. These limited, highly precious resources of water support humanity and underpin our lifestyles and social activities.

This precious resource is mired in a serious crisis. Ensuring access to safe water is a critical issue for human life and health, and stable supply of farming water is deeply associated with food production. Sewage treatment and water pollution are closely connected with environmental and hygienic problems. Problems surrounding water are at risk spreading and causing other difficulties, such as those related to hard labor, unequal education, poverty, and human conflicts. Water issues even pose problems in terms of ethics, fairness, and other social values. In other words, water is of concern to the very existence of human society.

As the world population continues to surge, water problems are expected to become increasingly serious. SDGs are action guidelines for breaking away from this critical situation. There stand high, challenging barriers to solving the water problems of the world.

The goal is not in sight yet. But just as the corporate slogan declares, “We take on any challenge,” and Kubota will keep working on water problems. Kubota remains ready and willing to produce sustainable water around the world.



The contents of the articles included in this volume are accurate as of September through November 2018, which was when the interviews were conducted.

### Notice on “GLOBAL INDEX” back numbers

Since the first issue of 1992, the previous “GLOBAL INDEX” publications have been considering social problems around the world for more than 20 years.



### GLOBAL INDEX 2018

Previous issues (magazines and web contents) can be viewed from the special “GLOBAL INDEX” website.

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