The governance of a community garden with a food cycle in suburban Tokyo

Naomi Shimpo

Faculty of Life & Environmental Sciences, University of Tsukuba, 1-1-1 Tennodai, Tsukuba, 3058577, Japan
Graduate School of Landscape Design & Management, University of Hyogo, 954-2 Nojimataokiwa, Awaji, 6561726, Japan

Correspondence
Naomi Shimpo, University of Tsukuba, 1-1-1 Tennodai, Tsukuba, 3058577 JAPAN; current address: University of Hyogo, 954-2 Nojimataokiwa, Awaji, 6561726, JAPAN.
Email: shimpo.naomi.gn@alumni.tsukuba.ac.jp

Abstract
Urbanites can learn more about food cycles by growing vegetables and fruits and composting food residues within a community garden (CG). Case studies are necessary for developing theories about the sustainable governance of CGs containing food cycles. In particular, Asian cities have high potential to establish food cycles because of their mixture of urban and rural land use. This paper discusses the governance of a suburban-Tokyo CG, where neighborhood kitchen wastes were collected and used as direct fertilizer for the soil. The quantitative and qualitative data obtained through interviews and internal material of the garden was analyzed to grasp the garden’s history, stakeholders’ involvement, and the relationships between gardeners and kitchen waste providers. The results showed that the founder started the garden in a bottom-up way and overcame challenges by maintaining a strong motivation and a flexible attitude. The gardeners provided work opportunities to people with disabilities and education materials to children. These collaborations may have corroborated the necessity of the garden existence. Most of the gardeners and all the waste providers live within 2 km of the garden and the close communication between them was possible, which may have maintained the kitchen waste quality. This study demonstrates advantages and challenges in the governance of Japanese CGs; however, further case studies are necessary for improving the generalizability of this study’s findings.

1 INTRODUCTION

Agricultural technology and globalization have increased the efficiency of food production; however, consequently, urban populations now have fewer opportunities to observe the food production process. Plant factories, which use water and artificial light, could save nutrient inputs, energy, and water and yield more vegetables than conventional agriculture, which is affected by weather, soil, and other conditions (Kikuchi et al., 2018). Cheap food production is sustained by migrant workers (Eriksson et al., 2019) or imported from various countries although there is attempts to encourage the purchase of local food (Chambers et al., 2007). These global food systems work but they are not invulnerable to environmental or socioeconomic crises (Hamilton et al., 2020). Furthermore, urbanites may struggle to secure food sources if natural or human disasters succeed in disrupting or destroying plant factories and transportation systems. In this scenario, people without knowledge or experience of growing vegetables or raising livestock may find it difficult to procure food during a crisis period. To raise urban resilience and prepare for such
situations, urbanites must keep memory of how to produce food and reimagine the city as a place where food can be grown (Barthel & Isendahl, 2013).

Furthermore, it is important to establish food cycles, as the earth has limited natural resources for food production. Henceforth, in this paper, the term food cycle will imply a repeatable process that is comprised of the production, transportation, and consumption of food and the use of food wastes as animal feed or compost. This cycle can help to reduce the energy consumption and greenhouse gas emissions involved in the production of chemical fertilizers and in the incineration or landfilling of food wastes (Keng et al., 2020). Usually, municipality-level projects involve the collection of food wastes from households, retailers, and restaurants and the processing of these wastes. However, in addition to the development of appropriate infrastructure for recycling food wastes, the continuous dissemination of awareness among citizens is crucial (Jamal et al., 2019). Community-level projects may offer greater ease in terms of communication with individual citizens than municipality-level projects. Therefore, it may be advisable to promote food-cycle projects in communities.

Community gardens (CGs) are a mechanism for establishing food cycles on a local scale. Participants from local neighborhoods can grow vegetables and fruits, compost crop residues and food wastes, and fertilize soil by using composts. Community gardens help to not only develop food cycles but also to provide learning opportunities for future generations. Gardeners often conduct food-related activities, including cooking and educational workshops, to raise awareness about food production and the environment (Bendt et al., 2013; Krasny & Tidball, 2009; Rogge et al., 2020). In particular, children born and raised in urban areas are often important targets in terms of such enlightenment because, though they tend to have little contact with agriculture, they may have to face future crises caused by climate change and political and economic collapse. The presence of CGs in their neighborhoods could help them acquire knowledge about food cycles through their daily experiences. Thus, the stable existence of such CGs is desirable for neighborhoods.

