Commissioned by the Ministry of Land, Infrastructure, Transport and Tourism

FY 2024

Study of International Cooperation in the Water Supply Sector

International Cooperation in the Water Supply Sector, With an Eye to Future Developments in Sewerage Systems

Final Report

March 2025

Table of Contents

Explanatory note

- When individual case reports used as source documents contain the terms "drinking water" or "tap water," they are replaced with "water supply" as legally defined in Japan, except in occurrences where it is outside the scope of legal restrictions in Japan, such as the name of an organization in another country.
- In Japan, water supply is organized as "charges" and sewerage as "usage fees," but in the survey results of overseas cases, both are described as "charges" in accordance with the source documents.

CHAPTER 1 Implementation Policy for the FY 2024 Study of International Cooperation in the Water Supply Sector

1-1 Content of Study

(1) Background and history

The Sustainable Development Goals (SDGs), adopted by the UN General Assembly in September 2015, consist of 17 goals and 169 targets, with SDG 6 "Ensure availability and sustainable management of water and sanitation for all"[1] set for the water and sanitation sector. Target 6.1, "By 2030, achieve universal and equitable access to safe and affordable drinking water for all," has been set,[2] and efforts are underway to achieve it. The Sustainable Development Goals Report 2024, published on June 28, 2024, shows that although the percentage of the population with access to safely managed drinking water increased from 69% to 73% between 2015 and 2022, approximately 2.2 billion people still do not have access to safely managed drinking water in 2022. Despite progress on sanitation, 3.5 billion people still lack access to safely managed sanitation facilities, and 2.0 billion people lack access to basic sanitation services. To achieve the 2030 goal, the current rate of progress must be increased six-fold for safely managed drinking water, five-fold for safely managed sanitation, and three-fold for basic sanitation services. In addition, climate change is exacerbating the problems of water scarcity and water stress, posing significant risks to social stability; integrated water management is needed to strengthen resilience to multiple crises, including climate change.[3]

In light of the significant changes in the situation since its formulation in 2015, the Japanese government revised the Development Cooperation Charter in June 2023 in order to update and implement development cooperation in an even more effective and strategic manner.[4] In terms of implementation, the report cites co-creation with various entities, strengthening of active cooperation such as co-creation for common agenda initiative cooperation that proactively proposes cooperation options that take advantage of Japan's strengths, and further improvement of the institutional design of Official Development Assistance (ODA) such as flexibility, efficiency, and speed.

In addition, in response to the major structural changes in the global infrastructure market over the past five years, it is necessary to go beyond the conventional concept of infrastructure and take on challenges in new areas through public-private sector cooperation, leading to growth for both Japan and partner countries. In place of the current 2025 Policy Program for Promotion of Overseas Infrastructure Systems, the framework of a new strategy looking ahead to 2030 was decided on June 5, 2024. It is expected to be formulated by the end of the year.[5] In the infrastructure market, there is growing demand for not only physical infrastructure but also comprehensive solutions and systems to address increasingly complex social issues. Infrastructure is shifting to a model that provides added value by providing ongoing services through operation and maintenance.

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[1] Sustainable Development Goals (SDGs) and Japan's initiatives (Ministry of Foreign Affairs) https://www.mofa.go.jp/mofaj/gaiko/oda/sdgs/pdf/SDGs_pamphlet.pdf

[2] Provisional translation by the Ministry of Foreign Affairs of Japan https://www.mofa.go.jp/mofaj/files/000101402.pdf

[3] UN https://unstats.un.org/sdgs/report/2024/Goal-06/

[4] Cabinet Decision on Revision of the Development Cooperation Charter https://www.mofa.go.jp/mofaj/press/release/press7_000038.html

[5] New Strategic Framework for 2030 https://www.kantei.go.jp/jp/singi/keikyou/dai57/siryou5.pdf

In Japan, up until FY 2023, water supply projects fell under the jurisdiction of the Ministry of Health, Labour and Welfare (MHLW), while sewerage projects fell under the jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT). However, beginning on April 1, 2024, the MLIT took over the administration of both water supply and sewerage systems. In recent years, there has been strong demand for water supply development and management administration to address issues such as the worsening business environment for water utilities due to the advent of a society with a declining population, the deterioration of water supply facilities and the need for earthquake resistance, and prompt responses to water interruptions in the event of a disaster. Transferring the administration of water supply development and management to the MLIT, which has expertise and knowledge in social infrastructure development and disaster response, the MLIT intends to promote integrated development with other social infrastructure such as sewerage systems while utilizing its extensive network of local branch offices, thereby strengthening the functions of the water supply development and management administration.

Thus, water and sanitation remain major challenges, and with climate change further exacerbating the issues, the need for cooperation in development to solve social issues remains high. Following the unification of jurisdiction over water supply and sewerage systems under the MLIT, it is necessary to organize examples of international cooperation and international contributions from the perspective of water and sanitation and consider future initiatives in order to promote more effective and efficient international cooperation and international contributions in the water supply sector.

(2) Purpose of the project

Experts from industry, academia, and government will collect, organize, and analyze relevant information on the expected effects of international cooperation in the water supply sector and issues that should be prioritized and actively addressed in international contributions, as well as discuss approaches and support policies for solving issues based on the needs of recipient countries. The purpose of the project is to promote the development of effective and efficient international cooperation and contributions by sharing the results with the parties concerned, which in turn will ultimately contribute to the self-reliant development of water supply and sewerage systems in recipient countries.

(3) Initiatives up until last year

This project was implemented by the MHLW up until last fiscal year. Through the Study Committee on International Cooperation in the Water Supply Sector established by this project, the MHLW has continued to conduct surveys and make recommendations focusing on intangible support. The committee set themes considered important at the time for each fiscal year for issues that needed active support and conducted discussions accordingly. Themes in past committee meetings have included the following.

Table0.1Study themes from the last 10 years

Fiscal year	Topic
2014	Consideration of support strategies appropriate to the actual situation based on an analysis of three aspects of the water utility's business environment: governance, human resource system, and financial base.
2015	The state of public relations
2016	Review of the recommendations made in the 2005 study on international cooperation in the water supply sector and the direction of efforts ahead of 2030

Fiscal year	Topic
2017	Review of the recommendations made in the 2005 study on international cooperation in the water supply sector and what form future activities should take
2018	Cooperation with other sectors and overseas expansion of water utilities and companies
2019	The state of water supply services in Africa
2020	The state of water supply services in Pacific Island Countries
2021	Effectiveness of water utility cooperation in international cooperation in the water supply sector
2022	International cooperation to address the impacts of climate change
2023	Synergistic effects of international cooperation activities on water supply development and climate change countermeasures

In FY 2022 and FY 2023, there was a focus on climate change countermeasures in the water supply sector in response to the recent demand for international cooperation, both domestically and internationally, in addressing the issue of climate change, whose effects have been seen in many parts of the world in recent years. The 2022 study examined Japan's policy on climate change countermeasures, specific examples of international cooperation activities in the water supply sector to address the effects of climate change, efforts by domestic water utilities to achieve carbon neutrality, and examples of efforts by overseas water utilities. The results were categorized into mitigation measures, adaptation measures, and human resource development measures related to climate change. Along with this, the ease or difficulty in proceeding with deployment in developing countries, conditions suitable for implementation, and important factors were summarized. In addition, the report provides evaluation perspectives and recommendations on matters to be aware of in future international cooperation activities. The 2023 study focused on the synergistic effects of water supply development and climate change countermeasures, and attempted to evaluate the synergistic effects in the case of international cooperation using Japanese ODA. The study also examined the deciding factors for promoting initiatives based on the efforts of domestic entities working to achieve carbon neutrality, information on site visits to Japanese companies with innovative technologies, and a survey of synergistic examples from other countries and development donor agencies, and considered future directions.

