

Success Factors of Participatory Irrigation  
Management in Japan: Case of the Kako Land  
Improvement District in Toban-Yosui Land  
Improvement District (2)

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# Success Factors of Participatory Irrigation Management in Japan: Case of the Kako Land Improvement District in Toban-Yosui Land Improvement District (2)

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## Abstract

This article is the conclusion to the first part: Success Factors of Participatory Irrigation Management in Japan: Case of the Kako Land Improvement District in Toban-Yosui Land Improvement District (1).

Many irrigation schemes in developing countries could not achieve expected targets in the operation and maintenance stage. Due to the deteriorating conditions of irrigation facilities, participatory irrigation management (PIM), which requires involvement of beneficiary farmers groups, such as, the Water Users Association (WUA), for the operation, maintenance, and management of the system, has been widely applied since the early 1990s. The WUA in Japan, called the Land Improvement District (LID), can be considered a global success, while the performance of many WUAs and PIM in developing countries are generally poor.

The first part of the article examined the success factors of the Kako LID in the Toban-Yosui LID in Japan, using six evaluation indicators derived from theories of common-pool resources management, proposed by

Freeman. This concluding section examines the success factors using seven evaluation indicators, proposed by Ostrom.

The evaluation shows that, in addition to those of Freeman, the Kako LID has irrigation management systems that are compatible with the theories of Ostrom, especially the indicator of the nested enterprises. Since the introduction of the irrigation system in the Edo period, approximately 350 years ago, twelve hamlets in the village of Kako have served as the subordinate organization of the Kako LID and fulfilled important functions. These include maintaining reservoirs and drainage canals, sending the local leaders as officials of the LID, avoiding free riders by watching each other and applying social sanctions. The local community called “Jichikai” (a resident’s association), has been supporting the management of the Kako LID for generations.

Furthermore, the Kako LID has had close relationships with superior organizations such as the Toban-Yosui LID and the town of Inami, so that the LID can receive sufficient financial, technical, and managerial support in a timely manner.

At the Kako LID, Ostrom’s indicator of monitoring is also evaluated as “yes”, because with the close cooperation of the LID directors, the “Jichikais”, and the LID staff, the Kako LID can achieve good monitoring of water distribution, fulfillment of obligation of each LID member, and the remittance of irrigation service fee (ISF) to the LID. The LID has effective methods to prevent the occurrence of free-rider behavior.

Meanwhile, even though the “Jichikai” supports the LID management sufficiently at this moment, there have been changes in the local community.

Recently the number of members who live outside twelve hamlets

("Chikugai") is increasing. They do not attend the "Jichikai"'s activities, such as communal labor for the mowing and cleaning of the drainage canals. Hence, there is no director position and only one for representative so that they do not have enough systems to participate in decision making. Thus, Ostrom's indicator of collective-choice arrangement is evaluated as "rather weak."

Even within the twelve hamlets, many residents in the "Jichikai" are part-time farmers with jobs, and it is difficult for them to participate in LID activities. LID has to rely on volunteers in their sixties and seventies, who have retired from their former jobs. In the village of Kako, the farmers' ages are rising, and the number of farmers who have stopped rice farming is increasing. There is a tendency that the person who maintains the paddy fields shifts from farmers to farming associations in each hamlet. At the same time, the number of non-farm households are increasing at each hamlet because of urbanization. The local people, especially in the younger generation, have increasingly lost their interest in rice farming, and thus in LID activities. Among the younger generation, it becomes gradually difficult to find successors to the "Jichikai."

The Kako LID has functioned for a long time on the condition that the "Jichikai" supports the LID management, as the subordinate organization of the Kako LID. If the local community that supported the Kako LID becomes weaker, it may lose its foundation. There is a concern that the present high quality of LID management might decline in the future.

## **I . Introduction**

Many irrigation schemes in developing countries cannot achieve the expected targets in the operation and maintenance (OM) stage. To

overcome the problems in irrigation management, participatory irrigation management (PIM), which requires the involvement of beneficiary farmers groups, such as, the Water Users Association (WUA), for the operation, maintenance, and management of the system (Ishii and Sato 2003; Sato and Sato 2006; Kulkarni and Tyagi 2012); and irrigation management transfer (IMT), which mostly shifts irrigation management responsibility from a centralized government irrigation agency to the WUA (Hatcho and Tsutsui 1998; Svendsen et al., 1997), have been widely applied since the early 1990s. However, the performance of PIM, WUAs, and IMTs, have generally been poor (Ishii and Sato 2003; Kakuta 2015; Sato et al. 2007)<sup>1</sup>.

Meanwhile, the WUA in Japan, called the Land Improvement District (LID), is considered a successful case worldwide. In the first part of the article (Kakuta 2020), the author examined the factors behind the successful management of the LID, based on a case study of the Kako Land Improvement District in the Toban-Yosui LID in Japan, using six evaluation indicators derived from theories of common-pool resources (CPR) management, proposed by Freeman (1989, 1992). This conclusion examines the success factors using seven evaluation indicators, as proposed by Ostrom (1990).

The remainder of this paper is organized as follows. First, the analytical framework and methodology of the study are presented. Second, the irrigation system and the WUA are described. Third, the performance of the irrigation system is evaluated. Finally, the reasons for successful management of the system are considered. Since this article is the conclusion to the first part, the first two aforementioned points are only

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<sup>1</sup> For a more detailed explanation of the performance of PIM, WUA and IMT, see Kakuta (2020:2-3).

broadly defined. For a more detailed explanation, see Kakuta (2020).

## **II. Analytical Framework and Methodology**

### **1) Theories of CPR Management**

An appropriate analytical framework is necessary to evaluate irrigation system management. Since the irrigation water and the system that delivers it to beneficiary farmers are considered to be CPRs, which are commonly managed by the local community, the author applies Ostrom's (1990) design principles of long-enduring CPRs and Freeman's (1989, 1992) distributional share system model to assess performance. The author applied Freeman's model in the first part (Kakuta 2020), hence this paper applies Ostrom's model.

According to Ostrom (1990), long-enduring and self-governing CPR institutions (e.g., irrigation systems) share eight design principles (see Table 1). If a CPR institution does not share these eight design principles, it cannot avoid free riders, who break rules and appropriate resources without fulfilling their obligations as members of the institution. This results in the deterioration and dysfunction of the CPR institution, finally leading to the depletion and destruction of the managed resources. Avoiding free riders is the key to managing CPRs in a sustainable manner (Ostrom 1990)<sup>2</sup>.

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<sup>2</sup> For a detailed explanation of the eight design principles of long-enduring CPR institutions, see Ostrom (1990: 88-102).

Table 1. Ostrom’s design principles illustrated by long-enduring common-pool resources (CPR) institutions.

1	Clearly defined boundaries: Individuals or households who have rights to withdraw resource units from the CPR must be clearly defined, as must the boundaries of the CPR itself.
2	Congruence between appropriation and provision rules and local conditions: Appropriation rules restricting time, place, technology, and/or quantity of resource units are related to local conditions and to provision rules requiring labor, material, and/or money.
3	Collective-choice arrangements: Most individuals affected by the operational rules can participate in modifying the operational rules.
4	Monitoring: Monitors, who actively audit CPR conditions and appropriator behavior, are accountable to the appropriators or are the appropriators.
5	Graduated sanctions: Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending on the seriousness and context of the offense) by other appropriators, by officials accountable to these appropriators, or by both.
6	Conflict-resolution mechanisms: Appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials.
7	Minimal recognition of rights to organize: The rights of appropriators to devise their own institutions are not challenged by external governmental authorities.
8	(For CPRs that are parts of larger systems) Nested enterprises: Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.

Source: Ostrom (1990:90)

Freeman’s distributional share system model has been formulated to apply to irrigation systems and WUAs. However, its conceptual model is equivalent to Ostrom’s design principles. Freeman (1989, 1992) presents six essential characteristics of an effective WUA (see Table 2).

Table 2. Freeman's six essential characteristics of an effective WUA

1	Leaders of the local organization should not be cosmopolitan outsiders but irrigators representing the various reaches of the local canal system.
2	Leadership and staff of the local organization are responsible to local members.
3	Water delivery is dependent on the fulfillment of organizational obligations (i.e., distributional share system).
4	The water share system should remove head and tail distinctions in service queues (i.e., distributional share system).
5	Water resource control of members is high.
6	The propensity of members to support the local organization is high.

Source: Freeman (1989:25), amended by the author based on Lepper (2007:50) and Freeman (2009)

Freeman (1989) states that a sense of fairness must be shared among WUA members in order to manage an irrigation system sustainably in the long run. Hence, the six characteristics mentioned in Table 2, especially a distributional share system (the third and fourth characteristics), should be introduced into the WUA management. A distributional share system has three aspects: (1) share of water, (2) share of cost, and (3) share of vote (Freeman 1992). According to Freeman, there are three conditions to make the WUA successful. First, each member's share of water should be equivalent to their share of cost; that is, the amount of water received by each member is roughly proportionate to the share of system costs paid by each member (Freeman 1992). A WUA should have a rule that if a member receives more benefits (e.g. water in a timely manner) than other members do, they must pay more management costs (e.g. via an irrigation service fee, labor, materials, etc.). If a member receives less water than others do, their management costs should be lower (Freeman 2009). Second, a WUA should remove head and tail distinctions in the service queue,

which ensures that it provides the same volume of water per unit area in the command area of the irrigation system. Third, conflicts in a WUA are resolved based on each member's share of vote: if a member's share of cost is larger, their share of vote in the WUA will also be larger (Freeman 1992)<sup>3</sup>.

Case studies have been conducted on successful irrigation systems that have distributional share systems, and Freeman's (1989, 1992) essential characteristics of effective WUAs (Freeman 1992; Maass and Anderson 1978; Martin and Yoder 1988; Siy 1982; Kakuta 2017).

In the first article (Kakuta 2020), the author examined the organizational performance of the Kako LID using the indicators derived from the models of Freeman, consequently this study examines it using the indicators derived from the models of Ostrom. Among Ostrom's eight design principles (see Table 1), the second, (congruence between appropriation and provisional rules are local conditions), is considered to be equivalent to Freeman's third essential characteristic, that water delivery is dependent on the fulfillment of organizational obligations (i.e., the distributional share system) (see Table 2). Therefore, the author excludes this second design principle. Thus, the author uses 13 evaluation indicators, derived from Freeman's six essential characteristics of effective WUAs and Ostrom's seven design principles, to assess the performance of the Kako LID.

## 2) Research Method

The author uses field data gathered over five days, in February 2017, from surveys of various stakeholders involved in the Kako LID, in the

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<sup>3</sup> For a detailed explanation of Freeman's six essential characteristics of an effective WUA, see Kakuta (2017).

Toban-Yosui LID<sup>4</sup>. The survey was conducted using the Rapid Rural Appraisal, especially semi-structured interviews, based on anthropological research methods. The interviews included questions about the respondents' activities in the WUA, farm and social settings, as well as their social relations. The survey respondents consisted of seven officials of the Kako LID, a beneficiary farmer from the Kako LID, a staff member of the Kako LID office, and an official of the Toban-Yosui LID.