Increasing numbers of studies have discussed the significance of CGs in food sharing initiatives (Davies et al., 2019; Fernandez-Wulff, 2019; Modibedi et al., 2020). This movement can thus be regarded as a new trend in urban food democracy (Davies et al., 2019; Fernandez-Wulff, 2019); furthermore, food commons can strengthen identification, participation, self-organization, and social resilience—all which are necessary for maintaining a sustainable urban development (Scharf et al., 2019). While it is necessary to prepare legal tools to distribute the health and safety risk of food commons from individuals to the public when a CG is originally a private property (Morrow, 2019), the new food system, which uses CGs, is expected to improve the socioeconomic and environmental sustainability of any conventional city.

The previously mentioned studies mostly focused on providing or sharing food and not on the recycling of food wastes, though composting facilities are a common fixture in most CGs. Community gardens have high potential to be used as decentralized community composting areas; this provides benefits for municipalities because, unlike conventional centralized composting systems, it does not require considerable capital investment (Pai et al., 2019).

A major challenge faced by CGs is governance. Nikolaidou et al. (2016) indicated that urban gardens, including CGs, show emerging forms of collaboration, partnerships, and governance patterns, which involve public and private sectors and increase citizens’ participation in the management of the gardens. Certomà and Notteboom (2017) also concluded that urban gardening practices exemplify an informal planning mode with a new transactive governmentality. This informality can cause a threat of losing urban gardens under development projects as a result of market economy (Schmelzkopf, 2002). Therefore, it is necessary to conduct comprehensive case-based analyses on governance structures. Fox-Kämper et al. (2018) reviewed CGs in several countries and found that CG governance structures could be classified into three major approaches: top-down, bottom-up, and mixed; however, this classification is a continuum, as there are cases of top-down approaches using community help and bottom-up approaches with political (or administrative), professional, or informal supports. These governance structures also change over time as the garden progresses through the planning, design, implementation, and management phases; furthermore, this process

---

Core Ideas

- Community gardens (CGs) are a potential way to establish a food cycle.
- This study examined the governance of a Japanese CG that recycled kitchen wastes.
- The garden founder had a strong motivation and a flexible attitude.
- The food cycle produced activities that involved local institutions.
- Close communication could help maintain waste separation quality.
is affected by the place-specific context of each CG (Drake & Lawson, 2015; Fox-Kämper et al., 2018; Göttl & Penker, 2020; Johnson et al., 2019; Škamlová et al., 2020). Thus, it is important to examine each case in order to determine ‘who’ from ‘where’ became involved in a given CG project, how this actor’s involvement came about, and what is being done by this actor. The established network of stakeholders should be also examined, as it is a key factor for overcoming barriers in CG development (Ghose & Pettygrove, 2014).

Besides the general challenges faced by CGs with regard to focusing on food-cycle establishment, another difficulty lies in controlling waste separation, which is necessary for maintaining the compost quality (Jamal et al., 2019). Galvan et al. (2018) examined a case study involving food waste recycling conducted at a CG in collaboration with a nearby hospital. In this case, waste separation conducted at one facility could be controlled relatively easily compared with separation conducted in individual households. If the project is conducted on a community-wide scale, more individuals will receive opportunities to participate, and proper waste separation will become more difficult because different individuals’ knowledges and behaviors related to food waste separation will differ. However, people in a given community can often recognize each other and so do not remain anonymous; by making use of this advantage, waste separation rules can be conveyed to all members of a given community. The scale of the food cycle is also a key issue to determine a realistic scale of project; the scope of community involvement and how food can be provided in return to realize sustainable governance should be examined. Therefore, relationships shared among gardeners and food waste providers as well as the size of the food cycle are important factors for successful food waste recycling.

Accordingly, this study aimed to clarify the governance structure of a Japanese CG that maintained a special focus on food waste recycling. To achieve this objective, three research questions were set as follows: (a) How was the garden established and developed? (b) What kind of stakeholders were involved and in what way? (c) What type of interaction exists between gardeners and food waste providers and how large is the food cycle they are involved in?