(4) Details for this year

Given that this is the year in which the jurisdiction of water supply systems was transferred to the MLIT, unifying the jurisdiction of both the water supply and sewerage systems, this year's study will focus on the interrelationship between water supply and wastewater treatment, including sewerage systems, in international cooperation.

In developing countries, the need for sewerage system development has increased as the amount of sewage effluent has increased and water environments have deteriorated as a result of the development of water systems as a means for providing a safe water supply. This was also the case in the past in Japan. In addition, the installation of sewerage systems has increased water use, such as for flushing toilets, resulting in a need to expand water supply facilities. In turn, in cases where wastewater treatment facilities, including sewerage systems, are inadequate, in addition to contamination of surface water, the presence of underground seepage tanks can cause contamination of groundwater and other water sources, necessitating alternative water sources. Water supply development and wastewater treatment facilities, including sewerage systems, are interrelated, and this interrelationship is often a problem in developing countries when trying to maintain water environments while ensuring both safe water supply systems and sanitation.

Japan's international cooperation in the water supply sector aims to contribute to the future self-reliant development of water supply and sewerage systems in developing countries. Our goal is that international cooperation in the water supply sector will lead to the development of wastewater treatment facilities, including sewerage systems, in the future and contribute to the achievement of SDG6. Therefore, we will organize and examine matters that should be taken into consideration when implementing international cooperation in the water supply sector by analyzing Japan's past international cooperation achievements.

The specifics of the study shall be as follows.

1) Organize interrelationships between water supply development and the development of wastewater treatment facilities, including sewerage systems
   - Investigate what is reported as the interrelationship between water supply development and the development of sewerage and wastewater treatment facilities.

2) Evaluation of the effects of integrated support options for water supply and sewerage systems
   - Collect reports and other information on the achievements of Japan's international cooperation. The cases to be studied should include both measures for safe water supply systems and wastewater treatment, including sewerage systems.
   - Organize the effects and characteristics of working on water supply and sewerage systems as an integrated unit.
   - Identify in each case what is envisioned as the interrelationship between water supply systems and wastewater treatment, including sewerage treatment, and what the challenges are to the integrated development of water supply and sewerage systems.

3) Survey of integrated water supply and sewerage system initiatives by Japanese water utilities, etc.
   - Collect information through interviews, etc. at water utilities that are actively implementing integrated initiatives for water supply and sewerage systems.
   - Organize the effects and characteristics of this integrated work.

4) Survey of integrated water supply and sewerage system initiatives by other countries and development donor agencies
   - Collect information on examples of international cooperation efforts implemented by other countries and development donor agencies that include both measures for safe water supply systems and wastewater treatment, including sewerage systems.
   - Organize the effects and characteristics of this integrated work.

5) Consideration of measures for more effective and efficient international cooperation in the future
   - Based on the results of the above study, examine matters that should be considered in order to achieve international cooperation in the water supply sector support that helps develop wastewater treatment facilities, including sewerage systems, in the future in order to achieve water and sanitation goals while maintaining water environments in developing countries.
   - Summarize the conditions that affect support, and consider efficient and effective support.
   - Based on the results of the study up to this point and the results of the committee's deliberations, summarize the direction and specific measures for future international cooperation and international

contributions, taking into consideration measures to ensure that international cooperation in the water supply sector can be used long-term and in a widespread manner by those involved, and with an eye to future development of sewerage systems.

1-2 Study Structure

(1) Committee composition

An evaluation committee will be established for the period up to the end of FY 2024, and the results of this study will be reported through deliberations at three committee meetings. The members of the committee for FY 2024 are as follows.

(Honorifics omitted; only committee members are listed)

[Committee members]

○Hidetoshi Kitawaki	Professor, Faculty of Global and Regional Studies, Toyo University
Koichiro Kubota	Chief, Planning Unit, Management & Planning Section, General Affairs Department, Fukuoka City Waterworks Bureau
Norio Saito	Senior Director, Water and Urban Development Sector Office, Sectors Group, Asian Development Bank (ADB)
Shinozuka Yasuyuki	Manager, Overseas Sales Department, International Business Division, METAWATER Co., Ltd.
Kazunao Shibata	Deputy Director General, Environmental Management and Climate Change Group, Global Environment Department, Japan International Cooperation Agency (JICA)
Kaoru Takahashi	Executive Director, WaterAid Japan
Satoshi Takizawa	Professor, Graduate School of Engineering, The University of Tokyo
Shigeru Horiguchi	Manager, Cooperation Promotion Section Department, Planning and Accounting Division, Management Head Office, Nagoya City Waterworks & Sewerage Bureau
Shigeyuki Matsumoto	Deputy Director General, Water Resource Group, Global Environment Department, Japan International Cooperation Agency (JICA)
Takayuki Miura	Senior Researcher, Department of Environmental Health, National Institute of Public Health
Masashi Yayama	Director, International Project Division Cross-Regional and International Project Department, Water and Sewer Bureau, City of Kitakyushu
Hiroomi Yoshikawa	General Manager, International Water and Environmental Infrastructure Sales Department, Kubota Corporation
Noriko Yokoyama	International Director, Training and International Department, Japan Water Works Association (JWWA)

(○: Chairperson)

[Secretariat]

Ryosuke Oka	Director, Water Supply and Sewerage Planning Division, Water and Disaster Management Bureau, Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

Moeko Yoshitomi	Deputy Director, International Affairs Office, Directorate General of Water Supply and Sewerage, Ministry of Land, Infrastructure, Transport and Tourism (MLIT)
Takeo Yamaguchi	Technical Advisor, Japan International Corporation of Welfare Services (JICWELS)
Naofumi Owada	Deputy Manager, International Cooperation and Training Department, Japan International Corporation of Welfare Services (JICWELS)
Mai Isohata	International Cooperation Section, International Cooperation and Training Department, Japan International Corporation of Welfare Services (JICWELS)
Sachiko Ochiai	International Cooperation Section, International Cooperation and Training Department, Japan International Corporation of Welfare Services (JICWELS)
Urara Imajo	Water Partners Jp Co., Ltd.
Mikiko Fujiwara	Water Partners Jp Co., Ltd.