The field data were qualitative rather than quantitative, since they were collected through semi-structured interviews. Hence, the performance of the Kako LID is evaluated by interpreting those qualitative field data.

### **III. Description of Kako LID**

Hereafter, the author describes the outline of the Toban-Yosui LID and Kako LID. For a detailed explanation, see Kakuta (2020).

#### **1) Description of the Toban-Yosui LID**

The Toban-Yosui LID is located in the Hyogo Prefecture of Japan, and irrigated 7,403.6 hectares in 2012, covering the cities of Kobe, Akashi, Kakogawa, Miki, and the town of Inami. The number of beneficiary farmers was 12,534 in 2012. In this region, annual rainfall totals are approximately 1,300 mm. Hence, farmers continue to face a chronic water shortage, even though they have constructed more than 7,000 reservoirs for their irrigation water sources in this area.

The Japanese government decided to construct the Toban-Yosui National Agricultural Irrigation Project to address the water shortage, to

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<sup>4</sup> The data and information presented in this article that do not indicate the original source are collected from the author's field survey.

provide irrigation water for existing rice fields, and to develop new fields for vegetable farming. Construction work began in 1970, and the project was completed in 1993. To secure enough water sources and to solve the chronic water shortage, the government constructed three new dams, namely, the Kawashiro Dam (1.3 million m<sup>3</sup>), the Ohkawase Dam (8.2 million m<sup>3</sup>), and the Dondo Dam (17.8 million m<sup>3</sup>), as well as new canals, which connect the new dams with the existing irrigation schemes in the area. Through these facilities, the Toban-Yosui LID provides irrigation water to approximately 500 existing reservoirs in this area (Toban-Yosui Land Improvement District 2013). It is considered to be one of the best irrigation systems in Japan, which could attain a 99.1% collection rate of an Irrigation Service Fee (ISF) (“Fukakin” in Japanese) in 2013 (Toban-Yosui Land Improvement District 2014).

## **2) Description of the Kako LID**

The Kako LID is one of the irrigation schemes that receives water from the Toban-Yosui LID. It is considered to be a successful LID, which always pays 100 % of its ISF to the Toban-Yosui LID (see Figure 1 and 2).

Figure 1: Kako-ooike reservoir and irrigation area of Kako LID



Source: Kako Land Improvement District, 2017

Figure 2: Kako-ooike reservoir and Kako Secondary canal of Toban-Yosui LID



Source: Kako Land Improvement District, 2017

It is located in the village of Kako, the town of Inami, Kako district, Hyogo Prefecture (Kako Land Improvement District 2016). The topography of the area is called the Inamino Plateau (Matsumoto 2016). The annual rainfall in the area is deficient, at approximately 1,200 mm. In addition, there is no river that can be used as a water source for irrigation purposes. Therefore, farmers in this area have long been suffering from severe water shortages (Kako Land Improvement District 2016).

The irrigation facilities of the Kako LID consists of the Kako-ooike reservoir, which is the biggest reservoir in Hyogo Prefecture. The other new reservoirs are Ibara-ike, Sankenya-ike, Yonkenya-ike, Rokkenya-

ike, Sichikenya-ike, and Hachikenya-ike (Matsumoto 2016). There are also irrigation canals (90% of them are underground pipelines) and drainage canals (See Figure 1). The Toban-Yosui LID provides irrigation water to the Kako-ooike reservoir. The irrigated area is about 300 hectares, and the average area per household is 0.36 hectare. The number of beneficiaries was 831 in 2016 (Kako Land Improvement District 2016).

The Kako LID consists of 12 hamlets in the village called “Chiku” in Japanese(see Table 3 and Figure 3). The residents of each hamlet belong to the local community, called “Jichikai”. In Jichikai, there is a neighborhood association called “Rinpo.” Each Jichikai serves as a subordinate organization of the Inami Town Office, organizing communal work, such as cleaning of local roads, reservoirs, and drainage canals, disseminating information from the Town Office, conducting regular meetings of residents, hosting traditional festivals (“Matsuri”), etc. (See Figure 4). Most of the Jichikais in the village of Kako are strong and active enough to participate in many of these local activities.

Table 3. 12 Hamlets in Kako LID

No	Name of the hamlet	Notes
1	Gokenya	
2	Ikenouchi	
3	Kitashinden	
4	Osawa	
5	Kamishinden	The oldest hamlet at the new rice field development in 1661. The three descendant families of the three Tobyakusho (Head Farmers) are quite influential in the hamlet.
6	Chiwaike	The second oldest hamlet. There are many local celebrities.

7	Nakashinden	The third oldest hamlet. Residents include many local celebrities.
8	Sanyonkenya	
9	Rokkenya	
10	Kentani	
11	Sichikenya	
12	Hachikenya	

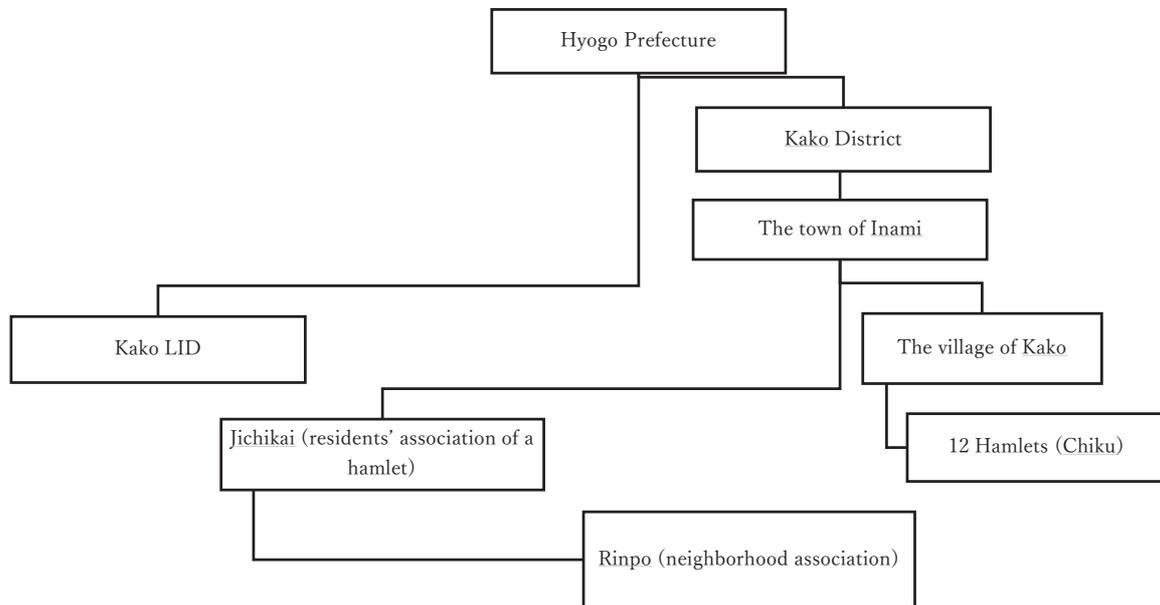
Source: Author's survey, 2017

Figure 3: 12 Hamlets in Kako LID



Source: Kako Land Improvement District, 2017

Figure 4: Administrative structure related to Kako LID



Source: Author's survey, 2017

Nowadays, there are some members who have their own fields but do not live within the village of Kako (12 hamlets) and are called “Chikugai” (outside the hamlets) members. The number of Chikugai members has gradually increased to 203 (24.4%) of the total 831 members in 2016.

The Kako LID has a very long history. It started irrigation activities about 350 years ago in the Edo period, the feudal age of Japan. In 1658, Mr. Saibe Sawa, the headman of the village of Nakasaijo, in Himeji-han, a feudal domain in Hyogo Prefecture, with the support of Mr. Kiheiji Numata, an assistant headman of the village of Kamisaijo, and Mr. Jihei Motooka, the village headman of Shimo, submitted a petition to Himeji-han, through Mr. Yojitayu Numata, the village headman of Kamisaijo, to develop the Inamino Plateau. In 1661, they received permission to develop the area. In 1662, the three farmers, Mr. Saibe Sawa, Mr. Kiheiji Numata, and Mr. Jihei Motooka,

migrated to Kako-shin, as head farmers (Matsumoto 2016).

In 1662, Himeji-han supported the construction of five new reservoirs (Go-ooike), namely Minami-oike, Kita-ike, Ato-ike, Naka-ike, and Gokenya-ike, which are the predecessors of the present-day Kako-ooike reservoir, and the 4.5-kilometer-long irrigation canals. The first hamlet built in the village of Kako-shin was Kamishinden (see Table 3). In this hamlet, the three head farmers, Mr. Sawa, Mr. Numata, and Mr. Motooka, as well as the village headman, Mr. Numata, built their houses and prepared rice fields. Following the hamlet of Chiwaike, in 1663, the Nakashinden hamlet was built, followed by the hamlets of Kitashiden, Sankenya, Gokenya, Sichikenya, Hachikenya, and Kentani (Hyogoken Kako Tochikairyō-ku Shi Henshu Inkai 1995).

Since the irrigation demand had increased, in 1669, the six new reservoirs, mentioned earlier (Ibara-ike, Sankenya-ike, Yonkenya-ike, Rokkenya-ike, Sichikenya-ike, and Hachikenya-ike), which were the offshoots of the main reservoir Go-ooike, and received water from the main reservoirs through irrigation canals, were constructed and irrigation canals extended. In 1680, the farmers in the village of Kako-shin succeeded in constructing the new diversion weir, Oomizo-iseki, to take water from the Kusatani River, along three kilometers of the new irrigation canal, Kako-oomizo, in order to bring water to Go-ooike in Kako-shin (Matsumoto 2016).

After the Meiji Restoration in Japan, in 1891 (Meiji 24), Go-ooike in Kako received water from the newly constructed Ougo irrigation canal (Ougo-gawa Sosui), through the new Kako secondary canal (Kako-shisen) (Matsumoto 2016).

In 1919 (Taisho 8), the new Yamada irrigation canal (Yamada-gawa Sosui), was constructed to supply water through the Kako secondary canal

to Go-ooike (Hyogoken Kako Tochikairyō-ku Shi Henshu Iinkai 1995).

However, since the five reservoirs comprising Go-ooike had deteriorated, in 1949 (Showa 24), the reservoirs were integrated into one large reservoir, called Kako-ooike (Matsumoto 2016). The irrigation system in the Inamino Plateau, including the Kako-ooike reservoir, was established by the Ougogawa & Yamadagawa Agricultural Irrigation Improvement Project, between 1949 (Showa 24) and 1962 (Showa 37). Furthermore, the Toban-Yosui National Agricultural Irrigation Project was constructed between 1970 (Showa 45) and 1993 (Heisei 5). The Kako-ooike reservoir was integrated into this new Toban-Yosui LID, and since then, the reservoir has received water from the newly constructed Dondo Dam (Hyogoken Kako Tochikairyō-ku Shi Henshu Iinkai 1995).