Through a case study based in the city of Tokyo in Japan, which is an Asian country, it may also fill the geographical gap of CG studies and be possible to discuss what is common and uncommon in terms of governance structure depending on local, environmental, and social conditions. Most previous studies on CGs have targeted English-speaking countries (Guitart et al., 2012), and cases in other countries have not yet received considerable international-level discussions. In East Asia, a variety of urban garden initiatives, including CGs, have emerged in recent years with different governance approaches (Hou, 2018). This study can contribute to grasp the worldwide phenomenon and find a local solution.

2 | MATERIALS AND METHODS

2.1 | Study site

2.1.1 | Profile of the studied CG

This study’s selected site, Seseragi Nouen, is a CG established on urban farmland in Hino City in the western part of Tokyo Prefecture; located ∼25 km from the center of Tokyo, it has ∼187,000 inhabitants as of 2020 (Hino City, 2020) and 141 ha of farmlands (5.1% of the total city area, 2,755 ha) (Ministry of Agriculture, Forestry & Fisheries, 2019). The garden, which was established in 2008, is located in a residential area that was originally a paddy field. This garden has held ∼2,600 m² of collective crop fields (Figure 1) and an additional 470 m² of paddy fields, which are located on the opposite side of a road. The gardeners started to use these paddy fields in 2015. The garden has no fences, and anyone can enter and join the activities. The gardeners collect kitchen wastes, a kind of food waste, and plant residues from the neighborhood using a small-sized truck; next, they plow it directly into the fields on Tuesdays and Thursdays (Figure 2). On Sundays, the gardeners carry out only gardening and no waste collection. On working days, gardeners can have lunch and communicate with each other in a shed. The current study author’s previous study featured core members of the garden, who were people over their 50s (Shimpo et al., 2014). The gardeners have no specific obligations regarding the frequency and contents of their work, so they are free to come to the garden at their own convenience. On each working day, the harvest is shared with gardeners who are present; the yields are distributed equally to each gardener regardless of their work. Sometimes the vegetables are also delivered to the houses next to the garden to gain understanding of the garden activities. Every year, the kitchen waste providers pay 2,000 JPY to the gardeners’ group as a fee for waste treatment. They receive a bucket for storing kitchen wastes and place it in front of their houses once a week. They also receive bamboo powder, which is then added into the bucket along with the kitchen wastes in order to promote fermentation and control bad odors.

2.1.2 | The potential of Asian megacities for establishing food cycles

Asian megacities, including Tokyo, often feature a chaotic mixture of urban and rural land usages on their fringes as a result of rapid growth in the post-war decades (Yokohari et al., 2000, 2020); this land use situation can provide certain advantages for establishing CGs on farmlands in residential areas and for realizing decentralized community composting systems. In Western cities, CGs tend to be established on vacant lands in urbanized areas, and soil contamination
FIGURE 1  Layout of Seseragi Nouen: Main field without paddy field (illustration by the author)

FIGURE 2  Plowing the neighborhood kitchen wastes and plant residues into the field at Seseragi Nouen (photograph by the author)
has often been a subject of discussion in this regard (Cooper et al., 2020; Mahrous et al., 2019; Mitchell et al., 2014; Paltseva et al., 2020). This contamination risk is one of the reasons why raised beds and container gardening with imported uncontaminated soil have become a mainstream CG practice in Western countries. Furthermore, new technologies related to soilless cultivation methods are being considered in CGs (Caputo et al., 2020). In Japan, land that has been originally used for professional farming poses a low soil contamination risk because areas with high soil contamination risk are legally monitored based on the Agricultural Land Soil Pollution Prevention Law. Taiwan also has a similar law for preventing farming in contaminated sites (Huang et al., 2015). Furthermore, on-soil horticulture provides a greater capacity for receiving food wastes than raised beds or containers based on area and depth of the field. The labor and energy expended on collecting food wastes from neighborhoods can also be saved because of the proximity between farmland and houses (Hirohara et al., 2002). These characteristics of Asian cities provide the potential for establishing neighborhood-scale food cycles by collecting food wastes from surrounding households and for growing and enjoying food through such food cycles.

