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### Contents

<b>Challenges of Japan's Water Governance in a Shrinking Society.....</b>	<b>1</b>
-------------------------------------------------------------------------------	----------

Shunsuke Kimura, Ph.D.

Professor, The Graduate School of Governance Studies,  
Meiji University, Japan

<b>Characteristics of Terrorism Prevention Measures in Japan: An Integrated Framework of Causation and Opportunity Theories.....</b>	<b>37</b>
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# **Challenges of Japan's Water Governance in a Shrinking Society**

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## Abstract

In a shrinking society, a new countermeasure is required for issues in local administration. Therefore, this paper focuses on water supply as a public service, and the following research questions guided this study: what are the accomplishments and challenges of Japan's water supply system? How did the local governments try to overcome the issues?

First, the water supply system in Japan has the following features:

- a. With the number of municipalities decreasing after the Heisei-era mergers of various municipalities, there has been a slight increase in the ratio of water supply utility operators and the number of affiliated bodies in water supply enterprise associations. The ratio of water supply utility operators and the number of member organizations are also gaining importance as implementing entities.
- b. Since the fiscal year 2014, the number of local water supply utilities exceeded the bulk water supply utilities, and the importance of broader-based local government has also been increasing in local water supply utilities.
- c. The structural decrease in operating revenue due to rapid decline in population, etc., also significantly impacted project operations of water supply enterprise associations.

Based on these characteristics, the accomplishments of the establishment of water supply enterprise associations, taking actual cases into account, are not limited to general matters such as reduction of long-term capital investments but also the upgrading of obsolete facilities, downsizing, and other such resolutions of the concerned associations.

The principal challenges are the following:

- A. Among water supply enterprise associations, the gap in management status is widening between the associations based on the size of the population supplied. While water supply enterprise associations supplying to a population of 50,000 or more are maintaining the population supplied, those supplying to populations less than 50,000 are seeing population declines, pointing to a polar split phenomenon. Further, the gap between Large-scale Water Supply Enterprise Associations (Associations serving populations of 150,000 or higher) and Small-scale Water Supply Enterprise Associations Group (those serving populations of 30,000 or less) is conspicuous in terms of depreciable assets and penetration ratio, and that gap is widening. In particular, in the case of small water supply enterprise associations, it is necessary to take countermeasures to rectify the vicious cycle of having a small population and a low penetration rate.
- B. As for water supply utilities, broader-based measures have been carried out one after another using wide-ranging methods, and more initiatives are expected that consider the study and verification of various types of precedents.

Japanese local governments required more strategic management as they are faced with a depopulated society. It is essential for water supply utility operators to take broader-based measures with “long-term perspective” and “collaboration between municipalities, prefectures, and government” as the keywords.

**Keywords:** Water supply, Consolidation, Enterprise association

## Introduction

Recently water governance has been one of the hot global issues. The Organization for Economic Co-operation and Development (OECD) (2016)<sup>1</sup> points out their main agendas: intensifying water competition, renewing aging infrastructure, preserving ecosystems, and maintaining adequate access to and quality of drinking water and sanitation services. It also states that those agendas require a dynamic analysis of who does what, at which level, how, and with whom, to assess whether governance structures are well-equipped to deliver intended water policy outcomes.

One of the key exogenous characteristics of the water sector is demographic dynamics. OECD (2016)<sup>2</sup> also describes the current global situation as follows:

“Demographic dynamics also affect water demand and supply and can challenge the capacity of local governments to manage water resources efficiently in the face of environmental degradation and economic trends. Shrinkage and expansion trends have an influence on water infrastructure needs through changes in the demand schedule and by alerting the composition of public finances as the base shrinks or expands. Adaptation to these trends should be reflected in investment choices and management models for supplying services.”

As this report points out, the demographic change fundamentally affects the water governance structure. There are two types of this change; the expanding and shrinking types. Among OECD countries, populations in Japan, Germany, and Italy are declining.

In OECD (2016)<sup>3</sup>, the status and issues of water management of the shrinking country types are described as follows;

“The economic effects of a shrinking population are generally loss in tax bases and revenues on the one hand and increase in public expenditure to maintain infrastructure on the other hand (snip). Urban shrinkage may also have implications in terms of decreasing water consumption, leading to increased prices of water and wastewater, as the fixed costs of infrastructure provision have to be borne by fewer people (snip). As the population shrinks, the size of existing water networks may be too large in relation to adjusted demand. This may call for alternative management models (e.g., smart distributed systems) that can provide greater room for adjustment to changing dynamics.”

In Japan's case, the main alternative management models have been the wide-area administration and the PPP of water supply. This paper focuses on the wide-area administration and sets the following research questions:

- A. What are the challenges of Japan's water supply system?
- B. How did the local governments try to overcome the issues through wide-area administration?

## I. Shrinking Society

We overview the situation of Japan's shrinking society. Japan's population was on a consistent upward trend through the first postwar baby boom (in the 1940s) and the second baby boom (in the 1970s), but it has been declining sharply after peaking at one hundred and twenty-eight million in 2008. According to the Population Projections for Japan by the National Institute of

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1 Source; OECD, *OECD Studies on Water: Water Governance in Cities*, OECD Publishing, 2016, p. 15.

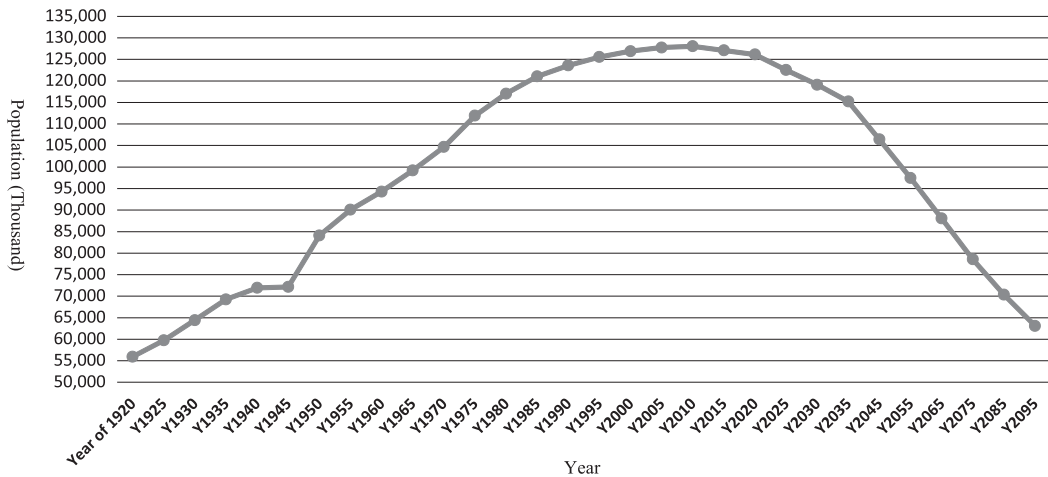
2 Source, *op.cit.*, p. 25.

3 Source, *op.cit.*, p. 25.



Population and Social Security Research (IPSS), the medium-fertility variant projection assumes that the total fertility rate (TFR) is approximately 1.35, showing that the Japanese population will fall below 100 million in 2050 and will decline further (See Figure 1-1).

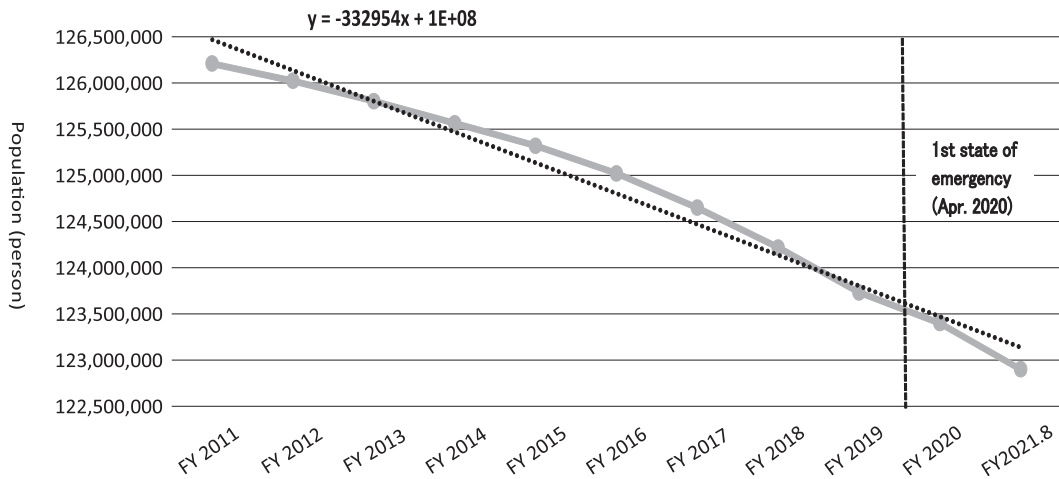
**Figure 1-1 Population of Japan Change / Forecast**



Source: Created by the Author.

Moreover, there are signs that the rate of decline has accelerated since 2020; they say that the pandemic of COVID-19 may affect lower TFR<sup>4</sup> (See Figure 1-2).

**Figure 1-2 Recent Population Changes (person; 1st of Oct.)**



Source: Created by the Author.

Japan's water supply business managements were stable until 2008 because the water supply population was growing. However, in 2008, the peak of the population was at a turning

4 The first state of emergency was issued in April 2020. Three states of emergency were issued by September 2021.

point, and its shrinkage has brought about significant impacts on the management (described later).

## II. Water Supply Services

### 1. General Remarks

Water supply services (general term for water supply utilities and small-scale water supply utilities) provide a necessary service by establishing social assets that are close to the daily life of people and have a self-supporting system that carries out business based on tariff revenue as a basic rule.

However, existing water supply services are facing a severe business environment due to factors such as (a) population decline, transition to a water-conserving society, and decline in water demand due to changes in industry structure<sup>5</sup>, (b) securing lifeline functions taking into account the frequently occurring large-scale disasters, (c) the advent of the period<sup>6</sup> for renewal of facilities that were intensively built in the 1970 to 1990 period, and (d) the challenge of passing on technology amidst a declining number of workers.

Water supply services are entering a large-scale renewal period of their facilities and must improve lifeline functions by strengthening earthquake resistance and optimizing asset size following the decline in population supply. Consequently, it faces various challenges, including the necessity to carry out improvements and upgrades systematically.

### 2. Characteristics of Current Water Supply Management

#### Business Entity

The number of users of a water supply service as infrastructure is small, but at the same time, it has the character of a facility operation-type business and, consequently, will have the following three features:

- A. It will inevitably require the utilities to have, upon operating the service, a plan to accumulate internal reserves from operating revenue over a long period and allocate that to investments for upgrading the facilities,
- B. The revenue structure changes significantly depending on the size of the population supplied, generating a clear gap in financial conditions and tariff standards, and
- C. It is a service that should be delivered to all citizens scattered across a region. Because it is a facility operation-type service, the impact of the fall in profitability due to the lower user population density will be substantial<sup>7</sup>.

While water supply utilities have such fundamental characteristics, currently, in terms of operations, those operated by towns and villages (901, or 50%), by cities (744 utilities, or 42%) and together account for 92% of the total (1,645 utilities). This is followed by those operated by

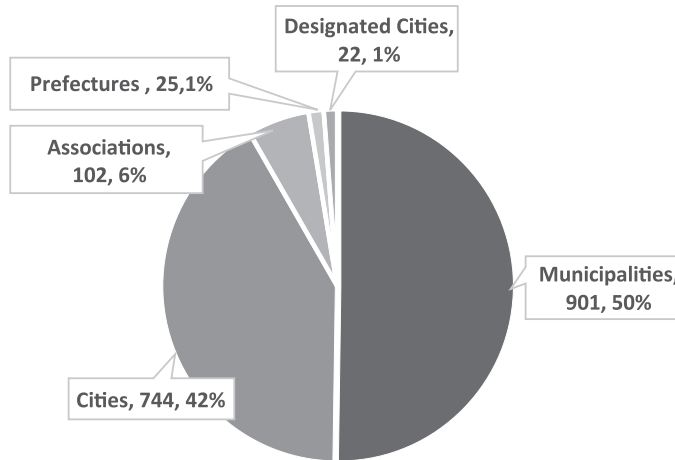
5 Due to these reasons, the tariff revenue of water supply services has been decreasing since peaking in the fiscal year 2005.

6 Capital investment in water supply services in Japan had two peaks on investments in construction around 1975 and around 1998, and given that the statutory useful life of water pipes, an important water supply facility, is 40 years, it could be said that we are already into the peak period for upgrade demand.

7 Nobuko Yamakoshi has pointed this out on p.65 of *Chiho koei kigyo no kadai to kongo no torikumi* (Challenges of local public enterprises and future initiatives), *Chiho zaisei (2020 nen 4 gatsu go)* (Local finance [April 2020 issue]), and Institute of Local Finance, 2020.

water supply enterprise associations (102 utilities) at 6%, by prefectures (25 utilities) at 1%, and by designated cities (22 utilities) at 1% (See Figure 2-1).

**Figure 2-1 Water Supply; Number of Utilities (FY2020)**

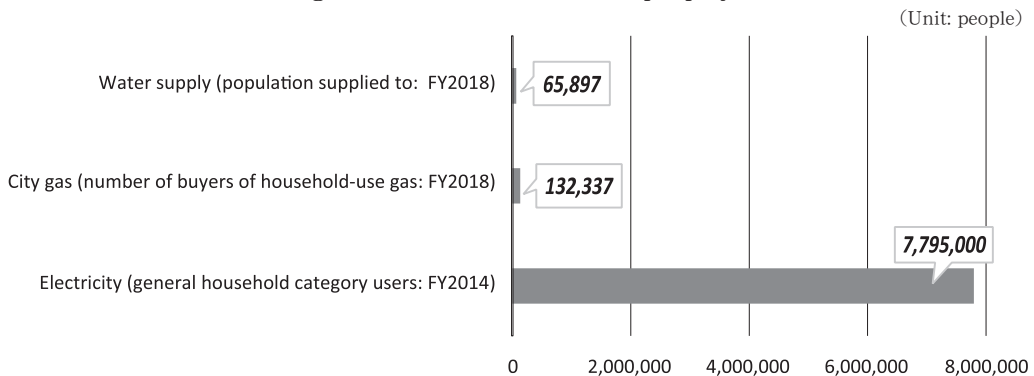


Source: Created by the Author.