In 1998 (Heisei 10), 90% of the area of the Kako LID was irrigated through underground pipelines, from the Kako-ooike reservoir (See Figure 1). Finally, the Kako LID had a stable water supply, following the resolution of the water shortage problem that the farmers had been facing for a long time (Kako Land Improvement District 2016).

The irrigated area of the Kako-ooike reservoir has been managed by the local community since 1662. The first legal WUA, the Hyogo Prefecture Kako District Kako Village Land Consolidation Association, was established in 1931 (Showa 6), before World War II. After World War II, under the new Land Improvement Act of 1949 (Showa 24), it was amended to the Kako District Kako Village LID, in 1952 (Showa 27), with the approval of the Governor of Hyogo Prefecture. Subsequently, in 1955 (Showa 30), the name was changed to Hyogo Prefecture Kako LID (Kako Land Improvement District 2016).

#### IV. Evaluation of the organizational performance of the Kako LID

In light of limited space, the former study in the first article (Kakuta 2020), used six evaluation indicators (Nos. 1 to 6, in Table 4), derived from Freeman's model (Kakuta 2020), and the organizational performance of the Kako LID was as follows (Table 5) (Kakuta 2020).

Table 4. Indicators for evaluation of the organizational performance of WUA

No	Model	Indicator
1	Freeman	Source of leadership
2	Freeman	Responsibility of the leader and staff
3	Freeman	Share system of water delivery and obligation (distributional share system)
4	Freeman	Head and tail distinction (distributional share system)
5	Freeman	Water resource control ability
6	Freeman	Members' support to the WUA
7	Ostrom	Clearly defined boundaries
8	Ostrom	Collective choice arrangement
9	Ostrom	Monitoring
10	Ostrom	Graduated sanctions
11	Ostrom	Conflict resolution mechanisms
12	Ostrom	Minimal recognition of rights to organize
13	Ostrom	Nested enterprise

Source: Freeman (1989:25) and Ostrom (1990:90), arranged by the author

Table 5. Evaluation of the organizational performance of the Kako LID using Freeman's model

NO	Indicator	Evaluation
1	Source of leadership	Yes
2	Responsibility of leader and staff	Yes
3	Share system of water delivery and obligation	Rather weak
4	Head and tail distinction	Yes
5	Water resources control ability	Yes
6	Members' support to the WUA	Yes
		Successful

Source: Kakuta (2020:47)

In Kakuta (2020), using Freeman's model, the author evaluated the potential for success, with regards to the organizational performance of the Kako LID, specifically along the lines of a WUA. The Kako LID's performance corresponds to Freeman's model of a successful WUA, although some issues still need to be resolved.

Hereafter, this study uses the seven evaluation indicators (Nos.7 to 13 in Table 4), derived from Ostrom's model.

### 1) Evaluation of clearly defined boundaries of the Kako LID

Ostrom states that individuals or households that have the right to withdraw resource units from the CPR must be clearly defined, as must the boundaries of the CPR itself (see Table 1). Freeman (2009) defines "organizational boundaries in terms of water share ownership." The WUA must clearly define members who are entitled to receive water and required to fulfill organizational obligations, such as paying the ISF (Freeman 2009).

The boundaries of local organizations and the membership of the Kako LID are clearly defined. All families that cultivate farmland inside the Kako LID are registered as members. In the Kako LID Office, an office clerk, Ms. F, updates the list of LID members annually. She renews the member list that contains the name of the member and their farm area on the occasion of changes due to a conversion, inheritance, sale, and deletion by death. Thus, there is no free rider who cultivates the Kako LID but is not included in the member list.

However, an exception exists in Rokkenya hamlet, as mentioned in Kakuta (2020). A Kako LID member who has his farm at the hindmost part of Kako LID, also belonging to Gandoi LID, took drainage water from the Kako LID, and brought the water to his paddy fields in the Gandoi LID. This is a very exceptional case in which a farmer outside of Kako LID takes water illegally from the Kako LID. Farmers who can take water from the Kako LID are clearly defined, because each member has their own valves at their farm to receive irrigation water through the underground pipelines from the Kako-ooike reservoir. Besides this exceptional case in the Rokkenya hamlet, a farmer outside of the Kako LID cannot access these valves.

It is a difficult task to keep the membership of the Kako LID clearly defined. Since the dues (ISF) of the Kako LID are levied based on the size of farmland, even a slight change in the size, results in the need for the ledger of the member list to be updated. To update the list of names and farm areas of each member, the office clerk, Ms. F, must deal with large quantities of complicated work. She has to work from Monday to Friday, sometimes working overtime. For example, there have been 10 to 47 cases per year of conversion and inheritance of farmlands. In the case of

a conversion, she has to prepare a document of conversion of agricultural land, and then submit it to the agricultural committee of the town of Inami. This significant task for the renewal of the ledger, seems to be a management issue of the Kako LID.

Therefore, indicator 7 of Table 4 is evaluated as “rather weak.” Although the boundaries of the Kako LID and the membership are clearly defined, it requires immense tasks to maintain the present high quality.

## 2) Evaluation of the collective-choice arrangement of the Kako LID

Ostrom states that most individuals affected by the operational rules can participate in modification of these rules (see Table 1). Freeman (2009) points out that, “at the level of the local commands, the collective choice arrangements are in the conceptual models mostly about administering the three-sided share system.” Most WUA members can participate in modifying the rules of the share system, such as receipt of benefits (i.e. water distribution), member obligations such as ISF payments, and voting privileges (Freeman 2009).

In the Kako LID, the director assembly and the representative assembly are the systems used to modify the operational rules of the LID (see Table 6).

Table 6. Kako LID share of the 16<sup>th</sup> Directors and Representatives per irrigated area and per number of LID members within Chikunai

NO	Hamlet	Number of Directors	Number of Representatives	Share of Representatives %	Irrigated area (m <sup>2</sup> )	Area ratio %	Number of LID members	Member ratio %
1	Gokenya	1	4	<b>11.4</b>	280121	11.2	74	<b>11.8</b>
2	Ikenouchi	1	2	<b>5.7</b>	180880	7.2	26	<b>4.1</b>
3	Kitashinden	1	4	<b>11.7</b>	324470	12.9	71	<b>11.3</b>
4	Oosawa	1	1	<b>2.9</b>	70076	2.8	18	<b>2.9</b>
5	Kamishinden	1	4	<b>11.4</b>	213243	<u>8.5</u>	69	<b>11.0</b>
6	Chiwaike	1	2	<b>5.7</b>	167871	6.7	36	<b>5.7</b>
7	Nakashinden	1	4	<b>11.4</b>	290180	11.6	75	<b>11.9</b>
8	Sanyonkenya	1	3	<b>8.6</b>	229221	9.1	56	<b>8.9</b>
9	Rokkenya	1	2	<b>5.7</b>	109423	4.4	29	<b>4.6</b>
10	Kentani	1	5	<b>14.3</b>	316932	12.6	87	<b>13.9</b>
11	Sichikenya	1	1	<b>2.9</b>	100111	4.0	24	<b>3.8</b>
12	Hachikenya	1	3	<b>8.6</b>	228176	9.1	63	<b>10.0</b>
	Total	12	35	<b>100</b>	2510704	100	628	<b>100</b>

Note : Irrigated area and the number of LID members in 2016.

The 16<sup>th</sup>: From August 2012 to August 2016 (four-year term)

Source: Author's survey, 2017

a. The director assembly at the Kako LID

In the Kako LID, each Jichikai had one allotment of director positions (see Table 6). Initially, the director assembly was held monthly. In 2011, the LID bylaws had been amended so that the assembly was held quarterly. All twelve directors and three auditors attend the director assembly. At this assembly, the directors discuss and amend the operational rules for the management of the Kako LID. The main purposes of each director assembly are the formulation of the annual plan in May, the settlement of accounts and the revision of the budget in September, the preparation for

the representative assembly in February, and the participation of the representative assembly to report the progress of the annual plan in March.

The main issues are: the decision regarding the date to open the gate at the Kako-ooike reservoir; the improvement of the water quality of the Kako-ooike reservoir, since the stinking drainage water from a bean sprout factory at the upper reaches of the river flows into the reservoir; the activities of the Kako Agricultural Land and Water Environment Conservation Council; rehabilitation work to remove sediment in the head race to the reservoir in 2017; the repair work of the LID office building, which amounts to 6 million yen; lumbering trees at the slope of the Kako-ooike reservoir; solar power generation; a rehabilitation project to extend the life span of the Kako-ooike reservoir; and the office expenses of the LID, etc. A project that costs less than 1.5 million yen can be approved at the director assembly.

b. The representative assembly at Kako LID

According to the Land Improvement Act, a LID, which has more than 100 members, can establish a representative assembly instead of a general assembly of LID members, as a decision-making body.

When the Kako District Kako Village LID was established in 1952, a representative assembly was set up as the decision-making body. Then, there were 50 representatives. In 2000, the number was modified to 35 representatives. Their term is four years. As mentioned in Kakuta (2020), from 1952 to 2016, all representatives were selected from 12 Jichikai. In the customary rules of Kako LID, each Jichikai had one to five allotments of representative positions (see Table 6).

However, since 2016, there has been one Chikugai representative. Before the LID election in 2016, one member from outside the twelve hamlets claimed that he would run for elections because he had been dissatisfied with the drainage problem of his field. Responding to his claim, the new president, Mr. A, agreed to change the number of representatives allotted to his Jichikai (Nakashinden) from four to three, and offered the seat to the member from outside. However, after the representative election in 2016, this Chikugai representative has been absent from the assembly.

The regular representative assembly is held once a year at the end of March, and the special representative assembly is held once every four years in August for election. The representative assembly becomes effective with the attendance of two-thirds of all representatives under the Land Improvement Act of 1949. In the Kako LID, the attendance rate of members at the representative assembly was 91.2% in 2016 and 88% in 2017. (If the rate is below 80%, the LID should receive guidance at an LID inspection conducted by the Hyogo Prefecture.)

The main issues are the repair work of an LID office building, which amounts to 6 million yen, and solar power generation.

Solar power generation on the surface of reservoirs has already been approved. However, the agenda item regarding solar power generation on the ground could not gain two-thirds approval at the special representative assembly in August 2016. Hence, in October, another special assembly was held and the agenda was finally approved. The reasons for opposition were that the Kako LID could not sell but rent the LID land to the contractor, and there was criticism of solar power generation.

In the Kako LID, each director and representative serves as a delegate

of each of the twelve hamlets. The directors present the requests from each hamlet at the director assembly. If the problem is emergent, the directors directly contact the president, vice president, or water tender telephonically, by going to the LID office, or on site at the fields to deal with the issues. Through such a collective arrangement system, each Chikunai LID member in the twelve hamlets can participate in modifying the operational rules of the LID.