[Topic providers]

Shigeru Horiguchi	Manager, Cooperation Promotion Section Department, Planning and Accounting Division, Management Head Office, Nagoya City Waterworks & Sewerage Bureau
Hiroomi Yoshikawa	General Manager, International Water and Environmental Infrastructure Sales Department, Kubota Corporation
Yakuro Inoue	Senior Consultant, Engineering Division 2, Technical Department, JAPAN-TECHNO CO., LTD.

(2) Committee meetings and survey schedule

In FY 2024, the committee met three times. The dates of each committee meeting are as follows. All three sessions were held online.

[Committee]

First committee meeting: October 29, 2024
Second committee meeting: December 20, 2024
Third committee meeting: January 29, 2025

[Domestic survey]

September 2024–January ~~2024~~2025

[Field survey]

January 11–18, 2025
Survey site: Kathmandu Basin , Nepal

CHAPTER 2 Examination of the Effectiveness of Cases of Integrated Water Supply and Sewerage Systems in International Cooperation in the Water Supply Sector

2-1 Summary

This chapter will summarize the information collected on 10 cases of integrated support for water supply and sewerage systems and examine the trend from international cooperation in water supply systems to the growing need for sewerage systems. Furthermore, it will consider the effects and issues in the implementation of projects under the coordination of water supply and sewerage systems.

[WASH]

- Water supply systems begin with the securing of water sources in the form of wells. The use of surface water sources is then expected to meet the increased demand as a result of social development and other factors. A typical international cooperation project is designed to address these needs. In addition, there are other cases where arsenic in well water sources have increased the need for water supply development, and where salinization has increased the urgency of water supply development.
- Even in cases where sewerage system development has been partially implemented, there are many cases where treatment facilities are insufficient and untreated sewage is discharged into rivers, etc., or where sludge from on-site treatment is not properly treated, adversely affecting residents who use water from rivers, etc. at sewage outflow points.
- In addition to centralized treatment via sewerage systems, there are many areas where on-site treatment such as with septic tanks is suitable. It is necessary to select a sewage treatment method that is appropriate given the characteristics of the region and aim to achieve sanitation as a whole.
- Several instances have been noted where residents' lack of awareness of sanitation has been an obstacle to sewerage system development.

[Effectiveness of integrated maintenance of water supply and sewerage systems]

- Deterioration of water quality in the environment due to inadequate wastewater treatment has been the backdrop for many projects, and wastewater treatment development will help ensure a sustainable water supply source, prevent adverse health effects, and reduce the rising cost of water purification.
- It is understood through many projects that water supply development increases the amount of sewage generated. In projects at a relatively advanced stage of development, where sewerage system developments are advancing, the plans include a sewage inflow of 70–80% of the water supply after the water system is installed.
- When the increase in sewage volume due to an increased water supply exceeds the drainage capacity, sewage overflows into the streets, etc. in some cases. It is necessary to consider the drainage capacity of the area in the water supply improvement plan.
- It has been reported that planning for both water supply and sewerage systems together allows for the selection of projects of higher priority and importance from both water supply and sewerage projects.
- The scale of the project can be increased and the project can be given more attention. This also extends the benefits of organizational improvements, planning, and improved working environments to both water supply and sewerage systems.

- There are cases where the use of treated sewage water is being considered for the purpose of increasing water supply water intake. However, it is noted that careful coordination with the agencies involved is necessary.
- In order to increase sewerage system connection rates and collect charges, it is necessary to gain understanding of sewerage services. There is a need to continue efforts to raise awareness of sanitation and promote understanding of sewerage systems. It is also important to increase customer satisfaction with water services to increase the prerequisite collection rate of charges.
- Even after a sewerage system is put into service, a certain period of time is required before the connection rate increases. It should be noted that if there is a delay between the start of sewerage system development and the start of service, further pollution may occur before the water pollution prevention effect of the sewerage system becomes apparent.

[Management and rate policy]
- In many cases, water supply and sewerage charges are collected together, and sewerage charges are often set as a percentage of water charges.
- Water supply charges are often set low, below the required level, and this is also responsible for the shortfall in sewerage charge revenue.
- The prerequisite for increasing the collection rate of sewerage charges is to increase the collection rate of water supply charges. This requires ensuring fairness in charges for water supply services and increasing customer satisfaction with water supply services.
- In cases where septic tanks, etc. are already installed and treatment is being handled through underground seepage or very infrequent sludge withdrawal, it can be difficult to prompt the need for sewerage systems, and even more difficult to raise the amount residents are willing to pay for sewerage systems. The fact that there are sewerage and stormwater perspectives in the sewerage charges is also considered a hurdle.

[Climate change]
- It has been noted that many projects need to reduce non-revenue water.
- Although water conservation is a measure that benefits both water supply and sewerage systems, the flat-rate water charge system and extremely low rates make it difficult for users to become aware of water conservation. To raise awareness of water conservation, the installation of meters and the introduction of metered and increasing-metered rates are being proposed and considered.
- Stable water supply services will lead to lower water withdrawals from private wells and reduce climate hazard risks.
- Replacing aging equipment will improve energy efficiency.
- Reuse of treated sewage water for irrigation is a climate change adaptation measure in areas where water resources are scarce.
- Natural-flow water supply systems reduce energy use.

[Laws and regulations]
- Countries with less progress in the development of water supply and sewerage systems tend to have less developed legal systems. In particular, the system of water rights, which is a prerequisite for

securing water supply sources and coordinating sewerage discharge, is considered important, but it was difficult to gather sufficient information in the project reports and other sources. However, we have been able to confirm cases in Myanmar, Pakistan, and other countries where the Ministry of Irrigation has jurisdiction, and it will be necessary to broaden our perspective at the stage of forming aid projects.

[Organization and human resources]

- In all cases in this study, the same organization is responsible for both water supply and sewerage projects, but there are differences in the organization's work assignment structure and human resource development.
- If water supply and sewerage are carried out by different organizations, it is expected that the hurdle to provide integrated support will increase. It is necessary to confirm the implementation system of water supply and sewerage projects in the target countries.
- Even in projects with advanced facilities and high penetration rates, it is pointed out in most cases that there are still problems such as unclear project policies and immaturity of the organization and operational structure. The need for organizational support and human resource development is pointed out in almost all projects.

[Differences in the amount of water resources, rainy and dry seasons]

- The occurrence of pollution impacts from wastewater differs depending on the availability of water resources and the presence or absence of rainy and dry seasons. The impact of pollution from sewage tends to be greater in countries and regions where water resources are not abundant. On the other hand, it has been pointed out that in countries and regions with relatively abundant water resources, the impact of sewage changes between the rainy and dry seasons. For example, at the beginning of the rainy season, environmental degradation due to runoff of accumulated pollution load during the dry season becomes a problem.