### Size

Electricity, gas, and water supply services are positioned as the typical infrastructure<sup>8</sup>, and among the infrastructure services in Japan, water supply services are characterized by smaller numbers of users per project. The current population supplied per water supply project is 65,897 (the fiscal year 2018). This is about half of city gas services (132,337) and about 1/118th of electricity services (7,795,000) (See Figure 2-2).

**Figure 2-2 Infrastructure Users per project**



Source: Created by the Author.

The reason behind this small user count of water supply services is that, in Japan, the water supply services are, as a rule, meant to be operated by municipalities (Paragraph 2, Article

<sup>8</sup> Infrastructure means the base and substructure and generally refers to public and public interest-like facilities and structures such as roads, railroads, water and sewage, power plants, electrical grid, communication grid, ports, airports, irrigation, and river improvement facilities.



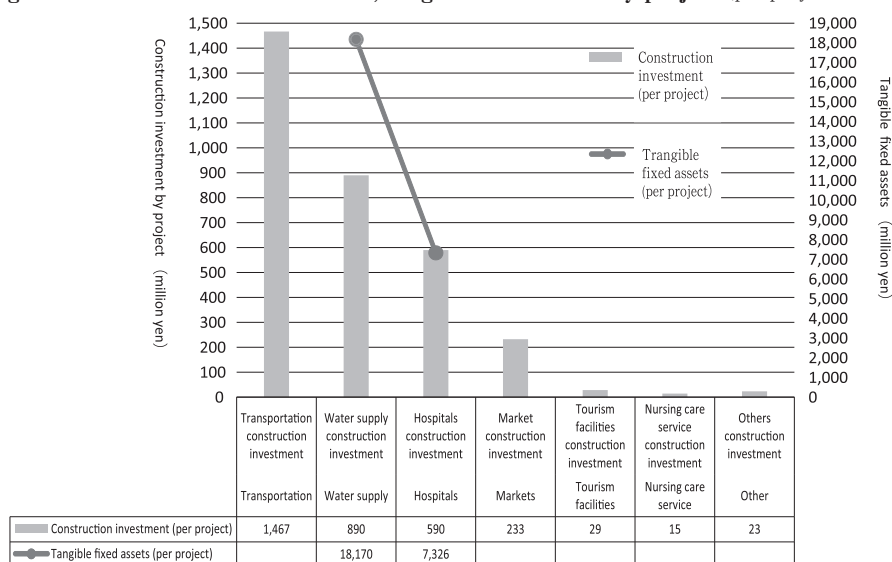
6, Water Supply Act).

The small number of users as infrastructure suppliers is the fundamental feature of water supply management because it brings about unique challenges: management instability and disparities between businesses. Water governance must face those challenges from the front.

### Investment

At the same time, a water supply utility is a facility operation-type administrative service that requires facilities of a specific scale such as intake weir, filtration plant, distribution center, pumping station, water-supply canals, and distribution lines. This is clear compared to the construction investments for local public enterprises in other industries. For example, excluding transportation projects requiring large capital costs (construction investment per project of 1,467 million yen) that include urban high-speed railways, the cost of a water supply utility project, reaching up to 890 million yen, is about 1.5 times that of hospital projects (590 million yen) — another facility operation-type service, about 3.8 times of market projects (233 million yen), and about 30 times of tourism facilities (29 million yen). Moreover, it is about 59 times that of labor-intensive nursing care services (15 million yen), which shows that water supply utilities involve relatively large construction investments. Also, tangible fixed assets, which correspond to the accumulated construction investment size, of water supply utilities (average per project) at 18,170 million yen is about 2.5 times that of the hospital business (7,326 million yen) (See Figure 2-3).

Figure 2-3 Construction investment, tangible fixed assets by project (per project: FY2018)



Source: Created by the Author.

### Profitability

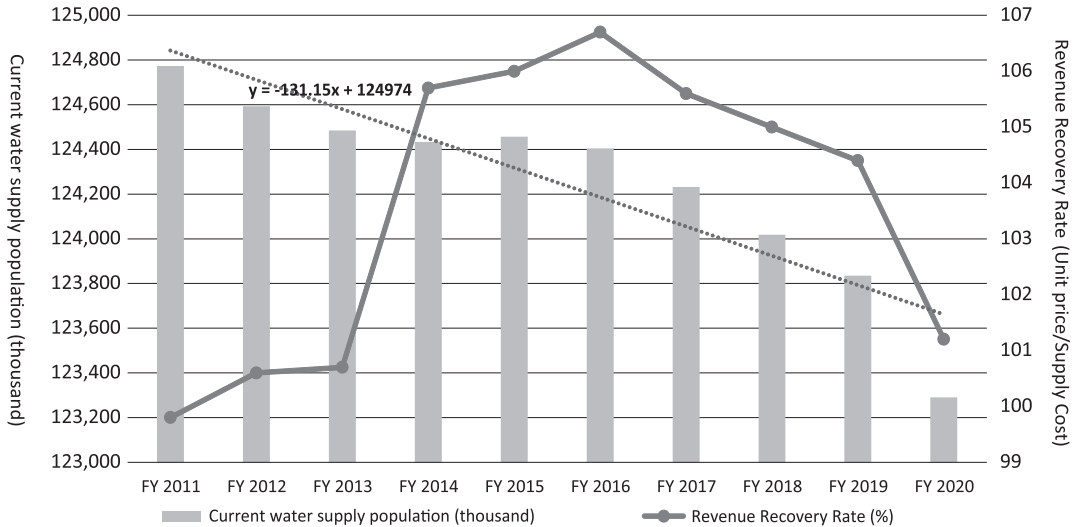
In accordance with the depopulation, the current water supply population has been consistently decreasing since 2011; the Approximate line formula is  $Y = -131.15X + 124,974$ .

Under this situation, the revenue recovery rate<sup>9</sup> has been fluctuating and recently

9 The revenue recovery rate means dividing the unit price by the supply cost.

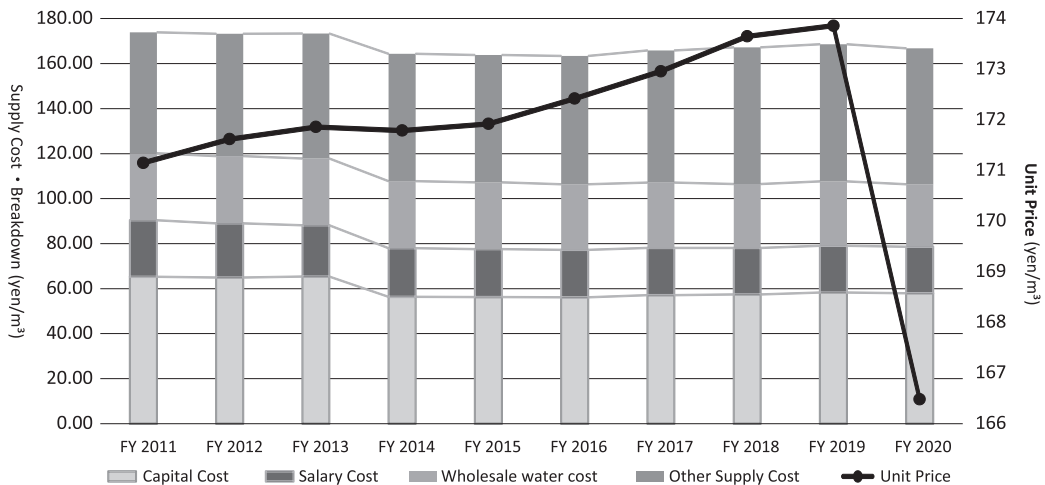
decreasing; the revenue has not grown and the demand has decreased because of depopulation. Moreover, the water demand of tourist facilities rapidly decreased because of the pandemic of COVID19 in 2020 (See Figure 2-4).

**Figure 2-4 Water Supply; Change of Current Water Supply Population and Revenue Recovery Rate**



On the other hand, the capital cost has been the key component of the supply cost, and it is hard to decrease suddenly. Therefore the supply cost has downward rigidity. This is a remarkable difference from the unit price, which has a large amplitude property (See Figure 2-5).

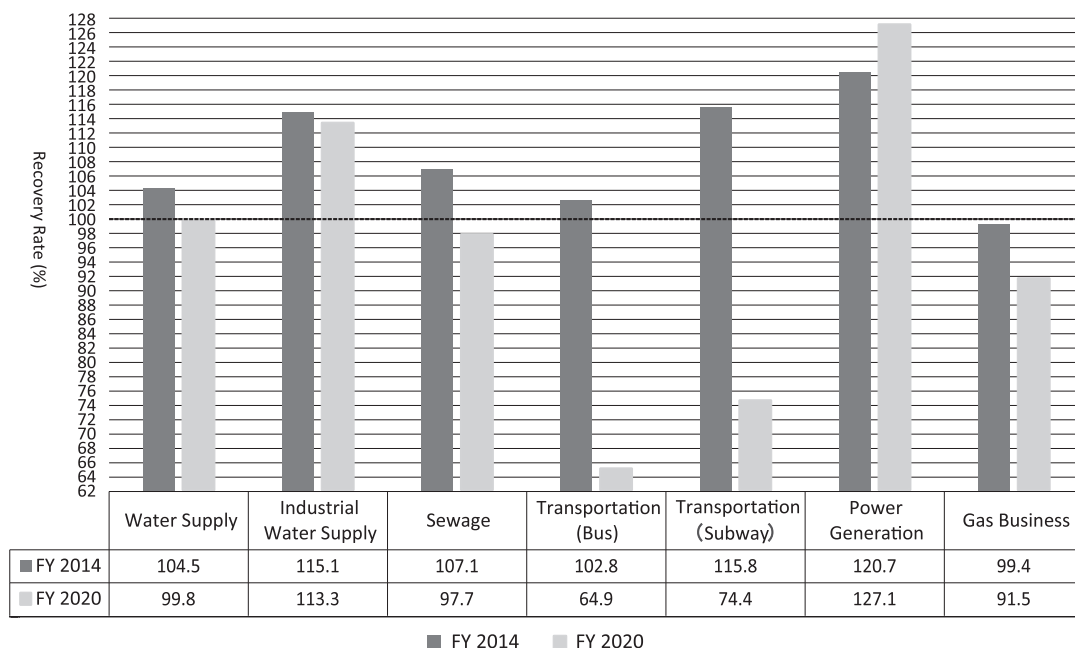
**Figure 2-5 Terminal Water Supply; Change of Unit Price and Supply Cost**



When we compare the revenue recovery rate of water supply with those of other local public enterprise industries, we conclude the following:

- A. Water supply had stable profitability in the fiscal year 2014; its recovery rate was 104.5. Compared with the other industries, it was not inferior.
- B. The recovery ratio of Water supply in the fiscal year 2020 is 99.8, less than 100. Compared with power generation, whose recovery ratio is 127.1, the recent water supply has become a non-profitable business (See Figure 2-6).

**Figure 2-6 Local Public Enterprise; Revenue Recovery Rate** (Unit Price/Supply Cost)



Source: Created by the Author.

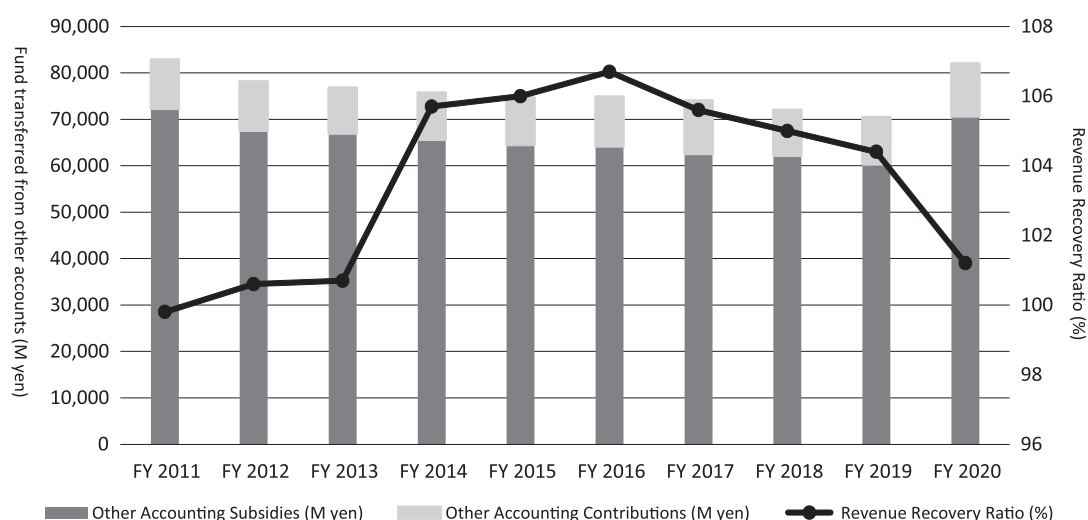
Against this background, it is hard to maintain a completely self-supporting system for some utilities. As the revenue recovery ratio declines, the size of the fund transferred from other accounts has been increasing. The main “other account” is the general account of each local government; it means that the water business becomes to be covered by water charges and tax revenue (See Figure 2-7).