Meanwhile, the problem with the collective choice arrangement in the Kako LID is that Chikugai (outside twelve hamlets) members (24.4% among total members in 2016) cannot participate in decision making in the LID management because there is no director and only one Chikugai representative, who is always absent from the assembly (see Tables 7 and 8). As mentioned in Kakuta (2020), there are discussions within the Kako LID regarding whether they should choose the directors and representatives not only from the twelve Jichikais, but also from the Chikugai since the number of Chikugai members have increased. However, the president and vice president of the Kako LID have not yet decided how to deal with this issue. In fact, the services for Chikugai members are worse than those for Chikunai (within twelve hamlets) members. For example, the Chikugai members do not receive a LID monthly bulletin, which is posted to each house in the twelve hamlets. They are laid aside for the moment. Although the president and vice president of the Kako LID recognizes the need to create a position for the representative from the Chikugai, the selection method has not yet been decided. Therefore, indicator 8 of Table 4 is evaluated as “rather weak.”

Table 7. The Kako LID share of the 16<sup>th</sup> Directors and Representatives per irrigated area and per number of LID members between the Chikunai and Chikugai

NO	hamlet	Number of directors	Number of Representatives	Number ratio %	Irrigated area (m <sup>2</sup> )	Area ratio %	Number of LID members	Number ratio %
1	Chikunai	12	35	<b>100</b>	2510704	83.7	628	<b>75.6</b>
2	Chikugai	0	0	<b>0</b>	488473	16.3	203	<b>24.4</b>
	Total	12	35	<b>100</b>	2999177	100	831	<b>100</b>

Note : Irrigated area and number of members in 2016.

16<sup>th</sup>: August 2012 to August 2016 (four-year term).

Source: Author's survey, 2017

Table 8. The Kako LID share of the 17<sup>th</sup> Directors and Representatives per irrigated area and per number of LID members between the Chikunai and Chikugai

NO	hamlet	Number of directors	Number of Representatives	Number ratio %	Irrigated area (m <sup>2</sup> )	Area ratio %	Number of LID members	Number ratio %
1	Chikunai	12	34	<b>97.1</b>	2510704	83.7	628	<b>75.6</b>
2	Chikugai	0	1	<b>2.9</b>	488473	16.3	203	<b>24.4</b>
	Total	12	35	<b>100</b>	2999177	100	831	<b>100</b>

Note : Irrigated area and the number of members in 2016.

17<sup>th</sup>: August 2016 to August 2020 (four-year term).

Source: Author's survey, 2017

### 3) Evaluation of monitoring at the Kako LID

Ostrom states that monitors, who actively audit CPR conditions and appropriator behavior, are accountable to the appropriators or are themselves appropriators (see Table 1). If a clear share system arrangement exists, first, the WUA should be able to monitor whether

water is being properly delivered to each member as planned, second, whether members have paid the ISF and fulfilled their obligations to the WUA; and third, whether collectors have remitted the ISF to the WUA. These three aspects must be monitored by the WUA, and the monitoring results should be reported to the WUA members.

a. Monitoring of water allocation at the Kako LID

In the Kako LID, water delivery is monitored daily by the LID water tender, Mr. O. As mentioned in Kakuta (2020), Mr. O checks for any breakdown of valves or water leakage from the pipeline. He also deals with the opening and closing of the valves, does maintenance work for open canals, and checks whether any farmer has forgotten to close the valves. If the breakdown of valves or the poor flow of water occurs in the summer, the farmers request Mr. O to solve the problems. (At Nakashinden hamlet, the Nakashinden farming association monitors their water by themselves exceptionally.) Because of these efforts, it is now possible to have a stable and equal water distribution in the Kako LID.

b. Monitoring of the fulfillment of the organizational obligations of Kako LID

a) Participation in communal labor

As mentioned in Kakuta (2020), in Kako LID, members' organizational obligations are the ISF payment and participation in communal labor.

Kako LID members are responsible for participating in communal labor work such as the mowing and cleaning of drainage canals ("Mizosarai"). This communal labor is organized by each Rinpo, supervised by each branch council of the Kako Agricultural Land and Water Conservation

which pays daily allowances. Attendance was checked by the Rinpo. Thus, there is no official report of the absence of members in the director assembly. However, it is considered that it is performed properly, since “if there is something wrong, the rumor spreads. So far, there is no such rumor.”

Each director deals with problems at his own Jichikai. For example, in Rokkenya, some members forgot to clean the Rinpo boundary. Hence, vice president Mr. B, who comes from Rokkenya, cleaned the parts.

#### b) ISF payment

In the Kako LID, ISF (dues) is currently set at 55,000 yen per hectare per year. Each director distributes bills within his hamlet. The due date is September 30. In 2016, by that due date, the collection rate was just 90.7%, in which 77 members among 831 had not yet paid ISF. In Chikunai, each director must dun the members of his hamlet for the payment of ISF. It is a difficult task for directors. For example, in Kamishinden, the director has to visit the member's houses frequently. In Nakashinden, there is a report on the ISF payment at the farming department of Jichikai. There are always three members remaining; hence, the president, Mr. A from Nakashinden, contacts them, and they pay their ISF. The president predicts that those members will increase in the future because of the aging of LID members.

Regarding the Chikunai members in the Kako LID, each director monitors and works hard to collect the ISF payment of each member in his hamlet. However, there is an exceptional case in which a director has not dunned one member to pay the accounts receivable, since he misunderstood that the LID office would dun the member.

In terms of the Chikugai members who live outside the twelve hamlets, the office clerk Ms. F duns them. After the first due date of an ISF payment, from October 1, Ms. F asks each director to dun the members who have paddy fields in his hamlet. Each director contacts the Chikugai members and asks them to pay the ISF. For example, in Nakashiden, the president, Mr. A, went to the house of a Chikugai member who lived in Kakogawa City to collect the ISF. In Rokkenya, there was a Chikugai member who thought he had already sold his land, but actually had not completed the title transfer. When the vice director, Mr. B, contacted the member, he paid the ISF.

On October 20th, Ms. F sends dunning letters, which is established to send within 60 days in the Land Improvement Act. She also contacts the members by phone. The Chikugai members then pay the ISF. However, there are some members who get angry during the phone call, stating that they had already stopped rice cultivation, or are unable to pay, that their rice field is poorly drained. For example, in Sichikenya, when Ms. F called a member, he stated that he was unable to receive irrigation water. After that, an official of the farming association addressed the person by asking whether they should cultivate their rice field. Then, the member immediately paid the ISF, as he seemed to want to join the farming association. Ms. F calls every member a maximum of five times. If she only reaches the answering machine, she tries to call at 5 or 6 p.m., which is after hours. Once, she went to the member's house to collect a bill.

Ms. F stated that the LID office and directors compete to complete the collection of ISFs from the Chikugai members. She would like to decrease the percentage of members who do not pay to zero as soon as possible. The Kako LID attains a high collection rate (starting from 90.7 %, and

finally reaching 99.8% in 2016) because of Ms. F's hard work, with only two members remaining without payment.

Previously, there were more than ten members who lived in the hamlet, but were Chikugai members, because they disliked directors coming to their homes to collect bills. Nowadays, since members pay the ISF through an account transfer via the Japan Agricultural Cooperative (JA) Bank, they have become Chikunai members.

Hence, the fulfillment of the organizational obligations of the LID (participation of communal labor and the ISF payment) is monitored by each director and/or by the office clerk of the Kako LID, and with their hard work, each member fulfills their obligation properly.

c. Monitoring of the remittance of the ISF to Kako LID

In the Kako LID, the office clerk Ms. F registers the records of ISF payments in the ledger of the LID. In September 2016, 75.2% of ISFs were paid through account transfers via the JA Bank, and 24.8% were paid directly at the Kako LID office or paid to the LID account at JA Bank. There are operational audits twice a year in February and July. The three LID auditors audit the management of the LID business and compose an audit report stating that the LID office manages these ISFs properly.

Therefore, in the Kako LID, LID activities are properly monitored, and the LID has effective methods to prevent the occurrence of free-rider behavior. Hence, indicator 9 of Table 4 is evaluated as "yes." However, maintaining the high quality of this monitoring system creates a heavy burden for officials, especially for the LID office clerk.

#### 4) Evaluation of graduated sanctions at the Kako LID

Ostrom states that appropriators who violate operational rules are likely to be assessed graduated sanctions by other appropriators, by officials accountable to these appropriators, or by both (see Table 1).

In the Kako LID, bylaws legislate against overdue ISFs. The member pays a penalty of four “sen” (1 sen is equivalent to 0.01 Japanese yen) per 100 yen per day that the ISF is overdue, and pays a fine for negligence of 100 yen per reminder. However, the LID office does not collect these penalties because all members except for two defaulters pay the ISF. Hence, the LID officials do not feel the necessity to collect fines.

Absence of communal labor for mowing and cleaning of the drainage canals is to be sanctioned with fines in each Jichikai of the hamlet. Each Jichikai collects fines (called “Debusoku-kin”) from 3000 yen to 10,000 yen per day.

Regarding the illegal checking of water, as mentioned above, there is only one isolated case in Rokkenya. Hence, the vice president has just tolerated it, but he plans to warn the member if the situation worsens.

Therefore, in the Kako LID, since there are only minor offenses, the LID does not need to apply severe sanctions. Hence, indicator 10 of Table 4 is evaluated as “yes.”

#### 5) Evaluation of conflict resolution mechanism at the Kako LID

Ostrom points out that appropriators and officials have rapid access to low-cost local arenas for resolution of conflicts among appropriators or between appropriators and officials (see Table 1).

In the bylaws of the Kako LID, there is no sanction, except for the penalty against nonpayment of overdue ISFs. However, there has been a

social sanction system in Jichikai at each hamlet, called “Okite” (rule) or “Mura-hachibu” (village ostracism). Therefore, each LID director reports the result of the ISF payment of each member in his hamlet to the farming department and Jichikai of his hamlet. The participation of mowing and cleaning drainage canals was checked by each Rinpo in the Jichikai. Thus, the offender will receive severe social sanction.

In regards to the conflicts relating to water theft, there were several water disputes before the underground pipelines were installed. However, after the pipeline installation and the end of the water shortage, water disputes had become rare, except in the case of Rokkenya.

There are now a few conflicts in the Kako LID. In the past, some of them were problems with land consolidation. For example, in Nakashinden, the father of a member was against the farmland consolidation, since he had a large farm of one hectare, but after land consolidation, it would reduce to 0.7 hectare. The father had not put his seal on the document for five years. He had finally put his seal because he was ostracized within the village.

In another case, there were discontents among members that “the committee member of land substitution got the good land.” Hence, the committee member, who was an ex-Jichikai chairman, took the inferior land to avoid criticism. He asked the members to put their seal on the document, as he himself had tolerated his new lot.

Another issue in the Kako LID is the existence of a director, who complains of LID management and does not perform the duties of a director, such as dunning a member who does not pay their ISF. In general, since a director is elected at the representative assembly, the director assembly cannot dismiss a director even if there are any problems in the

director's manner. This would also be a problem for the Jichikai, which is responsible for selecting a candidate director.