[Other unique and special circumstances]

- In many cases, local and project-specific issues have a strong impact on problems in water environments, and it is important to take these circumstances into consideration when implementing individual projects. Among the cases covered by this study, the following cases were affected by the special circumstances of the area in question.
  - In the case of Ulaanbaatar, Mongolia, there is a large disparity between the apartment district, which is well developed, and the ger district, which is not. The know-how formed in the apartment district will be useful in resolving institutional and organizational issues.
  - In Lima, Peru, the water supply penetration rate is high due to the city's location in a desert area, but leaks due to aging pipelines and sewage leakage from sewerage pipes are serious problems. This is an example of the how there are other perspectives besides the penetration rate that should be considered when looking at the level of development of water supply projects.

CHAPTER 3 Results and Discussion of Field Survey (Kathmandu Basin, Nepal)

3-1 Summary

(1) Field survey results

- In Nepal as a whole, Hindus, who make up the largest percentage of the country's population, regard rivers as very sacred and pure resources. The residents have lived with the rivers, believing that there are gods in the rivers and river water. They keep the rivers clean, take water from these rivers that they care for, and are washed away by them when they die. Furthermore, Nepal had an abundance of beautiful perennial rivers. Based on these facts, a system of river management in water resource areas has existed for a long time.
- Of these, in the Kathmandu Basin, urbanization led to a rapid increase in demand for water, increased education levels, efforts to install roads and water supply systems in their own communities, and the introduction of a water supply pipeline network (a system for producing and distributing water) around the 1960s. In provincial cities, the majority of agricultural laborers at the time wanted to have access to tap water distributed from the river in their own neighborhoods, and part of the funds required for this were contributed by the national and local governments. Local residents provided labor based on this water-conscious culture.
- The Kathmandu Valley, with its bowl-shaped formation surrounded by mountains, has limited natural water outlets. This characteristic restricts the natural flow of water, leading to water-logging and flooding during heavy rainfall. For this reason, drainage management was addressed by the local government from an early stage. Due to circumstances that restricted exchanges with other countries, water supply systems and wastewater management facilities were developed with its own funds. The World Bank, given considerations that “there are health hazards associated with the current system,” that “sanitary conditions and public health would be improved by providing sewerage to popular tourist destinations,” that “pollution of the Bagmati River would be reduced,” and that “water supply and sewerage system projects in urban areas should not be developed in isolation but be guided by urban analysis and structural planning,” water supply and sewerage system development projects were implemented in succession in 1975, 1982, and 1983. With regard to sewerage systems, although facilities were developed, they were not used for a long time due to a lack of human resources with the skills to maintain and manage the facilities and the extreme difficulty of training them, based on the idea that social structure and occupation are closely linked, something that remains deep-rooted in the local society.
- ADB has an office in Nepal and has been implementing projects based on the approach of the country partnership strategy, respecting the requests from the Nepalese government. In terms of WASH, the first step has been to implement and promote water supply as well as wastewater management systems. ADB has also been successful in educating the public and the government on the importance of wastewater treatment and sewage system development, both in Nepal and in other countries. In some cases, the wastewater management portion of the Melamchi water supply project has been partially postponed due to the withdrawal of some donors.
- The Maoist Rebellion (1996－2006) caused a massive migration of people from the mountains to the urban areas of the Kathmandu Basin, and Kathmandu has seen urban and residential land development as a result. Demand for water increased significantly, water supplies were insufficient, and people

began to rely on groundwater as well. In addition, wastewater was discharged directly into the rivers, causing them to become visibly polluted. River flows also decreased significantly.

- Until the 1990s, when the country began to interact freely with other countries, water supply and drainage measures were promoted domestically (by the national and local governments), but information and knowledge about the technology were also limited. Since the 1990s, there has been rapid globalization and a transfer of technical knowledge in the country.
- In the 1990s, volunteers began organizing the Bagmati Campaign to clean up the Bagmati River, which was polluted by dripping wastewater. This campaign continues today. The project has been extremely successful in terms of changing residents' behavioral patterns by raising people's awareness of rivers and water, using the idea of "keeping rivers—important both for religious and environmental protection purposes—clean, and maintaining water quality appropriate for sacred purposes."
- While priority is still given to water supply development, the increasing importance of wastewater treatment and sewerage system development due to the increase in heavy rainfall caused by climate change is also prompting the accelerated development of integrated and resilient solutions for water and waste water sector, mainly in Kathmandu and other major cities, with the support of ADB. The understanding of the importance of professions in the water sector still needs to be deepened. This mindset is changing, albeit very gradually, and maintenance is much better than before. Further improvements are expected in the future.
- Among the survey results, it should be noted that the Melamchi water supply project in Kathmandu is being promoted, and that plans for sewerage development are being made and promoted in response to this project. The Melamchi water supply project is a large-scale inter-basin raw water diversion project to ensure drinking water security in the Kathmandu Valley (water conduit from outside the basin). It is important to note that this project significantly increases sewage, and the importance of sewage development is also strongly recognized due to awareness of this issue. The fact that both water supply and establishment of centralized wastewater projects are progressing is distinctive of Kathmandu and is something that should be referenced.

(2) Matters to keep in mind when forming a case

- While demands for water supply systems exist in all countries, the perception of the importance of sewage treatment and water management is largely influenced by geographical conditions. When developing strategies to raise awareness of the importance of sewage treatment and water management, we should be aware of the geographical conditions of the country and, more recently, the risk of flooding in urban areas due to the effects of climate change.
- Based on a firm understanding of the cultural background of the country, including its religious beliefs about rivers (as a source of water) and water, and the impact of the social structure on occupations in the water sector, the causes of insufficient development and maintenance of water supply and sewerage systems become clear. Although the resolution of such causes will require time and a great deal of effort by the country, it is necessary to continue to consider the necessary means and measures to resolve the issues so that society can move forward and fully benefit from the effects of the facility development.
- Efforts consistent with religious beliefs can change people's behavior patterns and effectively reduce negative impacts on water. This is an excellent approach to improving the water environment.

- Even if facilities are developed early on, a lack of maintenance and management capabilities will result in facilities not being used for long periods of time. More than investments in facility maintenance, there is a strong need for the strengthening of institutions and development of human resources with skills and knowledge, from management administration to the field, and ultimately for capacity building. Japan's international cooperation in the water supply sector has earned a particularly high reputation in terms of human resource development, and we believe that there are significant opportunities for Japan to contribute in this area.
- Historical circumstances (e.g., the influx of people to Kathmandu triggered by political changes and the withdrawal of donors that occurred during the same period) greatly influence the promotion of water supply and sewerage system projects. Keeping a close eye on developments in that country, it is necessary to propose developments at a scale that the country requires now, as well as the intangible components that will enable it to achieve the greatest results.
- In countries where ministries and agencies are frequently reorganized or reassigned due to political circumstances, it is necessary to monitor the situation closely, remain engage, consult with appropriate counterparties, and negotiate deals based on a thorough understanding of the characteristics of the decision-making process in that country.