### Aging Infrastructure

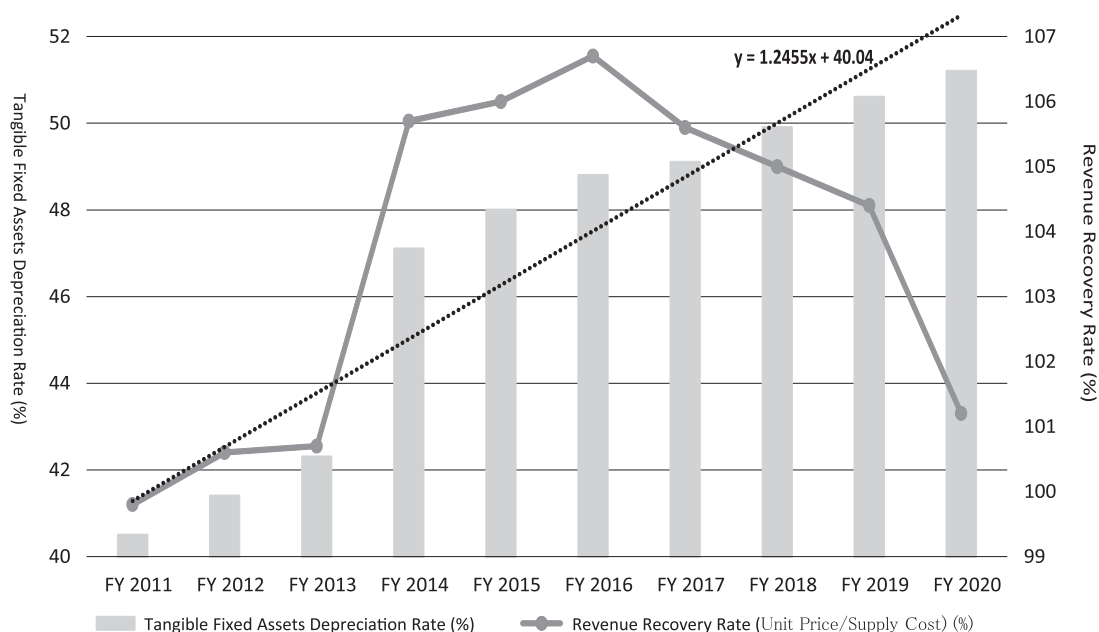
One of the main agendas of the water supply business is taking countermeasures to the aging infrastructure because the aging of facilities is directly related to the quality of water and efficiency of the water supply; the aging brings a leak.

However, as the revenue recovery rate has decreased, the tangible fixed assets depreciation rate<sup>10</sup> has been growing (See Figure 2-8).

<sup>10</sup> This index shows the degree of aging of facilities.

**Figure 2-7 Change of Revenue Recovery Ratio and Fund transferred from other Account**

Source: Created by the Author.

**Figure 2-8 Wate Supply; Change of Tangible Fixed Assets Depreciation Rate and Revenue Recovery Rate**

Source: Created by the Author.

This trend shows that the retained earnings are insufficient, and the equipment update is delayed. Therefore, establishing effective management and how achieving the appropriate facility renewal are universal but urgent challenges for water businesses.

### III. Wide-area Cooperation Initiatives

#### 1. General Remarks

Water supply services now are required to improve lifeline functions by strengthening earthquake resistance and optimize asset size following decline in population supplied, and consequently are facing various challenges including the necessity to carry out improvements and upgrades systematically as described in the chapter II.

Under such circumstances, the local governments are required to actively (a) implement wide-area cooperation ('WAC' hereafter) through WAC promotion plans, (b) enhance asset management, (c) implement steady upgrade investments, (d) secure tariff revenue, (e) promote use of private sector, and (d) utilize ICT and other advance technology.

This chapter will focus on WAC, which is considered as the most important challenge among the various challenges, in terms of water supply utilities from the aspects of (a) what type of consolidations had been carried out so far, (b) what have been the outcomes so far from WAC, and (c) what are the issues being faced by WAC.

#### 2. History of water supply utilities and broader-based local government

Looking at the history of Japan's broader-based local government (concerning overall administration of local governments and water supply utilities), the local government structure enacted in 1888 (Meiji 21), as "municipal unions," legally positioned the joint processing method of the administrative work of local governments for the first time, and based on the municipal organization revision law of 1891 (Meiji 24), established the concerned rules of "municipal associations" in the rules governing municipal administration. Regarding water supply utilities, the Edogawa Water Supply Association was set up as the first consolidated water supply utility<sup>11</sup> engaged in local water distribution in 1919, and the Hanshin Water Supply Municipal Association was established in 1942 as a bulk water supply utility (hereinafter referred to as bulk water supply utilities).

In 1947 (Showa 22) the Local Autonomy Act was formulated as a new basic law, and regarding the broader-based local government (joint processing) system, the administrative association system under the municipal system was continued as it is. Subsequently, the Local Autonomy Act was partially amended in 1952 (Showa 27), wherein the joint processing methods such as joint committee and entrustment of administrative processes were established under matters for ensuring cost-savings and efficient implementation of administrative work.

The national subsidy system was established for wide area water supply in 1967 (Showa 42), and partial revisions were made to the Water Supply Act in 1977 (Showa 52), which enabled the governor of the prefecture to request the concerned associations to stipulate a plan for consolidation of water supply in order to drive forward regional consolidation. The consolidation described here denotes development of water supply facilities and integration of primary management entities to promote systematic development of water supply from a broad perspective exceeding the administrative zone of the municipality and ensure optimization and streamlining of administration and management of the water supply service, etc. The said system was expected to enable the utilities to secure water resources and improve the maintenance and management standards, secure stable supply of water and improve safety of

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11 Denotes water supply utility whose supply zone includes two or more municipalities.

supplied water, and keep the tariff levels in check, and quite a few consolidated water supply associations came to be established.

Further, in the broader-based local government, the broad municipal zone concept, etc. formulated in response to the new nation-wide comprehensive development plan of 1969 (Showa 44) by the Ministry of Home Affairs (present Ministry of Internal Affairs and Communications) provided the momentum to the promotion of development of local government structures among municipalities. The said concept is a framework for establishing public facilities by installing broader-based local government mechanism (water works council or administrative association) and formulate a broader-based local government area plan that shows the area's future image, etc. to ensure development and maintenance of the area, which led to the development of broader-based local governments centered on administrative associations.

Subsequently, regarding water supply utilities, the majority of the water supply facilities built in the 20th century have started aging at the beginning of the 21st century, and prospects of population decline, trend toward municipality mergers, etc., reduction in young engineers, and other such changes to the business environment are becoming conspicuous. For this reason, the Ministry of Health, Labour and Welfare formulated the Water Supply Vision in 2004, which considered consolidation in a broad sense and proposed systems that integrate administration and operational management even if the facilities are scattered, mutual or joint entrustment of facility maintenance, and joint monitoring of quality of source water.

Next, the Ministry of Health, Labour and Welfare formulated the New Water Supply Vision in 2013, which puts forward a progressive consolidation. This is a concept that promotes a new consolidation that is not limited to utility integration but also measures led by sharing of various operational divisions (tariff collection, maintenance, water quality management, training programs, etc.), given the current situation where the spread of water supply is more or less complete and the water supply utilities have matured in most regions, and no significant progress is being seen in consolidation centered primarily on integration of utilities, which as a rule is managed by municipalities.

Further, the following revisions were carried out to the system of local government in the partial revision of 2014 to the Local Autonomy Act.

- A. Establish a cooperation agreement system that stipulates the basic policy and division of roles upon an ordinary local governments cooperating with other local governments in processing administrative work.
- B. An ordinary local government can entrust management execution of part of its administrative work under its own name to the head of another local government (execution by substitute).

In this manner, the broader-based local government system in local administration has undergone many revisions corresponding to the social conditions, and especially the establishment of the aforementioned diverse broader-based administrative systems could be cited as the most important feature.

Moreover, in 2018, there still remained numerous small-scale utilities (921 associations [fiscal year 2016]) supplying to 50,000 people or fewer, and it was necessary to have wide-area cooperation to generate economy of scale from the management aspect. Given this situation, the Water Supply Act was partially revised and systems were developed including establishment by prefectures of associations for promoting regional cooperation.

In addition, given the tough business environment of population decline, aging of facilities,



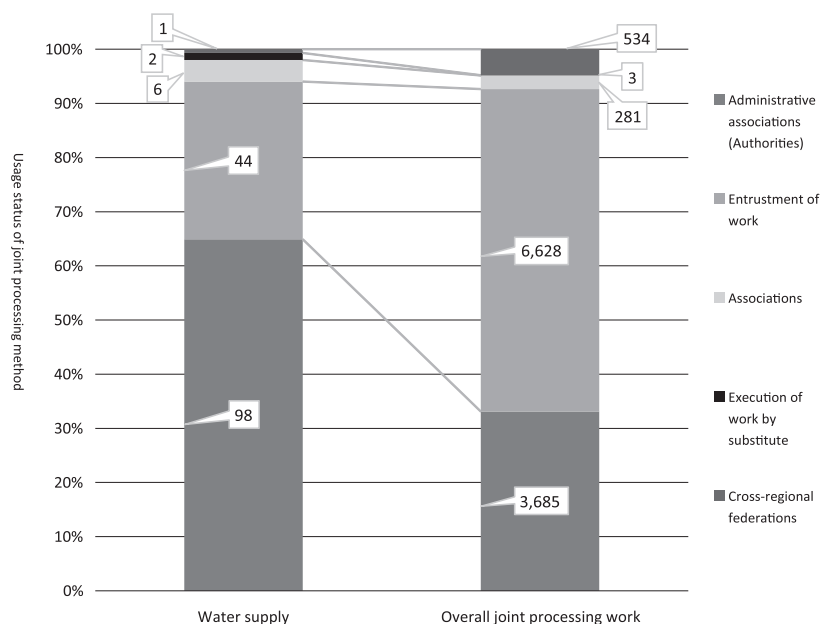
etc., the Ministry of Internal Affairs and Communications and Ministry of Health, Labour and Welfare, on the assumption that consolidation can bring about wide-ranging effects for small-scale water supply utilities such as cost-savings and strengthening of organizational structure through economy of scale, issued a joint notification (dated January 25, 2019) regarding the “formulation of ‘plan for promoting consolidation of water utilities.’” In the notification, the ministries called upon the prefectures to draft a “water supply consolidation promotion plan” by fiscal year 2022 for further promotion of the diverse consolidation policy in the future<sup>12</sup>.

### 3. Current Status of Consolidation of Water Supply Utilities

While the course taken by broader-based local government system is as described above, in this treatise we will look at the current status of consolidation with focus on water supply utilities. The following points are the features of consolidation of water supply utilities<sup>13</sup>.

A. Among the joint processing methods of water supply utilities, administrative associations (Associations)<sup>14</sup> account for the most (98 Associations, ratio of 64.9%; See Figure 3-1).

**Figure 3-1 Status of joint processing method Water supply utilities and utilities overall (FY2018)**



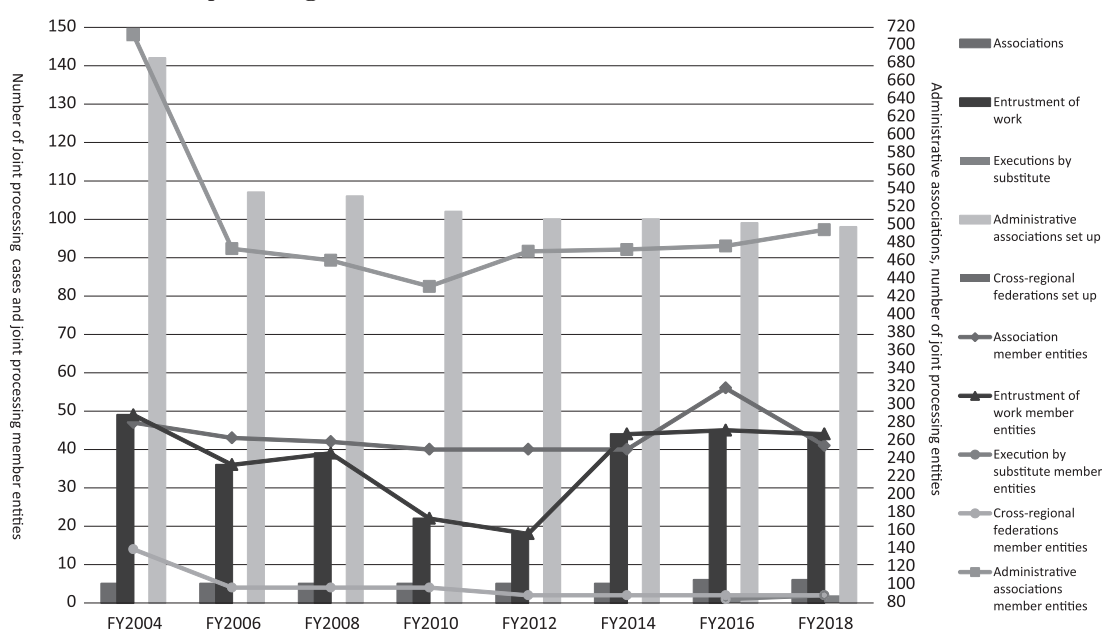
Source: Created by the Author.

- 12 Further in March 2019, the Manual for Drafting Consolidation Promotion Plan was formulated, which is expected to push forward the drafting of consolidation promotion plans by prefectures through simulations of management outlook by various consolidation patterns.
- 13 The framework of consolidation concerning water supply utilities is explained in pp.59 to 65 of *Suido jigyo no keieikaikaku* (Management reforms of water supply utilities) by Seiji Jige, published in 2017 by Diamond, Inc., where the mechanism of government-government cooperation that does not require corporatization (association, entrustment of administrative work, etc.) and mechanism of government-government cooperation that requires corporatization are analyzed separately.
- 14 The administrative association carrying out the joint processing of the work related to management of local public enterprise is called an Enterprise Association. Enterprise Associations is a system that was introduced, in a partial revision of the Local Public Enterprises Act of 1966 (Showa 41) with the aim of making administration association method more suited for the management of the enterprise. The term “Enterprise Associations” will be used hereinafter in this treatise.