The third issue of the Kako LID is related to a representative from Chikugai. He started to have a drainage problem in his paddy field in the Kako LID, which was next to the solar power generation site of the Kitayama LID. He laid his complaint to the ex-president of the Kako LID. However, the ex-president suggested to that he should put in a claim with the Kitayama LID, since the problem was caused by the solar power generation system. Then, the member ran for the representative election and became a representative. However, after the election, he did not attend the assembly.

The fourth issue is the nonpayment of ISFs. There is a member who is unsatisfied with the drainage problem after their land consolidation. However, the other members deal with the drainage problems by themselves installing underdrainage, therefore the Kako LID cannot respond to the specific member. Since 2015, the member has stopped paying their ISF.

The fifth issue is the solar power generation project. The Kako LID planned to build a solar power generation system on land that was previously the site of a reservoir. Later, it was revealed that industrial wastes were buried on the site so that the land was designated as a site covered by the law for industrial waste disposal. It is possible to construct a solar power generation system on the site by law, but it is necessary to continue monitoring the harmful waste.

The sixth issue is a claim from one member where the slope of the rural road collapsed. The member requested to have the road repaired by the Kako LID. It is not clearly defined in the bylaws who the responsible

parties are for repairing rural roads; whether it is individual farmers or the LID. It is a difficult issue for the LID, as repairing this road, will lead to other farmers making the same claims.

As mentioned above, there are several problems with LID management. However, most of the problems can be solved within the Jichikai or the LID director assembly because the directors who are at the same time the leaders of Jichikais deal with the conflict resolution within each Jichikai. However, some issues remain difficult to solve. Therefore, indicator 11 of Table 4 is evaluated as “rather weak.”

#### 6) Evaluation of minimal recognition of rights to organize within Kako LID

Ostrom states that the rights of appropriators to devise their own institutions are not challenged by external governmental authorities (see Table 1).

##### a. Financial management of Kako LID

The Kako LID has sound fiscal management.

In the budget of fiscal year 2017, 47,156,000 yen was included as the revenue of the LID. LID has several sources of revenue.

The first one is the ISF revenues (dues), which amounts to 16,435,000 yen. Among them, current dues amount to 8,962,000 yen, and special dues that are paid to the Toban-Yosui LID, amounting to 7,473,000 yen.

The second revenue is the rental fee, which amounts to 6,686,000 yen. The LID receives a rental fee of 5,962,000 yen for land, which was previously a reservoir, and now rented as a yard for materials. It also receives a rental fee of 690,000 yen for space in the LID office building,

which is rented to a sushi restaurant and the Kako Agricultural Land and Water Environment Conservation Council.

The third revenue is the sale of electric power by solar power generation, which is estimated to amount to 8 million yen from August 2017. The Kako LID plans to bury one reservoir and rent the land to a solar power generation trader. The LID plans to use the revenue for a maintenance fee of the LID.

Among the expenditure on the budget of fiscal year 2017, the Kako LID plans to pay 3 million yen for the repair of underground pipelines.

As a reserve fund for special accounts, in order to join the Toban-Yosui LID, the Kako LID sold eight of the 18 reservoirs and gained 600 million yen for the sites of a school, the LID office building, a hospital, and a town office building.

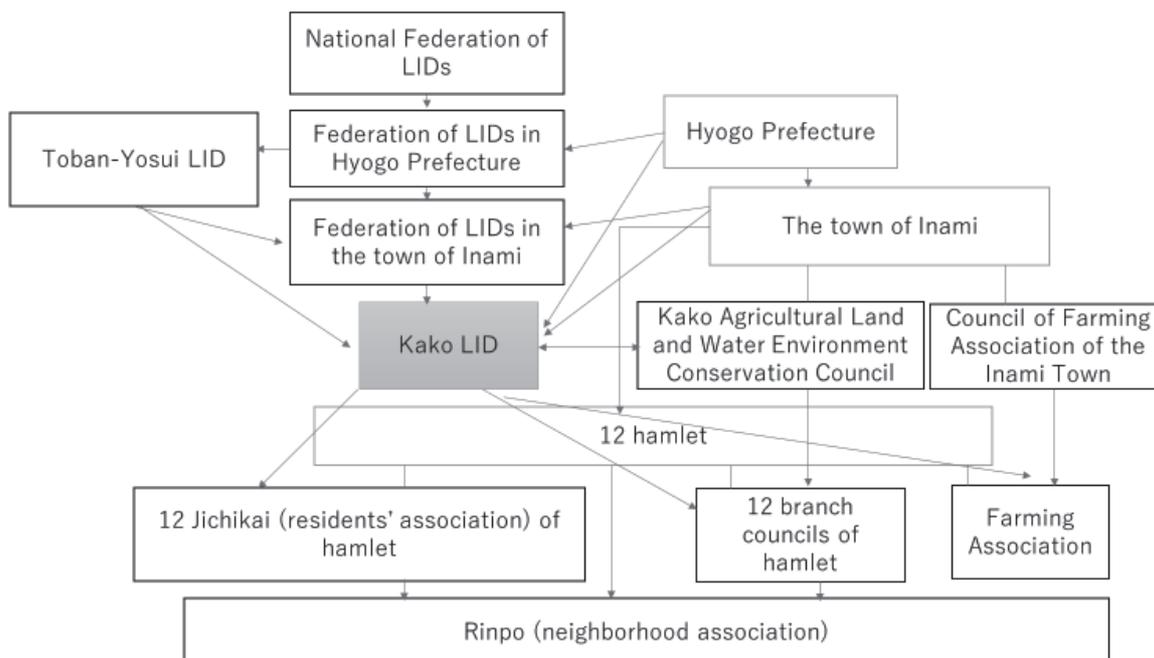
The Kako LID has maintained healthy and stable financial management.

#### b. Relationship with outsiders

The right to organize LIDs in Japan is guaranteed by the Land Improvement Act of 1949. Under this law, the Kako District Kako Village LID was established in 1952, with the approval of the Governor of Hyogo Prefecture. Subsequently, the name was changed to Hyogo Prefecture Kako LID in 1955 (Kako Land Improvement District 2016). From this point on, the Kako LID is legally authorized, and its right to organize is not challenged by external governmental authorities.

Not only that, the Kako LID has a good relationship with outsiders such as the Toban-Yosui LID and the town of Inami, and therefore receives timely support (see Figure 5).

Figure 5: Structures above and below the Kako LID



Source: Author's survey, 2017

a) Relationship with the Toban-Yosui LID

After the Kako-ooike reservoir was integrated into the Toban-Yosui LID, the reservoir received water from the Dondo Dam. Since then, the Kako LID has sufficient and stable water supply to irrigate the entire irrigation area of LID. In addition, the Kako LID has been able to receive sufficient technical and managerial advice from the Toban-Yosui LID, which are helpful for the officers of the Kako LID.

For example, the water tender, Mr. O, contacts the officer of the Toban-Yosui LID daily to secure sufficient and stable water supply.

The president, Mr. A, attends the meetings of the Toban-Yosui LID, such as the Water Use Committee meeting, Director Assembly, and Representative Assembly.

The managing director of the Toban-Yosui LID is requested to attend

the director assembly of the Kako LID once among two or three meetings, when there are questions regarding the bylaws of the LID.

Moreover, since the Toban-Yosui National Agricultural Irrigation Project Phase II is under construction, the officers of the Toban-Yosui LID, explained the project to obtain the agreement of LID members at the director assembly of the Federation of LIDs in the town of Inami, in which the Kako LID is also a member.

To receive the benefits from the Toban-Yosui LID, the LIDs belonging to it must pay special dues. The Kako LID is one of the best LIDs that always pays 100% of the dues to the Toban-Yosui LID. If an LID pays 100% of the special dues, it can receive a commission of 2% of the whole collection, which is higher than the accounts receivable from those two members who do not pay the dues. Hence, the Kako LID chooses to bear the cost of the accounts receivable by itself and pay 100% of the dues to the Toban-Yosui LID. For example, in fiscal year 2017, the special dues cost 7,350,000 yen. The Kako LID can receive a commission of 147,000 yen, which is much higher than the accounts receivable, amounting to 14,000 yen in 2013.

From the viewpoint of the Toban-Yosui LID, 73.6% of special dues are paid directly by each LID member, and the rest of 26.2% is paid collectively by each LID. In order to reduce the work of the Toban-Yosui LID, it pays a commission of 2 % to LIDs to promote the collective payment of dues. Hence, the Kako LID has chosen to pay collectively. However, in other LIDs, there are some members from whom the LIDs have difficulty collecting the dues. Therefore, these LIDs request the Toban-Yosui LID to collect directly from those difficult members.

#### b) Relationship with the town of Inami

The Kako LID officially directly belongs to Hyogo Prefecture (see Figure 4). However, the LID has had a close relationship with the town of Inami (See Figure 5). The town of Inami actively assists the Kako LID. When the LID wants to maintain and repair the reservoirs and other facilities, the town office becomes a window and sends the requests from the LID to the town of Inami, Hyogo Prefecture, and the national government, such as the joint activities for the Agricultural Land and Water Environment Conservation Program.

The Kako LID receives subsidies and technical advice from the town of Inami. The LID contacts and consults daily with the town office.

One of the main joint activities with the town of Inami is the Agricultural Land and Water Environment Conservation Program managed by the Kako Agricultural Land and Water Environment Conservation Council, which officially belongs to the town of Inami (See Figure 5). However, since the purpose of the council is the operation, maintenance, and repair of irrigation facilities of the LID, such as the drainage canals and reservoirs, and the LID vice president, Mr. B, is the chairman of the council, the LID members actually work under the town office (Kakuta 2020). For example, the council receives a refund of 900,000 yen from the town as a subsidy for the acreage reduction of rice.

In the joint activities of the Kako Agricultural Land and Water Environment Conservation Program, the council conducts rehabilitation work to remove sediment from the headrace to the Kako-ooike reservoir in 2017. In 2017 and 2018, the council plans to implement a rehabilitation project for the reservoir, which costs 30,000,000 yen for the rehabilitation of the slope, the gate, and the spillway of the reservoir. This construction is

100% funded by a government-aided rehabilitation project to extend the life span of the reservoir. Using this fund, the Kako LID plans to carry out the maintenance of the reservoir gradually.

Another project of the Kako Agricultural Land and Water Environment Conservation Council is the Plan for Conservation and Management of Local Resources. The council chairman, Mr. B, plans to submit a plan by 2018; otherwise, the council must return the grants. From 2019 for five years, the council expects to receive new grants that amount to 14,000,000 yen per year. The council will establish a committee to examine the extension of the life span of the reservoir in 2018, to hear requests from local people (i.e. the LID members).

Another relation with the town of Inami is the Federation of LIDs in the town of Inami (“Ina-doren”) (See Figure 5). The town office of Inami functions as a window of the Federation. There are two meetings and four training sessions per year. To the general assembly of the Federation of LIDs, leading persons, such as the chief director of the Toban-Yosui LID, a member of the Diet, a member of the Hyogo prefectural assembly, the mayor of Inami town, the chairman of the Inami Town council, the director of the Hyogo prefecture Kakogawa River Basin Management Office attend as the guests.