CHAPTER 4 Examples of Unique Initiatives by Domestic Water Utilities and Other Countries/Development Donor Agencies to Integrate Water Supply and Sewerage Systems

4-1 Organizing Findings for Use in Developing Country Assistance

(1) Findings from the integration of water supply and sewage systems by domestic water utilities

Based on the effects of organizational integration in the efforts of Japanese water utilities and points to note regarding organizational integration, the following is a summary of perspectives that should be kept in mind when providing support to developing countries.

[Business efficiency and cost reduction]

Integration of the water supply and sewerage organizations will lead to greater efficiency and cost reductions through streamlining of common operations, integrated operation of assets, and efficient use of human resources. In addition, charge collection can be combined to increase the charge collection rate. Increasing the number of personnel with knowledge and experience in both will strengthen the organization. At the same time, it should be noted that there are some items that cannot be standardized due to differences in technology or the nature of the work.

[Human resource development]

In Japan, where municipalities are responsible for the management of water supply and sewerage systems, the pressure to reduce staff has always been strong, and a shortage of skilled personnel has become a common issue.

In developing countries, on the other hand, the availability of skilled human resources has always been a problem, albeit for different reasons. In addition to the limited number of engineers, there is always a shortage of people who can handle the work, especially at the managerial level. A number of capacity-building projects have been undertaken to address this issue. It is expected that the development of skilled personnel can be implemented more effectively by conducting the human resource development process for both water supply and sewerage systems. In particular, the development of human resources who have an awareness of the water cycle from intake to discharge as an integrated whole, and who can view projects from the perspective of both water supply and sewerage systems, will play an important role in integrated water resource management, maintaining both the water environment and sustainable water supply projects.

It has also been pointed out that the promotion of outsourcing helps compensate for the shortage of skilled staff, and here, it is thought that the outsourcing of water supply and sewerage services together can enhance the benefits of outsourcing even more.

[Watershed-wide perspective]

As expressed in the concept of the Basic Law on the Water Cycle, today's water infrastructure in Japan requires consideration of optimization at the watershed level, centering on rivers. The optimization of water supply and sewerage systems at the watershed level will be a theme that Japan will need to address in the future.

For example, efforts to find the optimal arrangement of water supply and sewerage systems for an entire watershed with a single water source can be expected to yield significant benefits, such as sharing of

technology and information, expansion of activities to maintain water sources, and reduction of energy used for water purification and treatment.

[Integrated water resource management]

Integrated water resource management is one comprehensive solution for securing sustainable water resources and mitigating water supply and water-related disasters. It is a method of managing water resources to maximize the economic and social benefits of water in an equitable manner, while maintaining the sustainability of the natural environment and ecosystems. All water circulating in nature is covered. While various parties and organizations involved in water resources need to coordinate and consider the safety of water use, the integration of water supply and sewerage systems will contribute to this approach by enabling the promotion of environmental measures based on the water environment and the coordination of water supply and sewerage systems over a wide area. This includes the reuse of treated sewage water from a water security perspective. Integrated water resource management also plays a role in supporting both climate change mitigation and adaptation measures through sustainable water management.

[Climate change countermeasures]

Among countermeasures to fight the impacts of climate change on the water environment, initiatives common to water supply and sewerage systems can be rationalized by considering them in an integrated manner. In addition, it will be possible to consider measures such as efficient use of resources such as drainage and rainwater, flexible adaptation planning according to regional characteristics, and centralized management of facilities. In addition to the effects of each individual project, it is also expected that water supply and sewerage systems will work together to become carbon neutral, for example, by preventing sewage generated by water supply development from becoming a source of GHGs.

[Disaster response]

In the survey case study, the establishment of an integrated water supply and sewerage disaster system has been initiated within the project organization, triggered by organizational integration. Following the Noto Peninsula Earthquake, the national government, support groups, and related organizations mobilized to support the restoration of the water supply and sewerage systems in an integrated manner, and the importance of this has been recognized. In many cases, disaster response has not yet become a major theme in the countries where aid is provided, but Japan's expertise in disaster-resilient systems and organizations is more advanced than that of other countries. Therefore, it is expected that Japan will play a role in the future in terms of international cooperation in undertaking such projects.

[Promoting international cooperation]

Project formation and technical cooperation for international cooperation, including water supply and sewerage systems, will be possible. If the project organization receiving international cooperation has integrated its water supply and sewerage systems and the supporting organization has also integrated its systems, there are advantages such as eliminating the need for coordination between bureaus. On the other hand, if the project organization’s water supply and sewerage systems are separate organizations, the hurdles for promoting operations will differ. For the support organization, water and sewerage systems are

not necessarily limited to organizational integration, but can be handled through inter-municipal collaboration.

[Comprehensive outsourcing of integrated water supply and sewerage systems, promotion of overseas water business]

While possessing the expertise of both parties, this is expected to improve operational efficiency, reduce costs, and unify planning and decision-making, leading to comprehensive outsourcing of integrated water supply and sewerage system services and the promotion of overseas water business.

(2) Findings based on the efforts of other countries and development donor agencies

We will summarize the findings based on the efforts of other countries and development donor agencies, focusing on WASH, the effectiveness of integrated water supply and sewerage systems, charges and management, and climate change countermeasures, which are the perspectives for consideration in this study.

[WASH]

WASH is seen as contributing to achieving public health, improving livability, and combating climate change, and efforts by development donor agencies have focused on access to WASH for the poor, mainly in rural areas. Sanitation efforts in rural areas often entail individual sanitation facilities rather than centralized treatment by sewerage systems.

WaterAid integrates water and sanitation efforts, especially for poor and rural areas where access to safe WASH is difficult. The aim is to establish the necessary elements for the WASH mechanism to function and circulate, analyzing and identifying the missing elements in each activity area, and focusing on them. The elements listed were: active communities, vulnerable groups, organizational structure and institutions, coordination and collaboration with other organizations, data and monitoring, organizational planning, finance, government leadership, infrastructure development and behavior change, accountability and regulation, and environment and water resources. In the past, this project has organized items to be checked based on three aspects—human resource system, financial infrastructure, and governance—when organizing and analyzing the management environment of the urban water supply sector and water utilities in developing countries in 2014. The items related to these aspects are similar in content. Other items are also perspectives that should be referred to.

[Effectiveness of integrated water and sewerage system development, from an urban perspective]

UN-Habitat encourages a comprehensive view of water supply and sewerage systems from an urban perspective, and encourages the inclusion of both from the initial stages of urban planning. ADB also focuses on improving urban livability as an objective of its water sector support.