This ratio greatly exceeds the ratio of administrative associations (30.7%) in joint processing work as a whole. While water supply utility is a major administrative service of a municipality as a fundamental self-governing body, work that requires more than a certain level of asset operation such as water supply utility, hospitals and clinics, human waste, and garbage processing can be carried out by implementing economic activities of owning and managing assets, contract conclusion, etc., under an independent juridical personality, making it suitable for stable management and operation of organizations or facilities, and therefore mostly<sup>15</sup> utilizes the administrative association method.

B. Against the backdrop of the Heisei-era municipal mergers (1999 to 2010), the total number of joint processing works between municipalities decreased markedly in fiscal year 2006, and similarly the joint processing of water supply utilities also decreased to 149 (fiscal year 2016) from 198 (fiscal year 2014) (See Figure 3-2).

**Figure 3-2 Water supply utilities: Trend in number of joint processing cases and joint processing member entities**



Source: Created by the Author.

- C. At the same time, the number of processing entities (number of member associations) adopting the Associations method has been gradually increasing since 2010.
- D. There were periods in which processing entities increased from 40 to 56 in fiscal year 2016 and the number could possibly increase in the future.
- E. Entrustment of administrative work increased from 18 cases in fiscal year 2012 to 44 in fiscal year 2014, and has been expanding at a similar pace. Concrete examples include 24 cities under Tokyo entrusting the administrative work of small, private water supply systems to Tokyo,

15 See p. 30 of Shunsuke Kimura's *Kouiki renkei no shikumi (kaiteiban)* (Regional collaboration mechanism [revised]) by Dai-ichi Hoki Co., Ltd., 2019, for joint processing pertaining to facility operation-type administrative service.

and Hiroshima prefecture entrusting the management and operation of facilities it owns to Kure and other cities.

F. In 2016, there was one case of execution by substitute, which was institutionalized in fiscal year 2012, and it increased to two in fiscal year 2018, and there is likelihood of local governments utilizing the method in the future (see IV 2 described later).

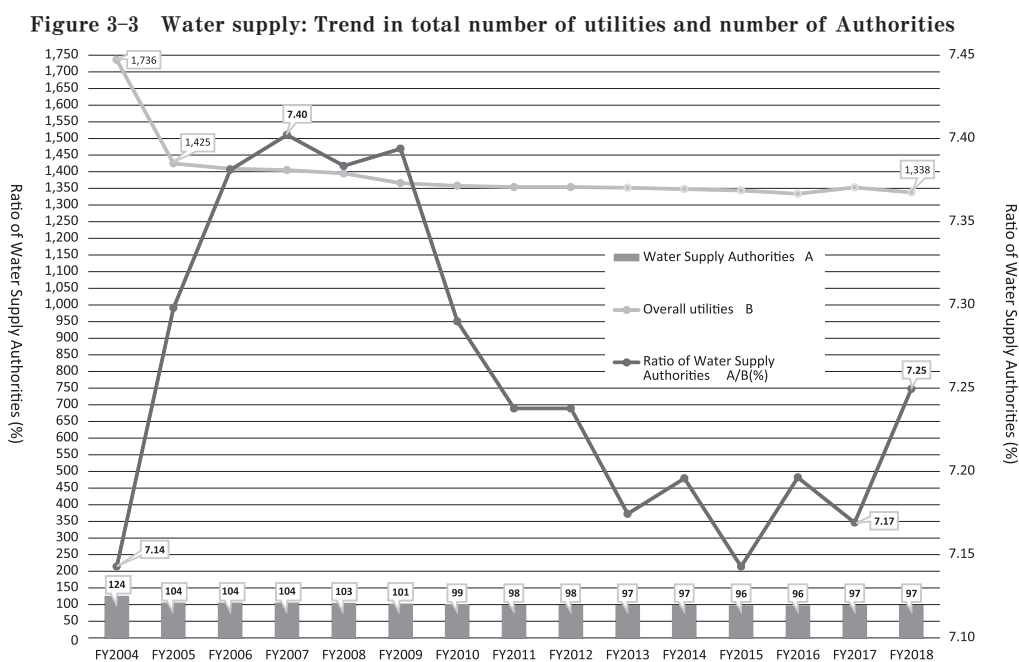
As shown, the progress in diversity of operational formats of joint processing in water supply utilities is quite discernible (See Figure 3-2).

#### 4. Trend of Water Supply Enterprise Associations

##### (1) Water supply utilities and water supply enterprise associations

Among WAC methods, the water supply enterprise association ('Enterprise Association' hereafter) is the major one. Below, we will look at the status of Enterprise Associations that carry out the water supply utilities' work ('WEA' hereafter).

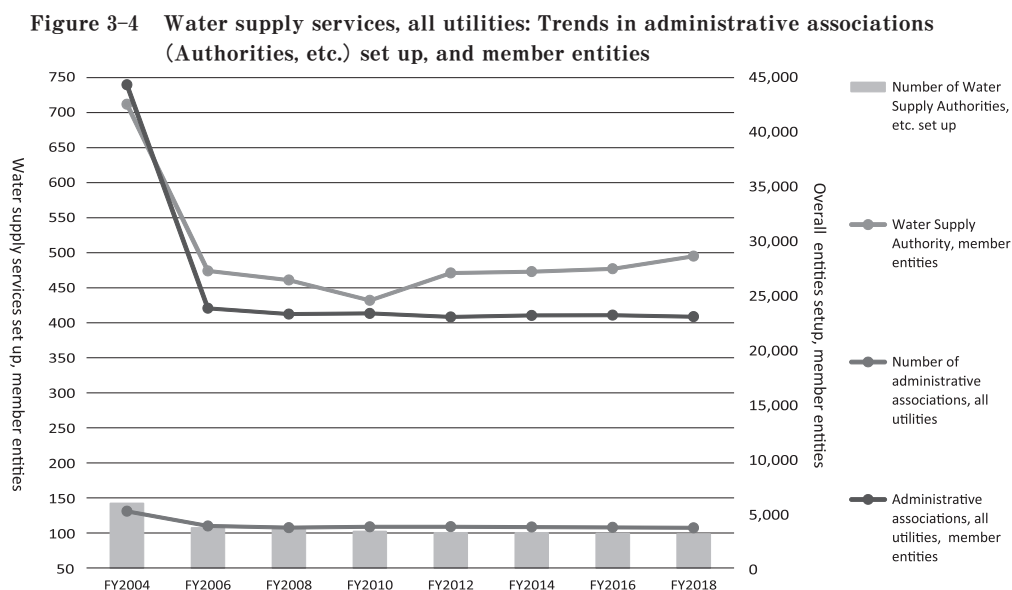
First of all, due to the impact of the merger of municipalities<sup>16</sup>, the number of water supply utilities declined markedly from 1,736 in fiscal year 2004 to 1,425 in fiscal year 2005, while the number of Water Supply Enterprise Associations decreased to 104 from 124. Subsequently, while the total number of water supply utilities gradually declined, the number of Water Supply Enterprise Associations rose from 96 to 97 since fiscal year 2016 and as a result the ratio increased from 7.17% (fiscal year 2016) to 7.25% (See Figure 3-3). This situation points to the growing importance of Water Supply Enterprise Associations as main implementation bodies of water supply utilities.



Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

16 Japan experienced local government reform; municipal amalgamation reform from the year of 1999 to the year of 2010. See Shunsuke KIMURA, *Regional Administration in Japan-Departure from uniformity*, Routledge, 2017, pp. 53-70.

Second, when we look at the number of administrative associations set up and their member entities, the number of administrative associations set up against the total number of utilities and member entities has been roughly unchanged since fiscal year 2008, while there has been an increase in member entities of Water Supply Enterprise Associations, etc. (Water Supply Enterprise Associations and small-scale water supply service's administrative associations) since fiscal year 2016 (See Figure 3-4).



Source: Created by the Author based on survey of joint processing of administrative work of local governments.

Thirdly, when we look at the trends in the member entities of Water Supply Enterprise Associations and the number of municipalities nation-wide, while the number of municipalities kept falling, the ratio accounted for by the number of entities in the water supply enterprise associations in number of municipalities, after declining once in fiscal year 2006, has been steadily increasing from fiscal year 2010 onwards despite fluctuations and the approximate line shows a positive coefficient (+0.674) (See Figure 3-5).

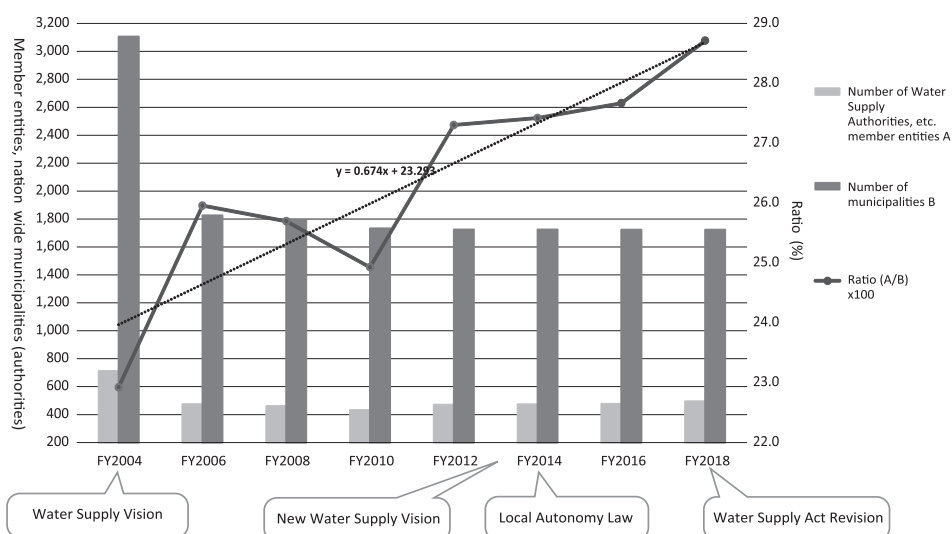
This reveals the increasing importance of the role played by broader-based administration in water supply service, where the number of municipalities sustaining their water supply utilities through regional collaboration has been maintained amidst decline in the number of municipalities following the Heisei-era mergers.

As these situations show, even as the number of municipalities decreased nation-wide after the major Heisei-era mergers, it is clear that the ratio of local governments, carrying out water supply utilities through regional processing by becoming members of water supply enterprise associations, is notably increasing. Such a trend shows that the formulation of the Water Supply Vision, establishment of Local Autonomy Act and Water Supply Act and other measures have been effective in promoting consolidation in reality.

## (2) Status of Water Supply Enterprise Associations

### Number of utilities by business

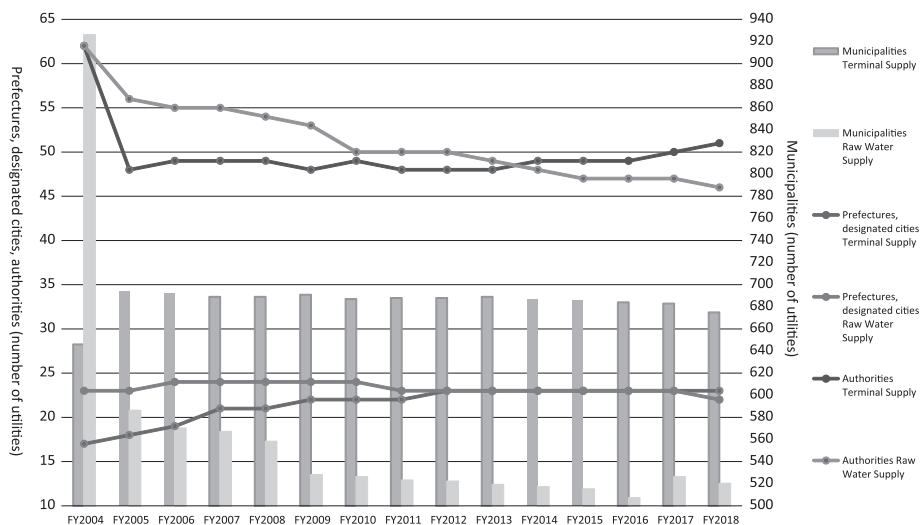
The status of water supply utilities by management format is as follows: those managed by

**Figure 3-5 Trends in member entities of Water Supply Authorities and number of municipalities nation-wide**

Source: Created by the Author based on survey of joint processing of administrative work of local governments.

municipalities account for 92%, with 6% managed by Enterprise Associations, and 2% by prefectures and designated cities (See earlier Figure 2-1).

Water supply services are classified into local water supply utilities and bulk water supply utilities<sup>17</sup>, and when looking at the trends in number of utilities in terms of management format and operations, while the number of entities have been unchanged since fiscal year 2005, the following features can be pointed out (See Figure 3-6).

**Figure 3-6 Water supply: Trends in number of utilities by management format**

Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

<sup>17</sup> Bulk water supply utility is the operation of supplying water through waterlines to the water supply service operators (entities operating water supply services), and is implemented based on the concept that economy of scale (low cost and streamlining) can be ensured by developing water sources (dams, etc.) and facilities (intake facilities, filtration plants, etc.) from a broad perspective.

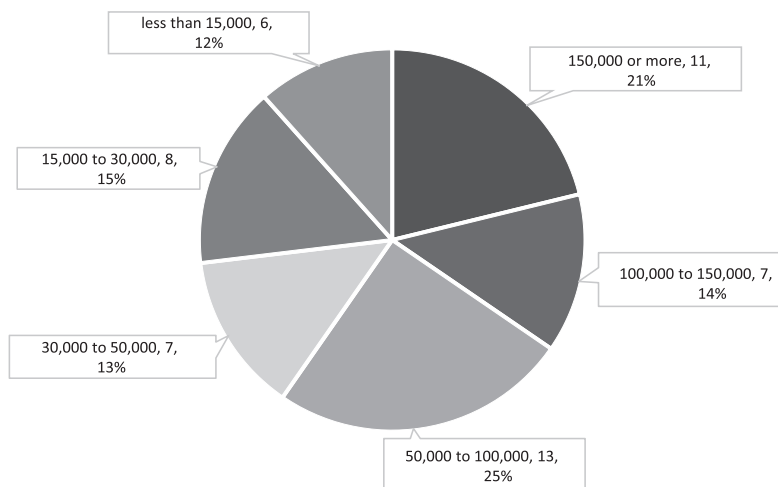
- A. Number of utilities operated by municipalities has been declining conspicuously.
- B. In the case of utilities managed by prefectures and designated cities, the number of local water supply utilities has been exceeding that of bulk water supply utilities<sup>17</sup> since fiscal year 2018.
- C. As for management by Associations, number of water supply utilities has been exceeding bulk water supply utilities since fiscal year 2014. Also, water supply utilities have been showing further increasing trend since fiscal year 2016.