There is daily contact with the town of Inami. The president and the vice president of the Kako LID frequently contact the department of industry and the department of urban planning in the town of Inami to send their requests. For example, the LID made a claim to the town because it had become clear that the sewerage system was installed over the underground pipeline of the LID. In the other case, the LID wants to hear the opinions of the town office to evaluate the trader’s proposal on the

solar power generation project, and to check the contract documents.

Moreover, at the representative assembly of the Kako LID, the town mayor, the chairman of the town council, and a member of the Hyogo prefectural assembly attend as guests. They make speeches and then return.

From the Gokenya hamlet in the village of Kako, there was one member of the Hyogo prefectural assembly. However, after his replacement, the new member is not connected to agriculture and therefore the influence of the Kako LID has decreased.

In the past, a candidate for a member of an Inami town assembly was recommended by the Jichikai and ran for the election. However, there is no member now.

#### c) Relationship with the Hyogo Prefecture

The Hyogo Prefecture audits the account of the Kako LID once in three years. The recent plan was completed in 2017. The audit committee checks the safety, the official seal, and the LID bankbook.

In summary, the Kako LID has maintained close relationships with the Toban-Yosui LID and the town of Inami. Thus, the LID has a system to receive sufficient support when needed. Therefore, indicator 12 in Table 4 is evaluated as “yes.”

### 7) Evaluation of nested enterprises at the Kako LID

Ostrom states that for CPRs that are parts of a larger system, appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises

(see Table 1).

The Kako LID has good structure and functions for nested enterprises above and below the LID. Indicator 13 in Table 4 is evaluated as “yes.”

a. Structures above the Kako LID

As mentioned above, above the Kako LID, there are the Toban-Yosui LID, the Federation of LIDs in the town of Inami (“Ina-doren”), and the Federation of LIDs in Hyogo Prefecture (“Ken-doren”) (see Figure 5). In addition, above the Kako Agricultural Land and Water Environment Conservation Council, there is a town level council.

a) The Toban-Yosui LID

Officially, the Toban-Yosui LID is not a superior organization to the Kako LID, both organizations are equally ranked. The Toban-Yosui LID is located upstream and the Kako LID is located downstream. Both LIDs are managed based on the Land Improvement Act. However, the Kako-ooike reservoir of the Kako LID is one of the approximately 500 reservoirs that receive irrigation water from the Toban-Yosui LID. Hence, the Kako LID relies on the Toban-Yosui LID for irrigation water.

There are 26 directors in the Toban-Yosui LID. The president of the Kako LID, Mr. A, is one of these directors. In addition, there are 80 representatives in the Toban-Yosui LID and the Kako LID has four seats in its representative assembly.

There are 334 members of the water-use adjustment committee in the Toban-Yosui LID. This committee is subdivided into 22 water-use committees. One of them is the Kako secondary canal water-use committee in which the Kako LID is included. There are nine members included

in this committee. The president of the Kako LID, Mr. A, is one of the members. The general meeting of the water-use adjustment committee is held once a year.

b) The Federation of LIDs in the town of Inami

The Kako LID is a member of the Federation of LIDs in the town of Inami (“Ina-doren”). The vice president of this federation is, Mr. A, the president of the Kako LID. In addition, Mr. B, the vice president of the Kako LID, is a director. Three LID members serve as committee members of this federation.

c) The Federation of LIDs in Hyogo Prefecture

The Ina-doren is a member of the federation of LIDs in Hyogo Prefecture (“Ken-doren”), hence the Kako LID also joins the Ken-doren. In Ken-doren, town mayors, representative of the Japan Agricultural Cooperative (JA), LIDs, and the Toban-Yosui LID are members.

The federation of LIDs at the prefecture level is integrated into the national federation of LIDs in which all LIDs in Japan are members.

d) The Kako Agricultural Land and Water Environment Conservation Council

This council is an organization belonging to the town of Inami. The headquarters of the council is located in the Kako LID office building and works together with the Kako LID. Below the headquarters of the council, there are twelve branches at each Kako hamlet.

Because of these structures above the Kako LID, the LID can receive

sufficient and smooth technical, administrative, and financial support from those organizations.

b. Structure below the Kako LID

Below the Kako LID, there are twelve Jichikais at hamlets (see Figure 5). Below the hamlet, there are Rinpos (neighborhood associations). These twelve Jichikais positively promote the activities to manage the Kako LID, so as to serve as the units under the Kako LID, fulfilling the functions of monitoring, enforcement, and conflict resolution for LID members. It can be said that each Jichikai supports LID management as the subordinate organization of the Kako LID.

As mentioned in Kakuta (2020), each Jichikai has one seat for a director in the Kako LID. The directors and representatives of the LID are considered important positions of the officers in Jichikais. It is common that the resident of a hamlet who took an official position of his Jichikai then becomes an LID representative, and then an LID director. An LID director recommends his successor in his Jichikai to the chairman of Jichikai before he is replaced.

There are differences in the activeness among the twelve Jichikais in the Kako.

Hereafter, the conditions of some hamlets and their Jichikais are described (see Table 3 and Figure 3) in order to see the variations in the activeness of each hamlet and how each hamlet functions to support the activities of the Kako LID.

a) The Kitashinden hamlet

In the Kitashinden hamlet, there are 133 households, of which 60% are

farmers and 40% are not farmers. There are twelve Rinpos. Each Rinpo organizes communal labor for the mowing and cleaning of drainage canals. In the past, the residents came even though there was no allowance because they were afraid of “Mura-hachibu” (social ostracism). The Kako Agricultural Land and Water Environment Conservation Council was founded in 2007. There are eleven committee members from Rinpos who are responsible for operating and maintaining the LID facilities at each Rinpo. The council pays 2,000 yen for a daily allowance for communal labor. In 2016, 111 persons came to do communal labor with an attendance rate of 83.5% because there were elderly persons and those who had other jobs.

In the past, young people took the positions of Jichikai officials. Now, the officials are all over 70 years old, and living on pensions. There is a problem in terms of the shortage of officials’ successors. There were no officials in their forties and fifties. Then, the present Jichikai chairman suddenly became the chairman just after his retirement from office, without the experience of any Jichikai officials. However, he has shown a positive attitude so that the council has become active.

b) The Kamishinden hamlet

In Kamishinden, there are 220 households, of which 60 households are farmers who have rice fields. There are 16 Rinpos.

In the village of Kako, Kamishinden is the oldest hamlet in the new rice field development of 1661. The J, K and L families, who are the three descendant families of the three “Tobyakusho” (Head Farmers), are quite influential in the hamlet. (Mr. D, the general auditor of the Kako LID is a member of the L head family.) It is said that the other residents cannot express their opinions.

There are 20 seats of officials at a Jichikai. Among them, the chairman, vice chairman, accountant, agricultural production department chief, and farming department chief are farmers. If one takes a position in a Jichikai, he must continue because there is no one who wants to be the official. The positions of the officials of the Kako LID are rotated among the Jichikai officials.

In Kamishinden, communal labor for mowing is conducted within the hamlet. However, only about 100 households (half) participate in it. There is an allowance of 1,000 yen, and if the member brings a mowing machine, they receive an additional 500 yen. There is no fine for absence (“Debusokukin”).

In Kamishinden, there is a farming association. It receives 50% of the subsidies from the Hyogo Prefecture. There were only six to seven members. The association undertakes the rice harvest and brings the harvested rice to a country grain for the members.

c) The Chiwaike hamlet

Chiwaike is the second oldest hamlet in the village of Kako. Ordinarily, a Jichikai chairman does not hold other posts. However, since the Chiwaike hamlet is small and there is no candidate for the officials of the LID, the Jichikai chairman has to serve concurrently as the director of the Kako LID.

d) The Nakashinden hamlet

Nakashinden is the third oldest hamlet in the village of Kako. Residents include many local celebrities. Mr. A, the president of the Kako LID, is a son-in-law of a well-established family in Nakashinden. In Nakashinden,

residents actively participate in the Jichikai's activities. The community bond is still strong there.

① The Jichikai of Nakashinden

There are 145 households, of which 70 are farmers. There are 13 Rinpos. There are eight Jichikai officials. All of them are men. Each official candidate is recommended from each Rinpo, and there is an election. If a candidate obtains the majority of the votes, he is approved. The chairman, vice chairman (who also serves as accountant), agricultural production department chief, farming department chief, environmental committee member, public relations and welfare committee member, and physical education committee members are the official positions of the Nakashinden Jichikai. The Jichikai chairman serves only one term consisting of two years, who is a farmer in principle.

Since there are three positions for the representatives of the Kako LID, the LID president, Mr. A, requested the Jichikai chairman to contact with the leader of the Nakashinden farming association. Mr. A himself asked the leader to select two persons from the farming association.

It is said that the residents of the Nakashinden hamlet are cooperative with the Jichikai activities. They are said to be conservative and protect traditional culture. The younger generations of Nakashinden have been trained by the elders. They say that they are commanded by the elders, and if they cannot perform well, they are scolded by the elders. For example, there is an elder, Mr. P, who is called "a god of rice farming." Younger people learn farming from him. With the leadership of Mr. P, the residents farm actively. They say it is important for residents to respect humanity, justice, and trust.

Because of this tradition, the positions of the Jichikai officials are dominated by the well-established families in the village of Kako, who are descendants of old families at the new rice field development in 1661. Other residents do not seem to be afforded a chance to be an official of Jichikai even if they wanted to be.

The Jichikai in Nakashinden serve as subcontractors of the town office of Inami and JA. It holds both town events and Jichikai events. The general assembly of the Jichikai is held once a year in March. The general assembly of farmers is held in February. There had been a women's association until 2008. At that time, the LID director asked the women's association to collect ISF (dues) from LID members. The association also collected the income tax of each resident. After 2008, account transfers of ISFs to the LID office increased immediately.

The Nakashinden Jichikai has a cleaning strategy. The environmental committee member is responsible for the mowing at the slope of the reservoir and cleaning the drainage canals. Communal labor is conducted twice a year in May and October. There is a daily allowance of 1,000 yen. If a member brings a mowing machine, they receive an additional 500 yen. If a member is absent from cleaning, they must pay a fine ("Debusoku-kin") of 5,000 yen, except in the case of a funeral and wedding. Some residents just pay the fine and remain absent from the communal labor due, for example, leisure purposes. People who cannot walk are exempted from communal labor.

## ② The Nakashinden farming association

In Nakashinden, the Nakashiden farming association undertakes the rice farming of most farm households. In 2004, Mr. P, mentioned above,

established the farming association. In 2012, Mr. H, who is now the representative of the Kako LID, joined this association. In 2013, the farming association became a joint-stock company, and Mr. H became president. Staff include the president, adviser, accountant, and ten part-time workers. After the establishment of the company, it became possible for the farming association to be entrusted with work and to employ workers. There are only two farming associations that have become joint-stock companies in Japan. The Nakashinden farming association joins the Council of Farming Associations of the town of Inami.