With the goal of creating a livable city, the perspective of positioning water supply and sewerage system development as basic urban services and planning them in phases, such as linking planning to financial capacity, is considered effective in developing solutions to problems, based on a bird's-eye view of the respective roles of water supply and sewerage systems and their mutual impact.

Expanding the reuse of wastewater is one measure to meet water demand. It is considered to be an example of the benefits of integrated development that can be achieved. But coordination with parties outside the water sector, such as irrigation use and river use, will be necessary.

[Management and rate policy]

ADB supports the water sector, including water and sanitation services, through policy and regulatory frameworks, tariff policies, appropriate business models, capacity building in project management, and asset maintenance, as improved governance and operational performance are key conditions for encouraging investment. Regarding the reform of state-owned enterprises, it is noted that the situation varies from sector to sector and country to country and that multiple reform measures are needed to improve corporate governance in state-owned enterprises. ADB provides support through long-term partnerships and in addition to infrastructure investment will also focus on supporting policy, regulatory, and institutional reforms that focus on sustainable, inclusive and resilient service delivery and operational efficiency, and creating an environment that encourages private sector involvement.

[Climate change countermeasures]

In urban infrastructure design, it is important to consider climate-related risks and impacts at the policy and capital investment planning stages. At the planning stage, water supply and sewerage systems need to be considered in a comprehensive manner and the impacts of climate change need to be taken into account.

It has been pointed out that improved sanitation can serve as a climate change adaptation measure, reducing the water supply and pollution improvement risks during floods, as well as reducing the risk of disease.

There is also an initiative to reuse treated sewage water by the World Bank, which views treated sewage water as a valuable resource and additional water source. It is noted that the reuse of treated sewage water needs to be viewed as a watershed-wide activity, not as a single facility activity. In addition to use as non-potable water such as irrigation water, in areas where water resources are tight, efforts are being made to use treated sewage water as a source of tap water through groundwater recharge and other means.

[Capacity building and human resource development]

The perspective that emphasizes not only the development of facilities but also the creation of mechanisms and capacity building for ongoing maintenance and management is shared by development donor agencies.

There is also a common perspective on the social and economic empowerment of women, as well as gender equality efforts in human resource development, such as training female engineers to work in the water sector.

CHAPTER 5 Considerations for More Effective and Efficient International Cooperation in the Future

5-1 Summary of Survey Results

In April 2024, administration of water supply systems was transferred to the MLIT, and international cooperation in the water supply sector was also placed under the jurisdiction of the MLIT. International cooperation in sewerage systems is conducted within the MLIT as well. The survey was conducted based on the recognition that international cooperation also needs to be promoted from the perspective of collaboration among these projects.

This study confirmed the situation in many countries and regions where, as societies develop and water supply systems are improved, the burden on water quality in the environment increases, and sewerage system development must also be considered. At the same time, we also learned that there are various bottlenecks and difficulties in promoting international cooperation in sewerage systems. To solve these problems, obstacles were identified based on existing surveys and other information, and it was confirmed that it would be effective to take into account considerations for overcoming these obstacles from the stage of international cooperation in the water supply sector. Furthermore, the goal of this study is to find out what kinds of activities should be carried out as international cooperation in the water supply sector in order to create awareness and prompt demand for Japanese technologies in the development of sewerage systems.

Below are the results of the survey items 1) through 4) presented in Chapter 1 as part of this year's work.

1) Organize interrelationships between water supply development and the development of wastewater treatment facilities, including sewerage systems

Based on the investigation and discussion of previous studies, the following were identified as interrelationships between water supply development and wastewater treatment facilities, including sewerage systems. These relationships can be grouped into those that occur as impacts, those that pose challenges, and those that have effects.

Table 5.1 Interrelationships Between Water Supply Development and Sewerage Systems and Wastewater Treatment Facilities

	Primary factor	Relationships
Relationships that water supply development has with sewerage systems and wastewater treatment facilities	Per capita water supply increases	(Impact) Increased use of sanitation facilities with high water usage will increase the need for sewerage development.
	Pollution load increases due to increased sewage	(Challenge) Water quality in the environment deteriorates and the need for sewerage system development increases.
	Sewage increases	(Challenge) The city's drainage capacity, including stormwater drainage, may be exceeded.
	Water charges are set lower	(Challenge) Sewerage charges are often set as a percentage of water supply charges, leading to a shortfall in revenues.
	There is a mechanism to collect water charges	(Effect) The collection rate can be increased by collecting sewerage charges together with water supply charges.

	Primary factor	Relationships
	Water conservation is encouraged through metered and increasing water usage rates and by raising awareness, thereby reducing unit consumption	(Effect) The increase in the amount of sewage generated is controlled The planned volume of treated water in the sewerage system can be reduced
	Reduce non-revenue water	(Effect) The increase in the amount of sewage generated is controlled The planned volume of treated water in the sewerage system can be reduced
Relationship that sewerage systems and wastewater treatment facilities have with water supply development	As the population grows and the economy develops, the system will evolve from pit toilets to on-site treatment and centralized treatment like sewerage systems	(Impact) Water consumption will increase, including an increase in water used for flushing toilets
	There is a time lag between the development of a water supply system and the development of a sewerage system and wastewater treatment facilities	(Challenge) The larger the time lag, the worse the pollution of public waters
	Wastewater treatment reduces environmental impacts	(Effect) Prevent water source contamination and prevent impacts on health and safety from tap water Reduce water treatment costs The sustainability of water sources can be ensured
	Utilize treated sewage water	(Effect) Indirectly or directly, the amount of water resources will increase.

2) Evaluation of the effects of integrated support options for water supply and sewerage systems

As a result of the survey of cases of Japan's international cooperation achievements that include both measures for safe water supplies and measures for wastewater treatment including sewerage systems, the following were identified as the effects, characteristics, and challenges of providing integrated support for water supply and sewerage systems.

Table 5.2 Effects and Characteristics of Integrated Support for Water Supply and Sewerage Systems

Item	Description
Improved public health	Public health improves and waterborne diseases decline. It is estimated that this would have the effect of reducing the mortality rate of children under five years of age.
Avoidance of problems due to reflection and mutual influence on planning	The scale and timing of development of sewerage facilities can be considered by taking into account the amount of sewage generated by water supply development. It will be possible to develop a master plan for integrated water supply and sewerage systems. Support measures and their priorities can be considered based on the mutual impact of water supply development and sewerage system and wastewater facility development.
Coordination of facility development	Prevent problems such as sewage entering water pipes via aging sewerage pipes by properly laying and updating water pipes and sewerage pipes based on their mutual impact.
Ease of organizational structure and ease of policy advocacy	When the same organization is engaged in water supply and sewerage system projects, it is expected that it will be easier to make proposals on the organizational structure and business management for the sector as a whole, as well as make policy proposals on legislation and other matters.