Taking these trends into account, utilities managed by prefectures, designated cities, and associations (these are collectively called broad area water supply utilities) mostly used to have many utilities in bulk water supply. However, in recent years, the number of water supply utilities has been exceeding bulk water supply utilities among broad area water supply utilities, and this points to the growing importance of broader-based local government method in water supply utilities.

### Number of utilities by population supplied

Among Water Supply Enterprise Associations, when we look at number of local water supply utilities by population supplied, there are differences between the scale of population supplied starting from a population layer above 150,000 (hereinafter referred to as “Large-scale Water Supply Enterprise Association”), to one between 15,000 and 30,000 population (hereinafter referred to as “Small-scale Water Supply Enterprise Association”) and those below 15,000 population (hereinafter referred to as “Very Small-scale Water Supply Enterprise Association”), and the entities are more or less equally split between the layers (See Figure 3-7).

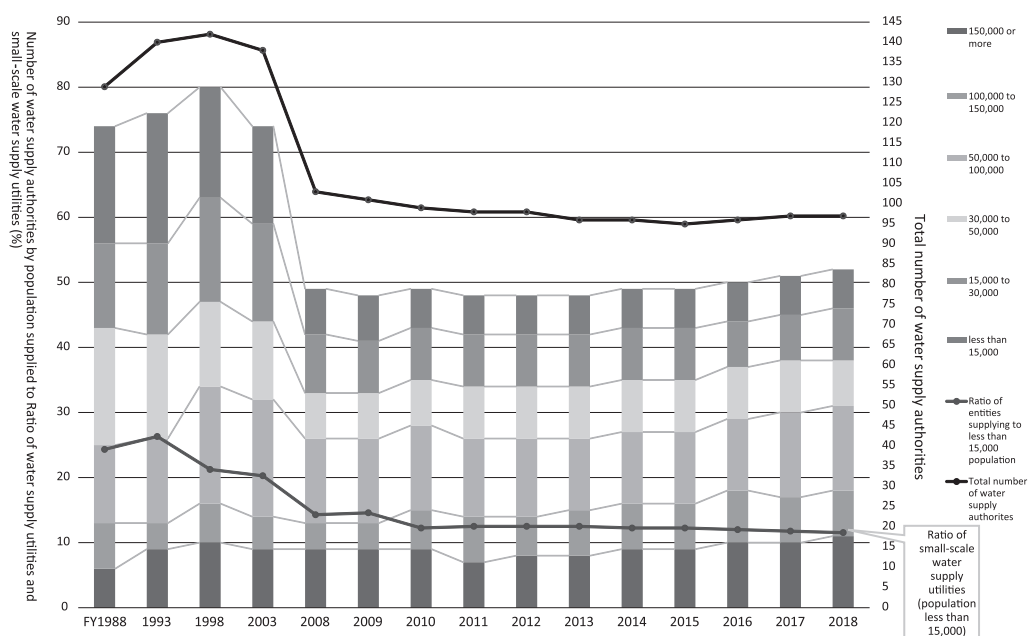
**Figure 3-7 Water supply authorities: Number of entities by population supplied (FY2018)**



Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

Next, when looking at the trend in number of utilities in the period between fiscal year 1988 and fiscal year 2018, while there is a conspicuous decline in number of local water supply utilities in fiscal year 2008, similar to that of Water Supply Enterprise Associations, from fiscal year 2013 onwards the number of utilities has been steadily increasing. Also, over the entire period, there has been no significant fluctuation in the share of each population layer (See Figure 3-8).



**Figure 3-8 Water supply authorities (terminal supply): Trends in entities by water supply population**

Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

From these, the following two points can be noted:

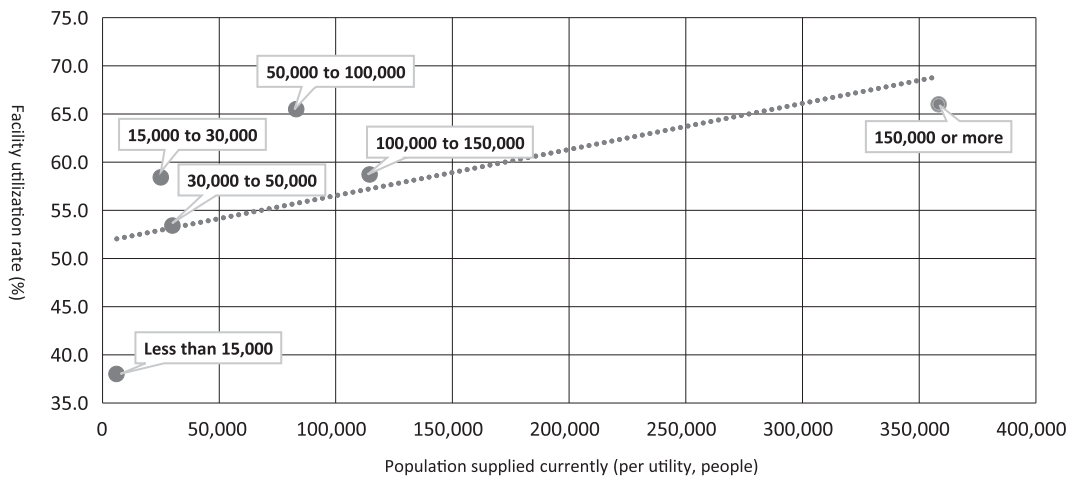
- A. Once being established as a Water Supply Enterprise Association, it is unlikely to see the occurrence of the phenomenon where the population supplied by the said association increases due to integration of Associations or addition of member entities, etc. (in other words, there is no consolidation where the population supplied by a water supply utility increases incrementally).
- B. In the local water supply utility of Water Supply Enterprise Association, while the ratio of Very Small-scale Water Supply Enterprise Associations compared to the total is decreasing gradually, they have been existing at a rate of 26% to 12% in the 30-year long survey period (see earlier Figure 3-8). In other words, a certain level of Very Small-scale Water Supply Enterprise Associations has existed at all times in water supply service for a long time.

### Facility utilization rate by population supplied

Looking at the mutual relationship between population supplied to and facility utilization rate<sup>18</sup>, the utilization rate was 66.0% for Large-scale Water Supply Enterprise Associations, 58.4% for Small-scale Water Supply Enterprise Associations, and 38.0% for Very Small-scale Water Supply Enterprise Associations, meaning that facility utilization rate has an equilateral relation currently with a certain level of mutual relationship ( $r = 0.611$ ) with population supplied (See Figure 3-9).

18 Denotes the ratio between water delivery (m<sup>3</sup>/day) and water supply ability per day (m<sup>3</sup>/day)

**Figure 3-9 Water Supply Authorities (utilities): relation between population supplied currently (per utility) and facility utilization rate (FY2018) ( $n = 50$ ,  $r = 0.611$ )**



Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

This implies that, if more than a certain level of population is secured, the volume of water supplied (ability to supply water) can be matched to the demand (water delivery) through integration or reorganization of facilities and other downsizing measures (conversely, in the case of extremely small population supplied, it will be difficult to retrospectively match the drainage volume and drainage capacity after consolidation through downsizing because of the weak financial base). Taking this point into account, upon considering consolidation, one of the important factors to consider will be the viewpoint on the size of population supplied by the entity through consolidation.

#### IV. Accomplishments of Consolidation

Let's now look at what the consolidation of these water supply utilities had accomplished. While many studies have been carried out over the years regarding the accomplishments expected from Water Supply Enterprise Associations, in this chapter, along with the general accomplishments, I would like to touch on practical outcomes based on specific examples.

##### 1. General accomplishment of Water Supply Enterprise Associations

The generally expected or anticipated accomplishments of Water Supply Enterprise Associations (or in other words, consolidation of water supply services) were considered to be the following in studies so far<sup>19</sup>.

- A. Upon consolidation, capital investment (depreciation) will be reduced in the long-term with the integration and removal of facilities as well as rebuilding of water supply systems going beyond municipal boundaries.
- B. Interest-bearing debt will be reduced by curbing procurement of funds as capital investment is reduced through consolidation.
- C. Unnecessary expenditure in labor costs will be curtailed by keeping the employee count in

<sup>19</sup> In studying the economic impact from consolidation, see Jige, *op.cit.*, pp. 223–228.

check through reduction of overlapping departments in the organization.

- D. Upgrading and streamlining of utilities will be ensured through increased entrustment of work to private companies, comprehensive entrustment of services, and implementation of DBO following consolidation, as expansion of project scale makes it easier to utilize private vendors.

These are matters that can be positioned as general accomplishments and significances. However, are accomplishments in the administrative field limited to these general accomplishments? I would like to examine this point using specific cases.

## 2. Practical Accomplishments of Water Supply Enterprise Associations (Case Study: East Gunma Water Supply Enterprise Association)

Let's look at the consolidation example of East Gunma Water Supply Enterprise Association<sup>20</sup>, which was established in 2016 by three cities and five towns<sup>21</sup> and its post-establishment operation status. The said Association was set up to strengthen the operational foundation of water supply service by addressing the issues surrounding the water supply services such as falling tariff revenue caused by population decline and upgrading of aging facilities. According to the Association's financial statements<sup>22</sup> for fiscal year 2018, it was able to effectively utilize water sources, streamline and upgrade water operations, and reduce costs by carrying out service integration, and coupled with the comprehensive entrustment of services by the public-private investment company, it has set a policy to pursue further streamlining of operations. Moreover, as a long-term future plan, the Association is considering measures aimed at integrating with Gunma Bulk Water Supply Utility in order to thoroughly ensure sustainable and stable water supply.

The following characteristics can be pointed out based on the post-establishment changes to the various indices:

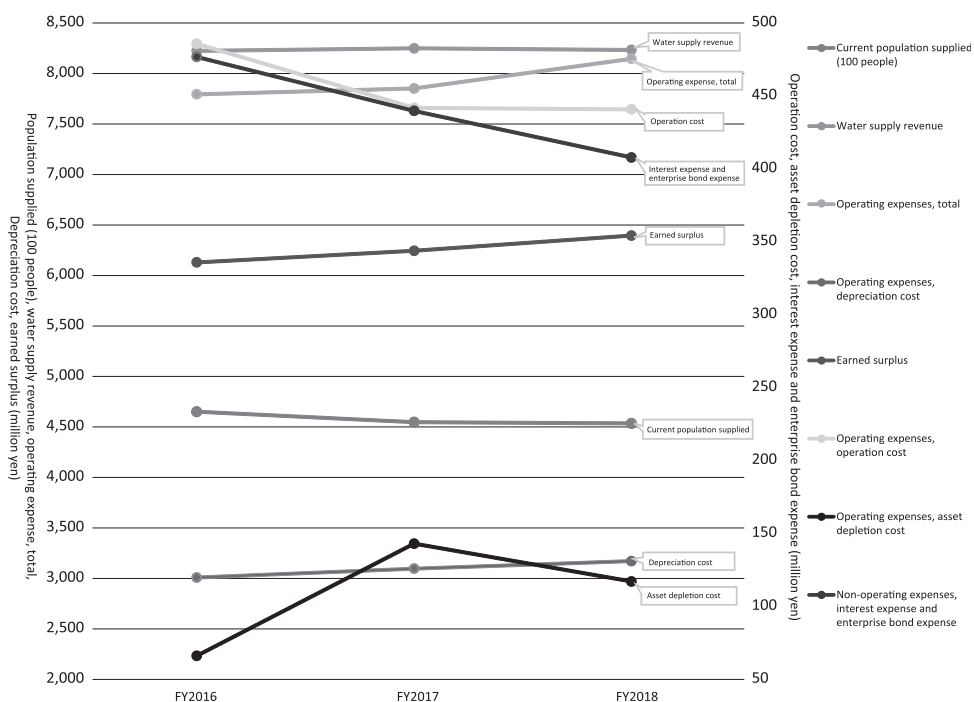
- A. The population supplied currently by the said Association had gone up to about 450,000 people (fiscal year 2018), which makes it a Large-scale Water Supply Enterprise Association (described earlier), but that scale has been continuously decreasing since inception. Due to this, tariff revenue also has been consistently decreasing since its establishment (See Figure 4-1, also in conjunction with Figure 4-2, which shows the changes from the time of establishment [fiscal year 2016]).
- B. With the establishment of the Association the facility utilization rate rose to 63.1% (fiscal year 2016) and gradually rose to reach 65.3% in fiscal year 2018, maintaining a slightly higher rate than similar Associations (63.5% in fiscal year 2018) (Figure 4-3), meaning that the equilateral relation between population supplied and facility utilization rate (described earlier in Figure 3-9) holds true, and that an asset status (delivery capacity) matching the demand volume has been secured through the said Association's establishment.

20 The Ryomo Region Water Supply Management Association established in 1981 in the said region was engaged in initiatives such as disaster support agreement and connection of water lines for disaster support. After repeated studies regarding consolidation and public-private collaboration, the said Water Supply Association was established in 2015. See *Atarashii jagesuido jigyo Saikochiku to sangyoka* (New water supply and sewerage service: rebuilding and industrialization) by Tetsuzo Yamamoto and Yuya Sato Chuokeizai-sha Inc., 2018, pp. 73 to 83 for details.