Among 70 farmers in Nakashinden hamlet, 62 have already joined the Nakashinden farming association. The other eight farmers are full-time farmers. The farming association cultivates 30 hectares of rice fields, which cover 80% of the total paddy fields in the Nakashinden hamlet. The farming association integrates the land, which is scattered. It undertakes transplanting, harvesting, transport to a rice-processing center, and the sale of the rice. It undertakes the mowing of 70% to 80% of the total area since the farmers are aging.

Additionally, the farming association undertakes the water management of paddy fields. Ten staff members of the farming association deal with the opening and closing of the valves of the irrigation pipelines. They adjust the date of opening and closing of the valves based on the varieties of rice. If there are any problems, such as a breakdown of the valve, or water does not flow well, the staff contacts the LID water tender, Mr. O, to solve the problem.

The farming association receives 30%–40% of subsidies from the Hyogo Prefecture. Without these subsidies, the association will run into red figures. Originally, the farming association was established to avoid abandoning

paddy fields. Before, the association undertook to cultivating the paddy field and the farmers received harvested rice from the association. Now, a grant of 7,500 yen per 0.1 hectare is paid to each farmer, so that the farmer pays this amount to the association for the rice cultivation. Moreover, the farmer pays the ISF (dues) and the municipal tax on the rice fields by themselves.

In December, January, and February, there are no rice farming activities; thus, the farming association carries out treading of barley plants, repairing leakages at paddy fields, repairing the drainage canals, conducting training in December, etc.

The farming association purchases fertilizers from the Inawa Shoten store. The varieties of rice that it cultivates are organic Koshihikari, Koshihikari, Kinuhikari, Hinohikari, Yamada-nishiki for sake, and Gohyakuman-goku. It sells the rice to the Inawa Shoten store. It sells the six-rowed barley to the JA. It also sells rice on commission to a day nursery, residents in the Kako village, a hospital, private customers through Mr. P, and a sake brewing company.

The Nakashinden farming association is active in the Kako Village. It undertakes the tasks of farmers in Nakashinden to cultivate and sell rice, including water management of each paddy field in the Nakashinden hamlet. It participates actively in the management of the Kako LID, sending representatives to attend. Among the three LID representatives of Nakashinden, two comes from the farming association.

### ③ Farmers growing vegetables

In the Nakashiden hamlet, there are about ten farmers who are certified as Kako farmers to grow vegetables. In addition, there are about ten farmers who grow vegetables. They can get a low-interest loan from the

town of Inami.

e) The Rokkenya hamlet

In the Rokkenya hamlet, there were 36 households before, which has now increased to 58 households, among which 40 are farmers. There are four Rinpos.

The official positions of the Jichikai are the chairman, vice chairman, accountant, agricultural production department chief, farming department chief, lifelong learning promoter, public relations and welfare committee members, and environmental committee members. Among those eight officials, five were women because only women could attend the meetings. Starting thirty years ago, the Jichikai officials have been rotated among residents. Two officials from each Rinpo are selected, and since there are four Rinpos, there are eight officials. One Rinpo chairman is also selected at each Rinpo. The terms of service of the officials are two years. Because the positions rotate among all residents, a resident works hard when he or she becomes an official. The post of the Jichikai chairman rotates every twelve years to each Rinpo. Even a non-farmer household must take the position of the chairman since there are a few residents in Rokkenya. Until now, nobody refused to take the position because people feel happy if they are relied on by the local community.

In the Rokkenya hamlet, there was a resident who remarked that residents did not need to join the Jichikai. The LID vice president Mr. B, who served as a Jichikai chairman before, convinced the resident. There are some residents who are not active. They do not participate in Jichikai events.

According to the LID vice president Mr. B, he himself was escaping

from the Jichikai activities when he was working at the company. After his retirement at the age of 63, he decided to contribute to his local community. He had worked hard to consolidate residents' opinions to construct a public hall. He was then nominated as the director of the Kako LID from Rokkenya.

The Jichikai of Rokkenya serves as the subcontractor of the local government and JA, for activities such as cleaning the drainage canals of the reservoir. The Rokkenya branch of the Kako Agricultural Land and Water Environment Conservation Council prepares the funds for daily allowance of 800 yen per person for communal labor, and it is reserved for the construction of a public hall. The attendance rate of communal labor is as high as 95%. The fine for absence ("Debusoku-kin") of 3,000 yen is pooled for the Rokkenya branch of the council.

There is a general assembly of the Rokkenya Jichikai once a year.

f) The Kentani hamlet

① The Jichikai of Kentani

In Kentani hamlet, there are 130 households, of which 89 are farm households, of which 52 are members of the farming association. The rest of the farm households are farmers in name only. There are eleven Rinpos.

The Jichikai chairman, who is a non-farmer, established a nomination system for Jichikai officials, in which the former LID director requests the Kentani farming association to recommend six candidates for the next LID officials, one for a director, and five for representatives.

② The Kentani farming association

The Kentani farming association was established in 1993. In 2016, it was

converted to a corporation so that it could take charge of work.

Now, it cultivates rice and soybeans. In principle, a farmer conducts puddling, water management, and mowing at their paddy fields. The farming association undertakes the transplanting and harvesting of rice. However, since there are two farmers who cannot engage in farming activities, the association undertakes all the work for rice farming. However, it is difficult to entirely support rice farming.

The farming association has accumulated paddy fields in Kentani. Since there is a policy in place to reduce rice acreage, the association changed rice fields to barley. In 2011 and 2012, it changed to soybeans.

It uses green manure to improve soil and reduce chemical fertilizers. The varieties of rice cultivated are Koshihikari and Hinohikari. In 2016, it purchased a rice processing center from the Hyogo Prefecture at a discount of 50% for 15 million yen, because due to its promotion of rice grown by green manure, it could not mix its rice with the other rice at the JA rice processing center, and it needed its own rice processing center. It wants to make a brand of rice referred to as Koshihikari and named it “Manyo-no-kaori.” The brand of rice is the local specialty of the town of Inami, especially in the Kentani and Kitayama hamlets. The association supplies the rice to elementary and secondary schools in the town of Inami, for school lunches. The school lunch was awarded as an excellent lunch in the Kinki Region.

The association also has a plan to produce decorative chrysanthemums in order to utilize abandoned rice fields.

When the association undertakes rice farming, it returns 6,000 yen per 0.1 hectare to the farmer, which is equivalent to the ISF (dues). If it produces barley, there is a subsidy of 35,000 yen, so that 20,000 yen is paid

to the association and 15,000 yen to the farmer. In the case of soybeans, the subsidy is 15,000 yen, so that the association returns 5,000 yen to the farmer.

The cosmos festival in Kentani is held jointly by the Kentani Jichikai and the farming association.

In 2014, the seven farming associations in the Village of Kako discussed the integration into one corporation named “Farm Inaka” which included Gokenya, Ikenouti, Kitashinden, Nakashinden, Kentani, Sichikenya, and Hachikenya. The purpose of the integration was to reduce accounting costs. However, since these associations had different histories, Jichikais, the ways to determine the membership, and bylaws, they could not reach the agreement, and gave up.

Through these discussions, several problems relating to farming associations became clear. For example, a farming association wants farmers to be more involved in farming, at least in terms of water management of their paddy fields, even though the farming association is ready to look after the paddy field if the farmer passes away. In another case, when a farming association plowed the paddy field, its tractor got the road dirty. A resident made call and complained to the police office. Then, the association members had to clean the road. In the other case, after a farming association spread manure on the paddy field, some residents called the police to complain. In a farming association, there is only one farmer who raises cows. He is 78 years old and wants to stop farming. Thus, the farming association has decided to care of those cows.

Through these problems, it becomes clear that many residents in the Kako Village, even those who are officially farm households, are losing their interests in rice farming, and just leave farming management completely to

farming associations.

In summary, there are differences in the activeness of each Jichiakai in the village of Kako. In the Nakashinden Jichikai, the residents follow the tradition and customs of the community and actively participate in the Jichikai's events. It is the most active Jichikai in Kako. On the other hand, there are some Jichikais, which are not so active, making it difficult for all residents to cooperate with the Jichikai activities.

Most of the farmers in Kako are part-time farmers. It has become difficult to engage in rice farming because farmers are aging. Many households decide to entrust farming activities to the farming association in the hamlet. In particular, the Nakashinden farming association undertakes farming of most of the paddy fields in the Nakashinden hamlet. The Kentani farming association is also active in covering for most farmers who are actually engaged in rice farming. Farming associations also actively participate in the Kako LID taking the positions of the director or representative. While farming association activities have become specialized, farmers in Kako seem to have less interest in rice farming than before. This situation may decrease the activity of farmers participating in LID activities, approximately ten years later.

However, at this moment, there are only a few free riders in the Kako LID, even though there is a possibility that they will increase in the future. The twelve hamlets serve as the subordinate organization of the Kako LID and fulfill important functions. They include maintaining reservoirs and drainage canals, sending the local leaders as officials of the LID, avoiding free riders by watching each other and applying social sanctions as mentioned above. Now, each Jichikai monitors and manages the water

distribution, each member's obligation (ISF payment and participation of communal labor), enforces each member, and resolves conflicts within the Jichikai. Therefore, indicator 13 in Table 4 is evaluated as "yes" now.

Based on the seven evaluation indicators derived from Ostrom's model, the organizational performance of the Kako LID is as follows (see Table 9). Indicator 7 (clearly defined boundaries) has been evaluated as "rather weak" because even though the membership and the irrigated areas are clear at the Kako LID, it requires a large effort by the office clerk of the Kako LID to update the ledger of member lists and the size of each member's farm every year. Since the ISF of the LID is levied based on the farm size, it must be accurately documented in the ledger, and there are many cases of changes in the farm size because of inheritance, conversion, sale, and deletion by death in Kako. If the Kako LID wants to maintain its accurate documents of the boundaries, it seems appropriate to reconsider the situation where it relies on the large workload of the office clerk earning a low salary.

Indicator 8 (collective choice arrangement) has been evaluated as "rather weak" because the Chikugai members, who are now increasing, do not have enough systems to participate in decision making at the Kako LID, although the Chikunai members from twelve hamlets can fairly participate in it. There is no position for a director from Chikugai, and only one position for the representative, who does not attend the representative assembly. The officials of the LID have already noticed this issue. However, they are still deliberating.

In addition, indicator 11 (conflict resolution mechanisms) has been evaluated as "rather weak." Although the Kako LID has been capable of

solving most problems within the LID, there remain a few problems. One of them is the existence of an uncooperative director, which is a very rare case. This is difficult to solve at the director assembly because a director is elected at the representative assembly and recommended from each Jichikai of twelve hamlets. Thus, in fact, the Jichikai has the responsibility to choose an appropriate person to be a director and usually selects a proper person. However, if the Jichikai does not function well, it is difficult for the LID to manage this problem.