Item	Description
Expanded effects of improvements	The benefits of improved organization, management, and working environments can be extended to both water supply and sewerage systems.
Ease of coordination among parties involved	Coordination between the parties involved is expected to be easier, especially when the same organization is engaged in water supply and sewerage system projects.
Proposed charge structure	The rate setting and collection methods are based on the business conditions of both water supply and sewerage system services. Metered and increasing rates for water supply systems have the effect of raising awareness of water conservation and reducing the generation of sewage.
Joint implementation of human resource development and public relations activities	Overlapping activities such as human resource development and public health awareness-raising activities can be carried out jointly.
Expanded project scale	The larger the scale of the project, the more attention the project will receive. On the other hand, there are aspects that make it more difficult to bear the financial burden and increase the need for co-financing, phasing, etc.
Proposals from perspectives on integrated water resource management	It will be easier to make proposals from the perspective of integrated water resource management, such as the reuse of treated sewage water.

Table 5.3 Challenges to Integrated Support of Water Supply and Sewerage Systems

Item	Description
Insufficient revenue due to sewerage charge setting linked to low water supply charge setting	Pricing is not at a level necessary for business. Sewerage charges are often set as a percentage of water supply charges, and low water supply charges cause sewerage charges to be set low as well, contributing to revenue shortfalls.
Increase rate of charge collection through improved customer satisfaction	With respect to water supply systems, it is necessary to ensure the fairness of charges for water supply services by shifting from a flat rate to a metered rate. With regard to sewerage systems, ongoing efforts are needed to gain understanding of the project.
Stimulate demand for sewerage system development	Residents' low awareness of sanitation is an obstacle to sewerage system development. With an on-site treatment facility, there is a hurdle in generating demand for sewerage systems.
Coordination with related organizations	More coordination with more stakeholders is needed.
Inadequate legislation	There is often a lack of legislation for the development of sewerage systems.
Organizational immaturity and lack of human resources	Problems such as unclear business policies and immaturity of the organization and operational structure are observed. The need for organizational support and human resource development is noted in almost all projects.
Impact of water resources and climate	The degree of occurrence of pollution impacts from wastewater differs depending on water resource conditions and the presence or absence of rainy and dry seasons.
Other unique special circumstances	Because unique circumstances, such as historical and cultural backgrounds, may present challenges. Careful surveys should be conducted in advance to determine whether unique circumstances exist.

3) Survey of integrated water supply and sewerage system initiatives by Japanese water utilities, etc.

Based on the results of a literature review and interview survey on Japanese water utilities' integrated water supply and sewerage system efforts, the following effects and characteristics of integrated water supply and sewerage systems were identified.

Table 5.4 Effects and Characteristics of Integrated Water Supply and Sewerage Systems

Item	Description
Improved operational efficiency and cost reduction	Streamlining of shared operations, integrated operation of assets, and efficient use of human resources will lead to increased efficiency and cost reductions.
Enhanced human resource development and organization	The development of human resources who are aware of the water cycle from intake to discharge as an integrated whole and who can view projects from the perspective of both water supply and sewerage systems is important for maintaining the water environment and integrated water management. It is also a means of addressing shortages of human resources and will help strengthen organizations.
Efforts from a watershed-wide perspective	It is expected that this will promote efforts to optimize the layout of water supply and sewerage system facilities at the watershed level, focusing on rivers. Benefits include sharing technologies and information, expanding activities to maintain water resources, and reducing energy consumption.
Promotion of integrated water resource management	The promotion of environmental measures based on the water environment and wide-area coordination of water supply and sewerage systems can contribute to the optimization of rainwater elimination and sewage treatment according to local needs. This will allow for the study of comprehensive solutions for sustainable water management.
Promotion of climate change countermeasures	Common measures can be streamlined by examining them in an integrated manner, and cross-sectional measures can be examined based on the nature of water supply and sewerage systems. It is also expected to help work toward carbon neutrality as a whole.
Enhanced disaster response	To achieve early restoration of water supply and sewerage systems, faster information sharing, more efficient use of disaster response resources, and the establishment of an integrated crisis management system will be advanced.
Project formation for international cooperation, technical cooperation for both water supply and sewerage systems	It will be easier to coordinate among the parties involved. It will be easier to identify issues from water supply to sewerage and from sewerage to water supply for project formation, and to conduct technical cooperation that includes both water supply and sewerage systems.
Comprehensive outsourcing of integrated water supply and sewerage system services, promotion of overseas water business	It is expected that this will be effective in promoting comprehensive outsourcing involving both parties and overseas water business by improving operational efficiency, reducing costs, and centralizing planning and decision-making.

4) Survey of integrated water supply and sewerage system initiatives by other countries and development donor agencies

Case studies of integrated water supply and sewerage systems by other countries and development donor agencies will be used to illustrate the perspectives and activities of each agency in their efforts.

Table 5.5 Effectiveness and Characteristics of Integrated Water Supply and Sewerage System Initiatives by Other Countries and Development Donor Agencies

Item	Description
WASH perspectives	WASH is important from the perspective of achieving public health and improving livability. Efforts are being made to emphasize access to WASH for the poor.
Effectiveness of integrated water supply and sewerage systems; urban perspective	Water supply and sewerage system development are positioned as basic urban services, and both are included from the initial stages of urban planning in order to create livable cities.
Management and rate policy perspectives	An important condition for encouraging investment is improved governance and better business performance. Long-term partnerships help improve governance.
Perspectives on climate change countermeasures	The emphasis on climate change action in the water sector is a common perspective. The report states that it is important to take a comprehensive view of water supply and sewerage systems and consider climate change risks and impacts at the planning stage in urban infrastructure design. Tools and guidelines are being developed to take climate change impacts into account at all stages of facility development or to incorporate climate resilience into support projects. It is also noted that improved sanitation can be a climate change adaptation measure. There are World Bank initiatives that view treated sewage water as a resource and an additional source of water, and there is a growing movement to utilize it as an indirect source of drinking water in areas where water resources are in short supply.
Perspectives on capacity building and human resource development	The creation of mechanisms for ongoing maintenance and capacity building is a key priority. Efforts are also being made to promote gender equality in human resource development.

5-2 Summary of Field Survey Results

In order to further examine the environmental impact of water supply adoption and the effectiveness of integrated water supply and sewerage systems as a countermeasure, we selected the Kathmandu Basin in Nepal—an area that actually faces such problems—and conducted a field survey.

The most distinctive features of the project were: the culture of the area with respect to rivers and water and the early projects that respected this culture; the lack of water supply due to rapid urbanization and the pollution of rivers and groundwater; the growing need for sewerage systems due to a large-scale water supply from outside the area and the consensus to promote measures to deal with this situation; and the participation of local residents to deal with this situation and the results of these activities.

We then pointed out the importance of project planning based on geographical conditions and climate change impact risks, the introduction of measures to enact behavior changes that take into account local cultural and religious influences, the importance of intangible efforts such as strengthening facility management capacity, and the need for deal-making negotiations that are consistent with the decision-making process shaped by national circumstances. It is important to refer to these series of findings, observe whether similar situations are occurring in other countries, and consider appropriate countermeasures.