21 The cities of Ota, Tatebayashi, and Midori and the towns of Itakura, Meiwa, Chiyoda, Oizumi and Ora.

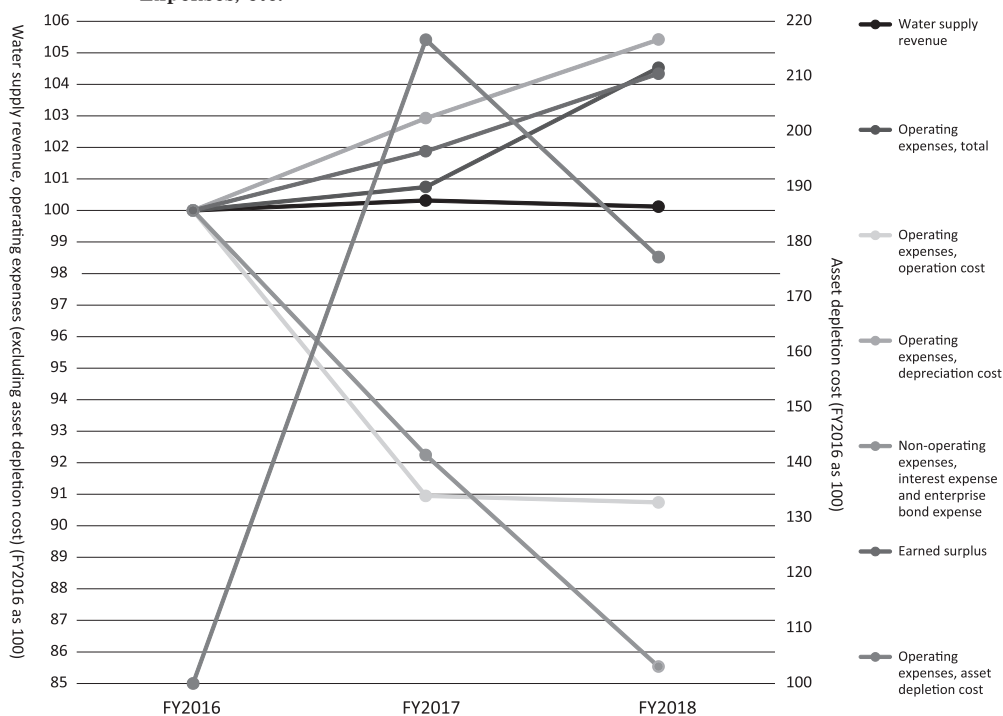
22 Source: East Gunma Water Supply Enterprise Association, fiscal year 2018 financial statements and management comparison analysis table.

Figure 4-1 East Gunma Water Supply Authority Trends in Revenue Expense, etc.



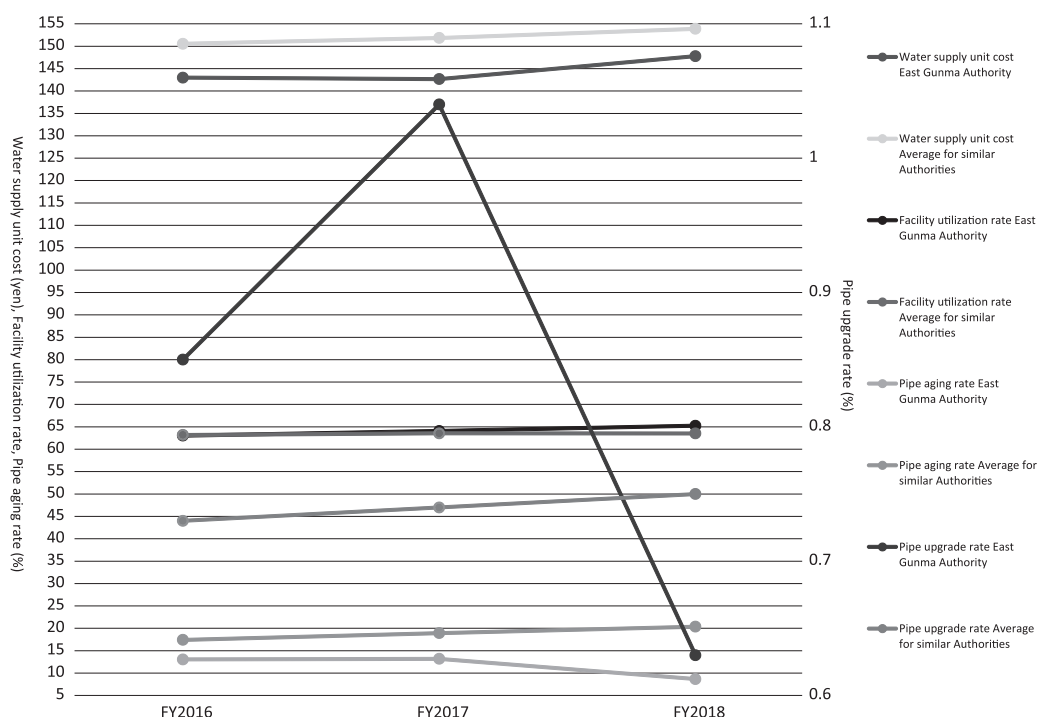
Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

Figure 4-2 East Gunma Water Supply Authority Changes in Water Supply Revenue, Operating Expenses, etc.



Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

**Figure 4-3 East Gunma Water Supply Authority Trends in Water Supply Unit Cost, Facility Utilization Rate, Pipe Aging Rate, etc.**



Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

- C. At the same time, the Association's facilities have aged<sup>23</sup>, and measures to tackle aging had been an important agenda (important policy challenge)<sup>24</sup>. For this reason, the Association significantly brought down the pipe aging rate<sup>25</sup>, which was at 13.1% in 2016 and slightly lower than that of similar Associations (17.4%), to 8.7% in fiscal 2018 by actively upgrading of aged pipes. Regarding this point, compared to the pipe aging rate of 20.4% of similar Associations during the said period, the difference is notable (Figure 4-3). Moreover, the Association's focus on upgrading aged pipes resulted in major increase in the pipe upgrade rate in fiscal year 2017 and notably shows up in the increase in depreciation cost<sup>26</sup> and asset depletion cost<sup>27</sup> since fiscal year 2016 (from Figure 4-1 to Figure 4-3).
- D. The Association, in order to carry out the agenda of upgrading the aged pipes, has been

23 As per the financial statements, tangible fixed assets depreciation rate has reached 48.0% (similar Associations: 50.4%, fiscal year 2018).

24 As for the policy regarding pipe upgrade, the Association's action guidelines are described in the East Gunma Water Supply Zoning Basic Concept formulated in 2013 ahead of the establishment. The basic concept had set forth upgrade standards for pipe type, age, and importance, and the Association has set the priority for upgrade in accordance with those standards.

25 Denotes the ratio of pipes, with respect to all pipes, which have exceeded the service life.

26 Depreciation costs reflect the amount allotted based on periodical accounting as expenses required for acquiring new delivery pipes, etc. for the upgrade of aged pipes.

27 Asset depletion cost reflects the amount of the fixed assets disposed as old pipes. In other words, the level of facility upgrade is indicated in the form of depreciation cost and asset depletion cost.

- implementing a pipe upgrade project<sup>28</sup> by actively utilizing the government subsidy system, and consequently made a considerable amount of capital investment, because of which depreciation cost and asset depletion cost are rising. At the same time, it has realized consistent control of interest expense and enterprise bond expense (Figure 4-2 and Figure 4-3).
- E. The Association started comprehensive entrustment of services to a public-private collaboration<sup>29</sup> in fiscal year 2017 to ensure streamlining of operations, and its outcome is seen in the notable reduction in administrative costs (Figure 4-2 and Figure 4-3).
- (6) The Association, amidst the current decline in population supplied, has achieved sound management as a water supply operator by realizing, among other things, a gradual increase in earned surplus through reduction of administrative expenses and utilization of external funding (government subsidy system).
- (7) On the other hand, water supply unit cost has been increasing gradually due to capital investment in pipe upgrading. For this reason, the medium to long-term challenge for the Association would be to keep the water supply unit cost in check while addressing the issue of aging facility.

When we look at the actual consolidation initiatives, the following items can be considered as the key points.

Firstly, upon considering consolidation, it is necessary to take into account the impact on revenue of the rapidly declining population across the nation (and the consequent decline in population supplied) in the post-consolidation operation plan.

Next, in terms of expenses, it is also necessary to note that consolidation does not necessarily bring about economy of scale or a simple reduction in unit cost by eliminating overlapping facilities in all cases. As can be seen from the case of this Association, there are cases where the unit cost goes up due to capital investment to address aging of facilities. In short, the impact of consolidation varies depending on the point on which the agenda focuses.

With the above as the premise, the following can be considered as the practical advantages of consolidation.

- A. The Association can build an effective organizational structure and financial scheme with respect to the agenda (in the case of the East Gunma Association, full-fledged upgrade of aged facilities) through consolidation. In other words, given the opportunity to demonstrate economy of scale from consolidation, an Association can improve the likelihood of using new methods such as (i) utilization of external funding (government subsidy), where the funding scale is large (so-called framework), in terms of revenue, and (ii) introduction of comprehensive entrustment of services, etc. to curb operating expenses in terms expenses.
- B. Consolidation becomes an opportunity to make the facility capacity to match the present demand. Also, in that sense, when a water supply utility operator contemplates consolidation, considering the post-consolidation scale of the utility will become crucial from the perspective

28 The East Gunma Water Supply Enterprise Association has utilized the government subsidy system for consolidation projects in the 2015 to 2024 period, and has secured 9.8 billion yen in subsidy against the subsidy eligible expense of 29.3 billion yen. See Yamamoto and Sato, *op.cit.*, p. 76.

29 There has been entrusting comprehensive services to the Gunma Tobu Water Supply Services Co., Ltd. (public-private joint venture company with Association: 51% and private consortium: 49%) since 2017 for a period of eight years. The operation details are (i) management of purification plant and related facilities, (ii) maintenance and management of pipe facilities, (iii) management of water supply devices, (iv) water tariff collection, (v) upgrading work of aged facilities, and (vi) aged pipe upgrade design and work management. See Jige *op.cit.*, p. 79; Yamamoto *op.cit.*, pp. 76 and 77.



of achieving stable facility utilization rate.

- C. As can be seen in the East Gunma Association's case, the horizontal integration becomes the base for considering the next vertical integration (integration with bulk water supply), as it becomes a phased, gradual step of consolidation.

Thus, while there are aspects where the practical outcome of consolidation overlaps with general accomplishments, when you analyze it in detail, it is reasonable to think that consolidation is delivering results as a mechanism for agenda resolution that takes into account the individual government demands and is not limited to the general accomplishment category.

## V. Challenges of Consolidation

Next, we will look at the challenges faced by Water Supply Enterprise Associations, and separately look at the challenges of the water supply utilities on the whole.

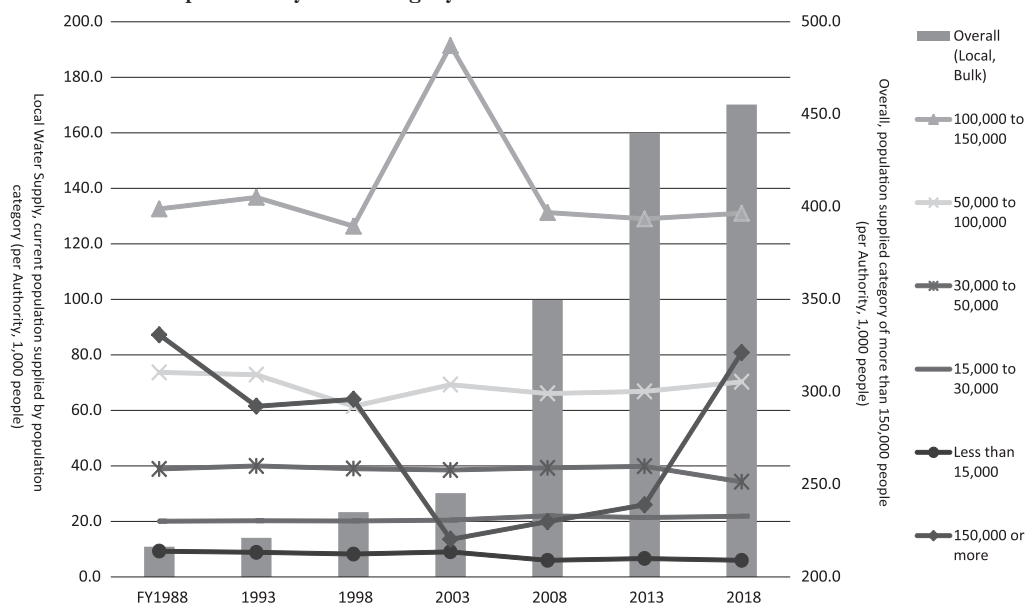
### 1. Challenges of Water Supply Enterprise Associations

#### (1) Population supplied per Association

When we look at the trend in number of utilities for the period from fiscal year 1988 to 2018, the population supplied per Association has continued to grow, considering the entire water supply service including local and bulk water supply utilities, and as of fiscal year 2018 it is 455,000 people.

Next, we examine it based on the population supplied category. Large-scale Water Supply Enterprise Associations (the population supplied 150,000 or more) are the ones where the population supplied is increasing notably, followed by the 100,000–150,000 category. On the other hand, the 50,000–100,000 category is unchanged and the less than 50,000 category is either unchanged or on a declining path (See Figure 5-1).