The other indicators 9,10,12,13 showed good performances at the Kako LID.

## V. Conclusion

Together with the six evaluation indicators derived from Freeman's model in Kakuta (2020), the whole organizational performance of the Kako LID is as follows (see Table 9).

Table 9. Evaluation of the organizational performance of the Kako LID using the indicators derived from Freeman and Ostrom

NO	Model	Indicator	Evaluation
1	Freeman	Source of leadership	Yes
2	Freeman	Responsibility of leader and staff	Yes
3	Freeman	Share system of water delivery and obligation	Rather weak
4	Freeman	Head and tail distinction	Yes
5	Freeman	Water resources control ability	Yes
6	Freeman	Members' support to WUA	Yes
7	Ostrom	Clearly defined boundaries	Rather weak
8	Ostrom	Collective choice arrangement	Rather weak
9	Ostrom	Monitoring	Yes
10	Ostrom	Graduated sanctions	Yes

11	Ostrom	Conflict resolution mechanisms	Rather weak
12	Ostrom	Minimal recognition of rights to organize	Yes
13	Ostrom	Nested enterprise	Yes
		Overall performance	Successful

Source: Kakuta (2020:47) and author's survey, 2017

The author evaluates the organizational performance of the Kako LID to be successful, on the basis of a WUA. The performance of the Kako LID corresponds to Freeman's and Ostrom's models of a successful WUA, although some issues still need to be resolved.

As mentioned in Kakuta (2020), one of the most important factors for the successful performance of the Kako LID is the existence of the distributional share system (indicator 3 in Table 9) in which each member's share of water is equivalent to their share of the costs (ISF payment and participation of communal labor). Freeman (1992) states that the amount of water received by each member should be roughly proportionate to the share of system costs paid by each member. In many developing countries, the ISF is set at a fixed rate per area. This is an unfair system for farmers who experience water shortages downstream.

In the Kako LID, the ISF is also levied by the size of farmland per hectare. However, the Kako LID could avoid this problem because they resolved the water shortage even in the downstream area with the installation of the pipelines. Therefore, the head and tail distinctions in the service queue were eliminated, and an equal water distribution was realized (indicator 4 in Table 9). If members have farmlands of the same size, they receive the same amount of water, even in the head and tail portions. This suggests that the farmer pays an ISF directly proportionate

to the volume of water that they receive. Freeman (2009) states that if a member receives more water, they must pay more ISF. In the Kako LID, if a member's farmland is larger, they must pay more ISF, thus it fits Freeman's model (indicator 3 in Table 9).

Another factor is that the Kako LID could have a high-water resource control ability (indicator 5 in Table 9) after the Kako LID was connected to the Toban-Yosui LID to provide enough water to the Kako-ooike reservoir. Moreover, they installed the pipelines in the LID. After these improvements, the Kako LID currently has irrigation facilities that can provide a sufficient volume of water in a timely manner to all LID members (Kakuta 2020).

The third factor is that the Kako LID has dedicated leaders in the form of a president, vice president, and directors (indicator 2 in Table 9). These LID leaders are simultaneously the leaders of the local community (indicator 1 in Table 9). These leaders devote themselves actively to their duties of managing the Kako LID with only a small amount of allowance, almost akin to volunteering work because they consider the LID tasks as one of the duties in their own local community (Kakuta 2020).

The fourth factor is that the Kako LID has a diligent water tender (Kakuta 2020), and a competent and hardworking office clerk (indicator 2 in Table 9), who prepares documents such as the ledger of ISF collections, etc., and promotes the collection of ISF from each member, especially from Chikugai members.

The fifth factor is that the Kako LID has functional nested enterprises (indicator 13 in Table 9) in that each Jichikai of the twelve hamlets of the village of Kako serves as the subordinate organization of the Kako LID. The Jichikai at each of the twelve hamlets is responsible for choosing

the leaders (director and representatives) of the Kako LID. Each of the twelve Jichikai has one director seat and several seats for representatives proportionate to the number of residents in the hamlet. The positions of LID are considered one of the important positions in the Jichikai. Within each hamlet, the Jichikai organizes the branch council of the Kako Agricultural Land and Water Environment Conservation Council to undertake the mowing at reservoirs and cleaning the drainage canals of the Kako LID. It is also interested in the collection of ISF from the LID members in the Jichikai, which are reported at the Jichikai official meetings. Most of the twelve Jichikais are actively engaged in LID activities.

The sixth factor is that within each hamlet, the LID director, who is also the leader of the Jichikai, takes charge of the management, monitoring, and resolving conflicts related to LID activities (indicators 2 and 13 in Table 9). He is responsible for the collection of ISF from his hamlet, and dunning members who delay payment.

The seventh factor is that the LID achieves good monitoring (indicator 9 in Table 9) of water distribution, fulfillment of obligations of each LID member, and the remittance of ISF to the LID with the close cooperation of the directors, the Jichikais, and the LID staff. Water distribution is monitored daily by a LID water tender. The participation of communal labor of the mowing and cleaning of the drainage canals is monitored at each Jichikai's branch council of the Kako Agricultural Land and Water Environment Conservation Council. The LID director of the hamlet monitors the performance of the jobs. The LID office clerk and directors divides the work of dunning to the ISF non-payers. The directors dun members of the Chikunai (within twelve hamlets) and the office clerk duns

members of the Chikugai (outside twelve hamlets) in order to attain a high collection rate of ISFs (99.8% in 2016). The remittance of the ISF to the LID is checked by the LID office clerk, and the results are audited and reported at the representative assembly by the LID auditors. They have established a transparent accounting system in the LID, applying the models of bylaws of the Land Improvement Act.

The eighth factor is that the LID members are cooperative in terms of LID activities (indicator 6 in Table 9). This is reflected in the high collection rate of ISFs and the participation rate of communal labor (Kakuta 2020).

The ninth factor is that even though there are some difficult problems in the Kako LID to solve, most of the problems inside the LID are resolved by themselves (indicators 10 and 11 in Table 9). There is a fine for nonpayment of ISFs. However, it is not collected because there are only a few non-payers (two in 2016 among 831 members). Most members participate in communal labor, and if they cannot attend, they pay fines (“Debusoku-kin”). There is only one isolated case of illegal checking. Thus, there are few free riders in the Kako LID. Moreover, most members follow the decisions of the Jichikai, such as land consolidation arrangements. One of the reasons is due to the fact that each Jichikai watches the performance of each resident, such as the ISF payment, which is reported at the Jichikai official assembly and the meeting of the farming department. The participation of each resident in communal labor is checked by each Rinpo. Furthermore, in each Jichikai, there is the existence of customary rules (“Okite”) to participate in the Jichikai’s activities such as communal labor or paying ISF, refraining from illegal checking of water, etc., to avoid being socially ostracized (“Mura-hachibu”). The residents in a hamlet watch the behavior of other residents. They are afraid of the other residents’

eyes. The existence of this social ostracism has avoided the appearance of free riders in the Kako LID. However, the strength of this social ostracism varies among hamlets. In addition, this custom gradually becomes weaker as urbanization increases in the Kako Village.

The tenth factor is that the Kako LID has had close relationships with superior organizations such as the Toban-Yosui LID and the town of Inami (indicators 12 and 13 in Table 9), so that the LID can receive sufficient support in a timely manner. If the LID has a problem that is too difficult to solve by itself, it asks those organizations to supply financial, technical, and managerial support.

Above all, in the Kako LID, each Jichikai has a strong will, relating to them wanting to treat the Kako LID, which has a long history, as their precious assets. For numerous years, the local community has had a good tradition in terms of managing the Kako irrigation system in a stable way. The community has inherited this tradition and backed up the LID (Kakuta 2020).

Meanwhile, there are also problems in the management of the Kako LID.

First, the Kako LID has to renovate their irrigation facilities in the future. As for reference, an irrigation company in the United States, which is equivalent to a WUA, has a self-supporting accounting system. Some irrigation companies have their own dams. They use the collected ISF for their daily operation and maintenance of irrigation facilities. They also sell their water for electric power and drinking water to cities so that they can use the profits for the funds to renovate or rehabilitate their deteriorated irrigation facilities. On the other hand, an LID in Japan has a problem in terms of the repair of pipelines or reservoirs. There is a discussion regarding whether it is enough to rely merely on grants from a nation,

prefecture, and town for the renovation of irrigation facilities, or whether it should earn and accumulate its own funds. At present, since it is stipulated in the Land Improvement Act that an LID cannot make a profit, the Kako LID has just earned enough money for the operation and maintenance of the LID from its several income sources, such as solar power generation, a lease charge of the ex-reservoir land, and the sale of the ex-reservoir land. However, for the future management of the irrigation system, the LID would need a sense of business administration. It would be necessary to establish a self-supporting accounting system like the irrigation company in the United States.

Second, there is an issue regarding who should be responsible for the maintenance of irrigation facilities. In the village of Kako, there is a tendency towards the person who maintains the paddy fields shifting from farmers to farming associations in each hamlet, because the farmers' ages are rising, and the number of farmers who have stopped rice farming is increasing. At present, farming associations cultivate paddy fields. However, mowing and water management in the paddy fields are also done by a farming association in the Nakashinden hamlet, and by farmers in the Kentani hamlet.

Third, while the number of Chikugai members (outside twelve hamlets) is increasing, accounting for 24.4% of all members in 2016, they cannot participate in the decision making of the Kako LID because for Chikugai members, there is no director position and only one for representatives. Meanwhile, they do not attend the Jichikai's activities, such as communal labor for the mowing and cleaning of the drainage canals. Thus, they do not fulfill their organizational obligations sufficiently. It is difficult to determine how to make those Chikugai members participate fairly in the decision-

making process of the LID.

Fourth, the number of non-farm households are increasing in each hamlet because of urbanization. This will weaken the bond of the Jichikai at each hamlet, causing an increase in free-riders at each hamlet.

Lastly, there is a problem in securing the successors of LID officials. Among the younger generation, it is difficult to find a person who will take the position of the Jichikai, partly because the residents, who are currently employed, are too busy to participate in the activities of Jichikai; and partly because the salary of the Jichikai officials is low, while they have many tasks. In addition, the local people have increasingly lost their interest in rice farming, and thus in LID activities.

In the past, the Kako LID depended on volunteer labor and the high morale of the local community. However, nowadays, many residents in the Jichikai are part-time farmers with jobs, and it is difficult for them to participate in LID activities. Since the salary of the LID staff is quite low, it is impossible to hire full-time employees, promoting the LID to rely on volunteers in their sixties and seventies, who have retired from their former jobs. It seems necessary to increase the salary of the officials and staff of the LID in order to employ full-time staff in the working-age generation to continue to secure competent officials in the future.

The Kako LID has functioned for a long time on the condition that the Jichikai supports the LID management, as the subordinate organization of the Kako LID. If the local community that supported the Kako LID becomes weaker, it may lose its foundation. It is necessary to address this problem properly. Otherwise, there is a concern that the present high quality of LID management might decline in the future.

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