In Japan, the current trend, especially in the late 2010s, has been to incorporate rural land uses within cities as a necessary land use; the rationale is that this contributes toward improving environmental conservation, disaster prevention, and health and welfare promotion for urbanites. In the past, especially from the end of World War II until the rapid urbanization of the 1970s, city planning in Japan aimed to maintain a distinct separation of urban and rural land uses by installing a zoning system initiated by the City Planning Act of 1968 (Yokohari et al., 2020). However, this planning attempt failed and, as the total population of Japan and urban development pressures decreased, the value of green spaces, including farmlands, increased. Then, the Basic Law of the Promotion of Urban Agriculture was enacted in 2015 to promote agriculture in or near built-up areas. The Urban Green Space Law was also modified to include farmlands within the category of urban green spaces in 2017. After this, municipality-level masterplans for parks and green spaces started to incorporate farmlands. Following this movement, since 2018, preferential tax treatment for specific urban farmlands originally for a period of 30 yr has been extended, and regulations for renting farmlands have been eased. These drastic changes in legal frameworks show how urban farmlands have gained more significance in city planning; this has increased the ease of establishing CGs on urban farmlands.

2.1.3 Data collection and analysis

In order to understand the history, basic structure, and relevant stakeholders of the garden, the author interviewed the garden founder several times between August and November 2011. This study’s information about the garden was updated based on interviews with the founder and the staff of the Waste Reduction Division of Hino City and the City Planning Division, which were conducted between March and October 2019. The development of the garden activities, especially stakeholders’ involvement, was also captured based on annual activity reports for the 2008–2012 period and of 2014, 2017, and 2018.

The geographical and social characteristics of the food cycle brought by Seseragi Nouen were grasped. First, the relationship between the gardeners and kitchen waste providers was investigated to determine not only the scale of waste recycling but also the associated social bonds. If the gardeners and kitchen waste providers live close together, it is easier to communicate closely with each other. However, merely living near each other is not enough to establish social bonds with others. Such relationships often require a link—for example, acquaintanceships through activities in the neighborhood association (jichikai: a type of neighborhood association consisting of residents in the same area, town or housing complex to enhance local ties and deal with community issues), schools, sports or cultural clubs, and so on. To examine these relationships, the author obtained a list of all participating gardeners and kitchen waste providers with their residential addresses (as of 27 Apr. 2011) from the garden founder. Their places of residence were then plotted on a map using Google Earth Pro, and the relevant data were imported to ArcGIS 10.7.1 in order to analyze the distance between these locations and the garden. Three of the gardeners were excluded, as they did not provide their living address. Additionally, this list included information about how kitchen waste providers learned about the existence of the kitchen waste collection project. This information was sorted out in order to know the connection between the gardeners and kitchen waste providers.

Secondly, information on food production and distribution was collected. Planting plans were obtained in 2018 to identify the variety of crops grown in the garden. The methods of harvest distribution were also identified through participant observation from 2011 to 2020. The amount of harvest was then calculated by referring to Tahara et al. (2011), which showed how much urban gardeners produce vegetables in a city of the Greater Tokyo Area. From this data, the geographical area of food distribution and its impact were estimated.
3 | RESULTS

3.1 | The garden’s history

Before Seseragi Nouen was established, the garden founder formed a citizens’ group and collected kitchen wastes from the neighborhood in order to compost such wastes combined with cattle manure at a livestock farm. Since 2004, her aim had been to do something good for the environment in her daily life. Around 2000, Hino City was infamous as the municipality with the worst amounts of incombustible waste and waste recycling rates in the western Tokyo area. The garden founder then made a plan to recycle kitchen wastes, which formed a relatively high portion of combustible wastes and decreased the efficiency of the incineration process because of their high water content. Next, along with her fellow citizens, she began to collect and use kitchen wastes. She was also a member of a nonprofit organization (NPO) that supported people with disabilities; this organization utilized under-used farmland to grow vegetables. When the livestock farm closed down in 2008, she planned to establish a CG on the farmland the NPO was already using and continue the composting activities there. Then, she talked to two acquaintances—one agreed on her plan strongly and the other was knowledgeable about vegetable farming—in order to start her CG project. At this point, they explained their plan to the land owner and obtained an agreement regarding the use of the land for their project. Gradually, other gardeners joined the CG; usually, they joined after being spoken to by the founder while passing by the garden, or they were brought to the garden by other gardeners. Some gardeners also joined the garden after participating in collaborative events with elementary schools and local festivals.