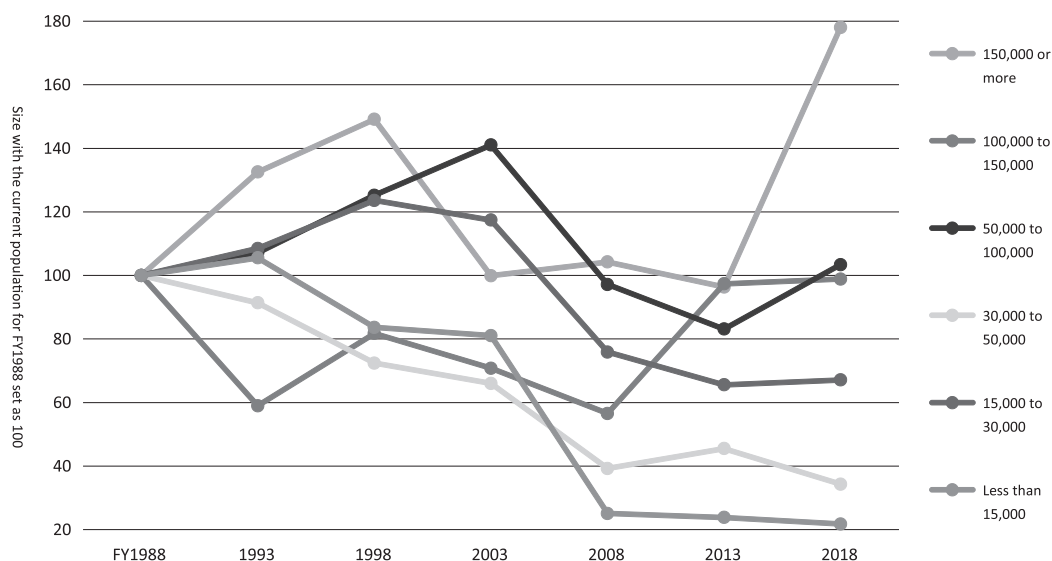
**Figure 5-1 Water Supply Authorities (Terminal Supply) Trends in Current Water Supply Population by Size Category**



Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

Such a phenomenon becomes even more apparent from the rate of change with the population supplied in fiscal year 1988 as the base (See Figure 5-2).

**Figure 5-2 Water Supply Authorities (Local) Trends in Current Population Supplied by Population Supplied Category**



Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

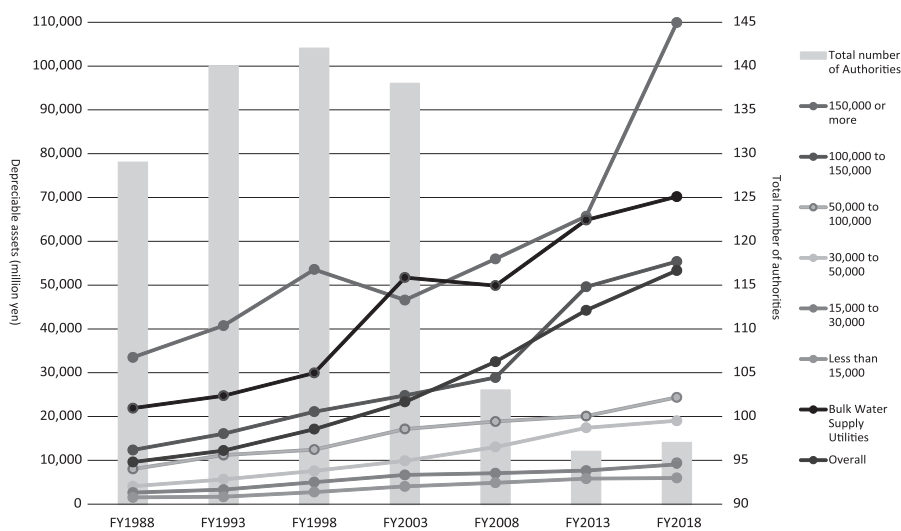
Looking at these situations, as an outcome of Water Supply Enterprise Association, it could be judged that for Associations supplying to populations more than 50,000, it has brought about the effect of either increasing the population supplied or maintaining the population supplied where populations of the respective municipalities had declined.

However, simultaneously, the change in the size of population supplied per Association shows the occurrence of a bipolar phenomenon among Water Supply Enterprise Associations depending on the population supplied category. In other words, as opposed to the above, population supplied is decreasing for Water Supply Enterprise Associations supplying to populations less than 50,000. This suggests the requirement to tackle outright the issue of expanding difference among Associations involved in local water supply. Since it becomes difficult for Associations with decreasing population supplied to sustain the water supply service in a stable manner due to the reduction in water supply revenue, it is necessary for the Water Supply Enterprise Associations also to evolve consolidation such as further integration (horizontal and vertical integration) as well as other measures (sharing of facilities, management, etc.) (to be described later).

## (2) Depreciable assets and penetration rate

Looking at the depreciable assets per Association population supplied by population category for the period fiscal year 1988 to 2018, the depreciable assets per Association are noticeably increasing in the Large-scale Associations, followed by those in the 100,000–150,000 population category. On the other hand, it is unchanged for Small-scale Water Supply Enterprise Associations, and slightly increasing for Very Small-scale Water Supply Enterprise Associations, but the rate of increase is markedly small. Also, bulk water supply utilities show the next highest rate of increase behind Large-scale Water Supply Enterprise Associations (See Figure 5-3).

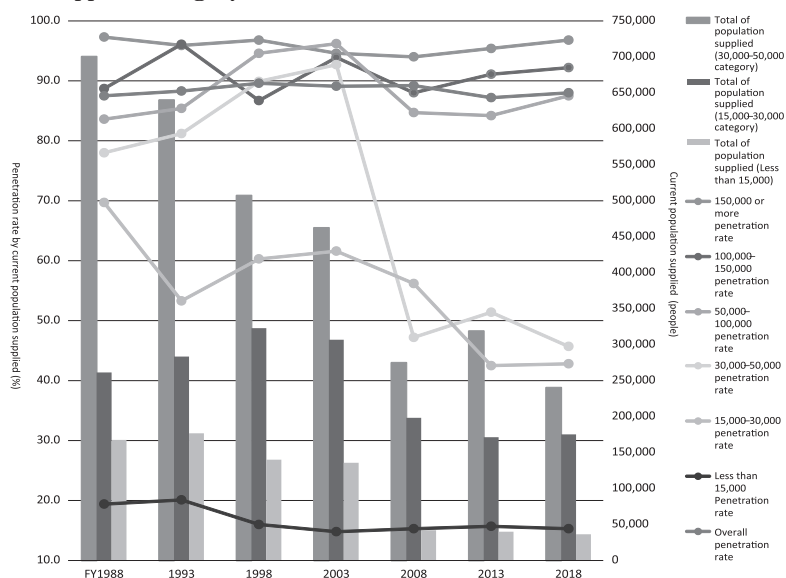
**Figure 5-3 Water Supply Authorities Trends in Depreciable Assets by Population Supplied Category (per Authority)**



Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

The penetration rate of population supplied by population category per Association for the fiscal year 1988 to 2018 shows an increasing trend across categories. The penetration rate in the 50,000 or more category is more than 87.5% (fiscal year 2018), while in case of the categories below 50,000, the 30,000–50,000 category had a penetration rate of 45.7%, the Small-scale Associations (15,000 to 30,000) had a rate of 42.8% and the Very Small-scale Associations (less than 15,000) had a rate of 15.3% (fiscal year 2018). In this manner, the differences between various population categories in terms of penetration rate are large and are increasing (See Figure 5-4).

**Figure 5-4 Water Supply Authorities Trends in Penetration Rate of Current Population Supplied Category**



Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

In particular, in the cases of Very Small-scale Water Supply Enterprise Associations and Small-scale Water Supply Enterprise Associations (hereinafter referred to as “Small-scale Water Supply Enterprise Associations Group”), the penetration rate is also declining along with the decline in population supplied, and it is clear that there is an aspect where the cycle of capital investment and securing of revenue has not been smoothly functioning (falling into a vicious cycle).

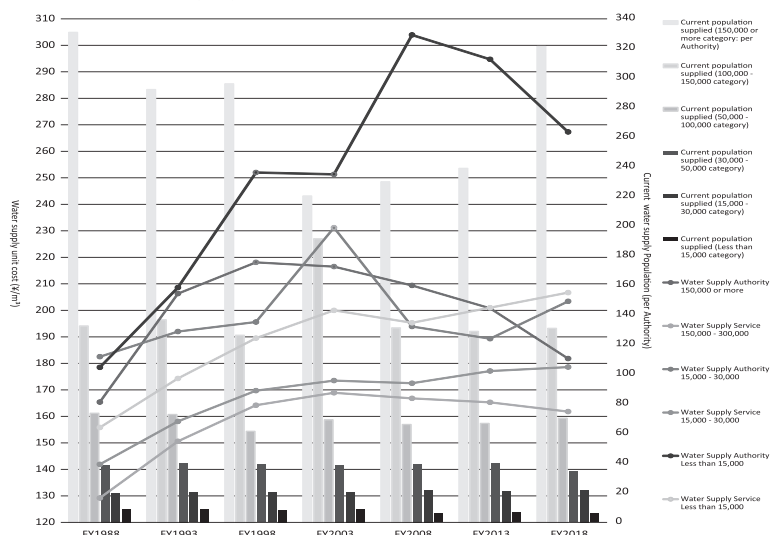
As seen above in the trends in terms of population supplied by the Water Supply Enterprise Associations, while the Associations with population supplied more than 50,000 are able to expand or maintain the population supplied levels, it is necessary to note that the gaps between the various population supplied categories are increasing in terms of all the indicators of population supplied, depreciable assets, and penetration rate.

### (3) Water supply unit cost

The water supply utilities' cost problem boils down to water supply unit cost. Looking at the water supply unit cost by population supplied category for the period from fiscal year 1988 to 2018, the following matters could be pointed as its features.

- A. The Water Supply Enterprise Associations' water supply unit cost has been on an increasing trend in general. Nevertheless, though the water supply unit cost of Large-scale Water Supply Enterprise Associations used to be higher than the unit cost of water supply utilities as a whole in the same scale (150,000 to 300,000), it fell noticeably since fiscal year 2003 and the unit costs of both are rather coming close.
- B. In the case of Small-scale Water Associations (15,000 to 30,000), the unit cost has been going up and down, but has been on a slight upward trend since fiscal year 2013. The unit cost for water supply utilities overall in similar categories also has been showing a similar trend.
- C. The fluctuation in unit cost is greatest in Very Small-scale Water Associations (less than 15,000), which after consistently rising till fiscal year 2008, has been noticeably falling ever since. Nonetheless, the unit cost gap, with Associations with current population supplied of more than 15,000, is still significant (See Figure 5-5).

**Figure 5-5 Trends in Water Supply Unit Cost and Current Population Supplied by Population Supplied Category (per Unit)**



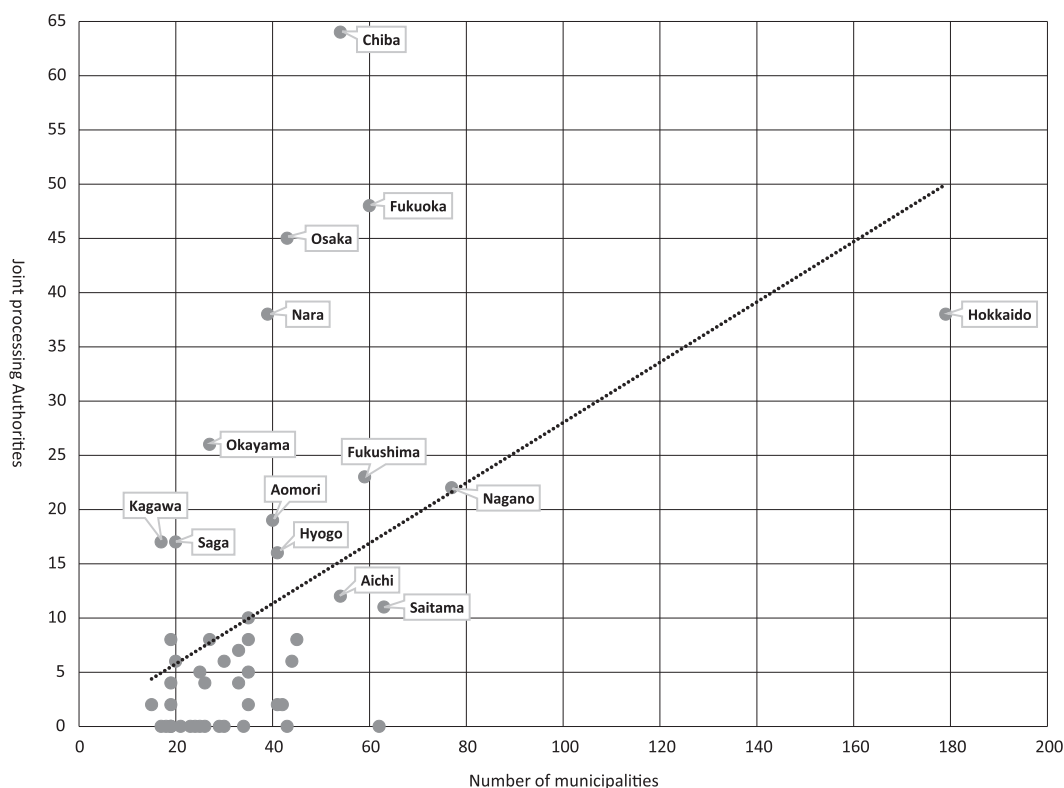
Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

Since there is such a remarkable difference in water supply unit cost between Small-scale Water Supply Enterprise Associations Group and Large-scale Water Supply Enterprise Associations, along with resolving the issue of the cycle of capital investment and revenue returns not working smoothly, it is required to continue implementing measures to pull down the water supply unit cost.

#### (4) Spreading of joint processing

Upon considering consolidation of water supply services as a measure, it is necessary to note the differences in those initiatives between regions. The joint processing (earlier mentioned Figure 3-1, Figure 3-2), of the Local Autonomy Act is being utilized also in the water supply services, but there are discrepancies between regions in terms of the level of implementation. Specifically, the correlation factor, between the number of municipalities by prefectures and the number of joint processing work of water supply service, is 0.487, which does not suggest a strong correlation. While a few prefectures including Chiba, Fukuoka, and Osaka are actively utilizing joint processing, there are many regions that are not utilizing it much (See Figure 5-6).