5-3 Discussion Based on Study Results

Based on the results of this study, the following are basic ideas on approaches and support policies for individual specific issues that should be prioritized and actively addressed in future international cooperation in the water supply sector.

[Lobbying for project formation]

In many cases, partner countries are aware that sewerage system development is effective in improving the pollution of public waters and that sewerage system development will be necessary in the future. Therefore, it is conceivable to raise awareness of this at the stage of project formation in the water supply sector and encourage that it be reflected in master plans for water supply and sewerage systems, and even in urban planning approaches. In the case of Kathmandu, considering that the introduction of tap water from outside the region has increased the consensus on the need for sewerage systems, working on water supply and sewerage systems simultaneously will increase the scale of the project and raise the profile of the project for the partner country. By appropriately explaining the necessity of considering water supply and sewerage systems in an integrated manner, such as the benefits that sewerage system development will bring to water supply services and the benefits to society as a whole by reducing the gap between the timing of water supply and sewerage system development, and by obtaining the consent of the other government, the project can be promoted with the precise cooperation of both Japan and the partner country.

[Consideration of measures based on an understanding of regional characteristics]

Sewerage systems with culvert development is not the only option. In many cases, especially in areas with low population density, it is more realistic to consider the development of localized wastewater treatment facilities, such as sewage treatment through decentralized systems, pumping toilets and septic tanks to provide sanitary environments. In developing countries, septic tanks, etc. are often included in the definition of sewerage systems, and the best measures should be considered based on the circumstances of each district, starting with an expert's understanding of the issues and their structure.

Based on the analysis of the survey results, the following are important for the formation of water supply and sewerage system projects. Experts must be aware of the problems related to water supply sewerage systems, WASH, and environmental conditions. The causes of the problems, including the historical background and cultural aspects of the partner country, must be inferred. Solutions to the problems must be provided to decision makers in the partner country for negotiations. And a support system must be established on the Japanese side.

The following is a list of points to be considered and activities that should be undertaken in conducting this series of activities.

[WASH perspective and the need to think with an expanded perspective]

Based on the premise that safe WASH is essential to achieving public sanitation, water and sanitation must be viewed together, including the relationship between water use and sewage generation, and the relationship between the development of wastewater treatment and water use. Furthermore, it is necessary

to look at the city as a whole and the entire watershed, and also to consider the fact that water supply development will increase the need for wastewater treatment and sewerage systems.

[Coordination with stakeholders]

Expanding the scope of the project to include sanitary toilets and drainage in addition to the water supply will allow for a very broad range of stakeholders. If the water supply and sewerage systems in the partner country receiving international cooperation are operated by different organizations, or if cities and watersheds are also considered, the scope of the parties involved will be further expanded. Coordination among a wide range of stakeholders is needed to build consensus and cooperation.

In addition, there are cases in which region-specific values due to religious backgrounds play a role in promotion of the project (e.g., a culture that considers rivers sacred may lead to a greater understanding of the importance of cleaning up the watershed and, in turn, sanitary water) or, conversely, may be an obstacle to human resource development (e.g., a sense of aversion to sewage-related work may impede the securing and training of technicians). Attention should be paid to these regional characteristics.

[Increasing project expenses]

If cooperation for water supply systems is provided while also providing support for wastewater treatment, including sewerage systems, the overall project cost may increase. It is necessary to consider collaborations with partner institutions, rather than assuming sole financing.

[Necessity of policy recommendations]

The state of development of the legal system, etc. in the partner country will affect the speed of development of water supply and sewerage systems in that country. Without a legal system in place, sewerage systems will not be developed. In particular, legal systems requiring connection to the sewerage system, as in Japan, are often not yet in place, and residents' low understanding of the need for sewage treatment and low willingness to pay sewerage usage charges are major reasons for the lack of connections even after pipe culverts are built. It is also important to make policy recommendations related to the establishment of a business environment, such as the development of legal systems and awareness-raising on sanitation, in addition to the usual units of technical cooperation and other financial cooperation projects. It is important to explain cooperation in the water supply sector, and at the same time, it is also important to encourage explanations of points to be considered when developing sewerage systems. Another important perspective is that improved governance can promote investment.

[Human resource development]

In order to promote international cooperation projects based on the need to solve problems in water supply and sewerage systems, employees with expertise in identifying issues in water supply and sewerage systems, and even integrated water resource management, are needed both on the Japanese side and on the counterpart side. In Japan, water supply system administration has been transferred to the MLIT, and human resources with expertise in both fields are being trained. For the sake of international cooperation, it is necessary to implement measures to develop human resources capable of managing both water supply and sewerage systems from a broad perspective.

In addition, consideration should be given to motivation rooted in local culture in the partner country and to gender balance.

[Climate change countermeasures]

It is necessary to consider the impacts of climate change on the country or region in question. In addition to making water supply and sewerage systems resilient to climate change, climate change countermeasures that benefit both water supply and sewerage systems will be considered, such as promotion of water conservation, preservation of water quality in the environment, countermeasures against flooding, consideration of facility layout in each watershed, and reuse of treated sewage water, etc. It is also important to aim for carbon neutrality through integration of water supply and sewerage systems.

[Examination of the effects on water quality in a characteristic environment]

Adaptation to conditions in which Japan has limited experience is necessary, such as regional characteristics in water quantity and quality of water resources, cultural peculiarities, and climates with pronounced rainy and dry seasons. For this purpose, it is necessary to gather case studies.

[Water supply charges and management efforts]

Collecting water supply and sewerage charges together has the advantage of increasing the rate of charge collection. Sewerage charges are often set as a percentage of water charges in other countries, as is the case in Japan. On the other hand, if water supply rates are set low, sewerage usage charges will also be set low, which is a major problem in building a management base for the sewerage system.

Increasing customer satisfaction with the service is important to improve the rate of charge collection. As a prerequisite for the collection of sewerage charges, it is necessary to increase the collection rate, taking into consideration the transition from flat rates to metered rates in the collection of water supply charges, and the fairness of charges for services. Continued efforts should be made to promote understanding of the significance of sewerage systems and the services they provide.

In addition, the management of water supply and sewerage services should be conducted under an independent accounting system from the local government and other entities. Ultimately, we need to work toward setting appropriate water and sewer user charges. To this end, it is necessary to first ascertain the situation of the subject entity, including confirmation of its financial condition and separation of accounts, and make proposals accordingly.

It is also important to have a perspective that sees improved business performance, along with improved governance, as an important condition for encouraging investment. Support can be provided through rate policies, appropriate business models, capacity building in project management, and asset maintenance.

[Medium- to long-term support]

It is necessary to recognize that improving water supply and sewerage services and establishing a sustainable operation and management system will take time. It is also important to consider priorities and provide support in stages from a medium- to long-term perspective, including organizational enhancement and support for legal systems.