**Figure 5-6 Water Supply: Relation between Number of Municipalities and Number of Joint Processing Authorities by Prefecture (FY2018) ( $r = 0.487$ )**



Source: Created by the Author based on Survey of Financial Status of Local Public Enterprises.

Water supply services require water sources, intake facilities, and water distributing facilities and therefore it is a fact that the method of wide area processing will be significantly affected by the natural conditions. However, in recent years, there is room for utilization of diverse consolidation methods such as establishment of Associations through not only service integration but also management integration, and cooperation in management.

## 2. Challenges in consolidation of water supply utilities

Regarding consolidation of water supply utilities overall, the New Water Supply Vision had put forward a concept called “new consolidation,” which calls for wide-ranging measures led not only by simple service integration but also by cooperation between various operating divisions (tariff collection, maintenance, water quality management, training program, etc.).

Specifically, in consolidation, service integration<sup>30</sup> and management integration<sup>31</sup> are considered as the most promising means<sup>32</sup> to deliver effective strengthening of the management foundation such as reducing water supply unit cost and securing specialist workforce through integration and reorganization of water supply facilities and centralized management of human and financial resources. Also, even in regions where services and management integration is difficult due to geographical factors, it is possible to expect reduction in upgrading and maintenance costs through sharing of facilities<sup>33</sup>. Further, collaboration in management<sup>34</sup> can be expected to deliver streamlining of administrative work. The new consolidation is looking at effective utilization of such methods based on a broader vision.

Concrete examples of recent consolidation initiatives are listed in the chart below, and the key points to note are as follows:

- (1) Service integration, which is made up of horizontal and vertical integrations, and management integration are full-fledged consolidation methods in the sense that it establishes a permanent organization following the change in juridical person (new establishment, integration) called administrative association (Association). Against a background with such features, after the completion of the Heisei-era mergers of municipalities in March 2010, from around 2006, when there was a break, to after fiscal year 2014, the number of member entities of Water Supply Enterprise Associations continued to increase (see earlier Figure 3-4), and more Water Supply Enterprise Associations are being established as part of the new form of consolidation wherein since fiscal year 2015 the share of Water Supply Enterprise Associations in water supply services has been showing a rising trend (see earlier Figure 3-3).
- (2) Typical examples of horizontal integration in service integration are the East Gunma Water Supply Enterprise Association (see earlier IV 2), Chichibu Regional Administration Zone Association<sup>35</sup>, and Kagawa Wide-area Water Supply Enterprise Association<sup>36</sup>.

Further, impact from the vertical integration of bulk water supply utilities and local water supply utilities is considered to be significant due to the reduction in expenses by securing stable water sources, facility downsizing through flexible water flow, and as reserve funds become

30 Denotes integration of management entity and water supply implementing entity into a single entity.

31 Denotes retaining multiple implementing entities of the water supply service, while integrating the management entities.

32 See Yamakoshi, *op.cit.*, p. 81.

33 Denotes shared installation or shared usage, etc. of part of the water supply facilities.

34 Denotes sharing of system for tariff, accounting, pipe information, etc., joint entrustment, joint ordering, etc. and such intangible operations and contract activities, in addition to sharing method using the third sector or virtual association as the receiver.

35 Concluded a permanent independent zone formation agreement in 2009 to set up Chichibu Regional Administration Zone Association, carrying out joint processing of services such as garbage processing, fire services, etc. The water supply services were added in 2016, which carried out integration and reorganization of facilities (reduced purification plant to 26 from 41, etc.), reducing time and monetary expenses.

36 A case of service integration of prefecture, eight cities, and eight towns (first prefecture-wide integration in the country) to ensure stable supply by unifying water source.



unnecessary for bulk water supply utilities. Typical examples of that are the Nakasorachi Wide-area Water Supply Enterprise Association, Awaji Water Supply Enterprise Association, and Midland Iwate Water Supply Enterprise Association<sup>37</sup>.

- (3) In management integration, while the managing entities are consolidated, the water supply services (accounting, tariff system, etc.) coexist even after the integration. A typical example is the Osaka Water Supply Enterprise Association. This Association started operations in 2011, and in 2017 it was integrated with three other Associations (Shinjonawate-shi, Taishi-cho, and Chihaya Akasaka Mura), but accounting continue to be carried out separately.
- (4) Execution by substitute was a system introduced in the partial revision to the Local Autonomy Act of 2014, and as existing examples there are two types based on their nature. The first one is the execution by substitute by prefecture, where a prefecture takes on the municipalities' administrative work, as in the case of Nagano prefecture. In particular, in under populated municipalities, solving issues such as the decrease in tariff revenue following population decline, upgrade of aging facilities, and shortage of water supply technicians had been difficult, and the prefectural government carries it out from the perspective of regional contribution. Second is the central city subsumption type, where municipalities, under a horizontal relationship, take on the administrative work of surrounding municipalities (as in the case of Kitakyushu).
- (5) Other methods include the permanent independent zone formation agreement (e.g. Chichibu Regional Administration Zone Association), virtual associations (e.g. Northern Ouu District Water Supply Council<sup>38</sup>), establishment of third-sector entities (e.g. Hiroshima prefecture), etc., which have realized new consolidation utilizing existing local government systems.
- (6) As seen in sharing of facilities and cooperation in management, there are examples where the concept of joint processing is interpreted flexibly to handle consolidation. Sharing of facilities focuses on the infrastructure aspects and ensures reduction in construction and maintenance costs of facilities (e.g. Arao-shi and Omuta-shi<sup>39</sup>).

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37 The Midland Iwate Water Supply Enterprise Association was established in 2014, focusing on downsizing, and by 2018 reduced the number of purifying plants to 29 from 34 and water intake facilities to 32 from 36, saving approx. 7.6 billion yen. See pp. 36 to 38 of Junji Hashimoto's *Suido mineika de mizu ha donarunoka* (What will happen to water with privatization of water supply) by Iwanami Shoten, Publishers, 2019.

38 Northern Ouu District Water Supply Council was established as a virtual association in 2008, and initially was engaged in activities such as study sessions, etc. centered on information exchange, but concluded an agreement in 2015 and started four sharing initiatives (shared operation of facilities, shared management of water source data, bulk order of facility management, and sharing of water purification system).

39 The cities together ordered the design, construction, and maintenance management of the purification plant and achieved cost reduction of approx. 700 million yen through shared installation and approx. 1.2 billion through DBO method.

Table

Joint processing method	Type		Examples		Number set up (FY2018)	Local Autonomy Act (relevant legal basis)
			Concerned Authorities, etc.	Starting fiscal year		
Administrative association (Water Supply Authority)	Service integration (integrate management entity and water supply service)	Horizontal integration (integration with multiple water supply services)	Iwate Chubu Water Supply Authority (2 cities, 1 town)	FY2014	98	Article 284
			East Gunma Water Supply Authority (2 cities, 5 towns)	FY2016		
			Chichibu Joint Administration Bloc Association (1 city, 4 towns)	FY2016		
			Kagawa Water Supply Authority (integrated water supply services of the prefecture, 8 cities, 8 towns)	FY2018		
		Vertical integration (integration of bulk water supply authority and local water supply authority)	Nakasorachi Water Supply Authority (3 cities, 1 town)	FY2006		
			Awaji Water Supply Authority (3 cities)	FY2010		
	Management integration (integration of management entities. Water supply services continue to exist)		Osaka Water Supply Authority (The Authority manages the water supply services of Shinjonawate-shi, Taishi-cho, and Chihaya Akasaka-mura.)	FY2019		
Execution by substitute	Execution by substitute by prefecture		Nagano prefecture carries out the design and work management of water supply services for Tenryu-mura.	FY2016	2	Article 252 16-2
	Central city subsumption type		Kitakyushu city carries out the water supply, tariff collection, facility construction and renovation, etc. for Munakata District Administrative Association	FY2016		
Other methods	Permanent independent zone formation agreement		Started water supply services as part of services of the Chichibu Joint Administration Bloc Association utilizing the agreement.	Study period: FY2009–FY2016		—
	Sharing of facilities	Joint set up and usage of water supply facility. Connection, etc. during emergency notification period.	Arao-shi (Kumamoto prefecture) and Omuta-shi (Fukuoka prefecture) jointly constructed a purification plant.	FY2012		
		Establishment of third sector	Hiroshima prefecture established Mizu Mirai Hiroshima Corporation (a third-sector entity). The company carries out the work as specified manager of prefectural water supply facilities and management of municipal water supply facilities.	FY2012		
	Cooperation in management	Sharing of systems	Through Kita Ou Water Supply Association, the concerned Authorities considering sharing the systems for tariff, accounting, pipe information, and other works of Hachinohe Water Supply Authority.	FY2014		
		Virtual association	Through Kita Ou Water Supply Association, (virtual association), considering sharing the systems for tariff, accounting, pipe information, and other works.	FY2014		
		Joint entrustment (centrally and jointly entrust water quality inspection, facility management etc.)	Water source quality inspection, etc. of five operators in Kanagawa prefecture (Kanagawa prefecture, Yokohama, Kawasaki, and Yokosuka cities, and Kanagawa Water Supply Authority) carried out centrally by Wide-area Water Quality Management Center (the said Authority).	FY2015		
		Joint ordering	Kasumigaura-shi and Ami-machi (Ibaraki prefecture) jointly ordered service entrustment of water supply tariff payment.	FY2015		

Source: Created by the Author.

Regarding collaboration in management, there are (i) measures where the work is subdivided and only those works that can be shared (tariff collection, water quality control, etc.) are shared, and (ii) initiatives where, instead of ownership management of facilities, sharing is done on a contract act basis such as joint entrustment and joint ordering (e.g., Kasumigaura-shi, Ami-machi<sup>40</sup>).

In the case of East Gunma Water Supply Enterprise Association, Ota-shi and Tatebayashi-shi were already comprehensive entrustment of services prior to the establishment of the Association, which is said to have enabled the securing of time for considering consolidation through labor-saving<sup>41</sup>, and such interlinking of public-private collaboration and public-public collaboration can also be expected in the future.

In this manner, wide-ranging methods were put forward for consolidation of water supply utilities, and as listed in the chart, many concrete measures have been successively carried out repeatedly. For this reason, it is hoped that water supply service operators would implement more measures by taking into account the study and verification of various types of precedents.

## Conclusion

### 1. Features, Accomplishments, and Challenges of Consolidation

The features, accomplishments, and challenges of consolidation observed so far can be summarized as follows:

#### (1) Features of consolidation

- A. Amidst declining number of municipalities following the Heisei-era mergers, the ratio of Water Supply Enterprise Associations has been increasing in water supply utilities overall. At the same time, the number of member entities of the Water Supply Enterprise Associations also has increased slightly in recent years. In this manner, Water Supply Enterprise Associations are consistently raising their importance within the water supply utilities as a whole, and at the same time diverse consolidation initiatives are being carried out across water supply utilities overall.
- B. Since fiscal year 2014, the number of local water supply utilities has exceeded that of bulk water supply utilities in Water Supply Enterprise Associations, and the importance of consolidation is increasing in local water supply utilities also.
- C. The decrease in operating profits due to rapid declines in population is a structural problem for the water supply utilities as a whole and has a significant impact also on the operation of Water Supply Enterprise Associations.

#### (2) Accomplishments

The outcomes of the establishment of Water Supply Enterprise Associations, taking actual cases into account, are not limited to general accomplishments such as reduction of long-term capital investments, but also include outcomes such as efficient resolution of the agendas that a given Association is tackling including upgrading of aging facilities and downsizing.

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40 Both Associations bulk ordered the tariff collection work (reception, opening and shutting of valves, meter reading, settlement, payment, etc.) and achieved savings of 16 million yen in entrustment costs.

41 See Jige, *op.cit.*, p. 79.

### (3) Challenges

- A. Among Water Supply Enterprise Associations, the gap between various population supplied categories is widening. Water Supply Enterprise Associations with population supplied of 50,000 or more are maintaining the population supplied level, whereas Associations supplying less than 50,000 populations are seeing further declines in population supplied, leading to the occurrence of a bipolar phenomenon.
- B. In both depreciable assets and penetration rate, there is a noticeable gap between Large-scale Water Associations (population supplied 150,000 or more) and Small-scale Water Associations Groups (less than 30,000), and that gap is expanding. Especially, in the case of Small-scale Water Supply Enterprise Associations Groups, measures to rectify the vicious cycle of having a small size of population supplied and low penetration rate are required.
- C. As for water supply services as a whole, wide-ranging consolidation measures have been implemented successively, and it is hoped that more measures, which take into account the study and verification of various types of precedents in the water supply services, will be implemented.

## 2. Future initiatives (two key phrases)

While the current situation can be summarized as above, the author believes that the role of consolidation in water supply utilities will assume further importance with the nation facing full-scale population decline. In that sense, the author hopes local governments to take active measures in the future, and sees the following two phrases as keys upon doing so.

The first one is “long-term perspective.” Water supply service is an asset operation-type administrative service, as described earlier, and when you take that point into consideration, the basic service cycle of the service is, in terms of statutory useful life of water supply facilities, 40 to 47 years, and it is 40 years in terms of repayment term of bonds. For this reason, upon considering consolidation, it is crucial to examine what is the most appropriate way to implement consolidation and the scale of consolidation so as to ensure balance between capital investment and profit in the concerned region over a long period.

Second is the “collaboration between municipalities, prefectures and country.” Water supply services have the following features: (i) as a rule, it is under municipalities, (ii) at the same time, it is an administrative service indispensable for the life of residents, and (iii) water tariff, which forms the fiscal resource, is a typical index of public utility charges, and is handled as administrative work that is directly linked to the lives of citizens. For this reason, the country is preparing to offer external funding (government subsidies and local bond funding) and support based on service implementation such as execution by substitute. Going forward, upon municipalities implementing consolidation initiatives, the operation of Small-scale Associations is expected to be the most important challenge, and it is necessary for the municipalities, prefectures, and country to collaborate, and along with carrying out new consolidation measures, create sustainable water supply service through processing framework and verification of financial schemes.

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