To reduce necessary working load of stirring up and moving heavy compost, the founder learned kitchen waste fermentation methods using the soil instead of composting in Seseragi Nouen. This method was invented by a former agricultural instructor; this individual has occasionally been invited to the garden and kindergartens nearby to teach its implementation. Approximately five to 10 gardeners plow the collected waste into a plot. The plan of when and where to plow kitchen waste was prepared in advance, and each crop’s planting season was taken into account (Figure 3). The plot size is calculated based on the empirically ideal amount of kitchen waste input (10–15 kg m\(^{-2}\)) and the average daily collected kitchen waste.

While, in principle, the gardening activities are conducted voluntarily, since 2010, the kitchen waste and plant residue collection workload has been secured by paying a fee twice per week. Two persons are hired for each collection day; these persons may be hired from among the garden members or from among people with disabilities at a facility nearby.

In addition to on-site gardening and kitchen waste recycling, the gardeners engage in enlightening neighbors by teaching the significance and way of kitchen waste recycling through giving a workshop at local festivals or kindergartens in the city. They also have a regular meeting to improve their activities. Through these actions, the philosophy of the garden leader is being shared among the community.

FIGURE 3 Plan of when and where to plow kitchen wastes into each plot (photograph by the author)
Land tenure is a crucial issue for the sustainability of Seseragi Nouen. The landowner of the farmland has little intention to continue professional agriculture there. As this farmland was designated to belong to a special category called Seisan Ryokuchi, if the owner seeks land tax exemption in urbanization promotion areas, the farmer will be obliged to cultivate the land themselves for at least 30 yr and will not be able to rent the land to others. The NPO to which the garden founder belonged to then started using the land in the form of “enno,” thus helping the farmers in cultivation activities but not renting the land. The Seseragi Nouen project also employed this land use form to avoid any legal conflicts. In 2018, certain legal regulations were loosened, and nonfarmers can now officially rent farmland in the special category. The problem regarding land ownership can be solved completely thanks to these legal changes now; however, a new problem that could threaten the existence of the garden arose. The neighborhood where the garden is located is currently part of a municipality-managed land readjustment project. If the landowner decides to sell the land or move his tenure to another piece of land, the garden will have to shut down or move to another location. This issue is currently being negotiated between the garden founder, the landowner, and the municipality. The tentative plan is to stop kitchen waste collection in March 2022 and all garden activities by the following autumn. After this, the garden may be moved to another location with municipal help.

A major portion of the garden budget is supplied through a municipality subsidy. The Waste Reduction Division of Hino City provides financial support to the kitchen waste recycling project as a fee for waste treatment since before Seseragi Nouen was established. The estimated amount of reduced waste is ~50 t yr⁻¹. This fee was 300,000 JPY in 2013 and increased to 1.72 million JPY in 2019. According to the responsible person from the Waste Reduction Division of Hino City, it is highly possible to keep funding this project as long as the gardeners continue recycling kitchen wastes despite the possible relocation of the garden. If similar projects arise, the Division may support them as well. The garden’s funding is also derived from the profits that were earned by selling the garden’s products at local events and from the fees received by kitchen waste providers for their waste treatment services. This money is mainly used for paying the maintenance fees for the truck used for kitchen waste collection and for preparing rewards for people who commit their time and energy toward collecting kitchen wastes and conducting accounting activities. The economic condition of Seseragi Nouen has thus remained somewhat stable.

### 3.2 Process for involving stakeholders in the garden project and their roles

Table 1 shows when the main stakeholders’ involvement (other than the garden founder) was observed based on the Seseragi Nouen’s annual activity report. The activity plan is created by the garden founder, who is also the person responsible for organizing and implementing events. She may ask other gardeners to facilitate depending on the event. As previously mentioned, the Waste Reduction Division of Hino City has been supporting the project since before the garden was established. The division not only provides funding but also help public relations of the seminars, cooking workshops, and other events because such enlightening activities are part of the commission. After the garden was established in 2009, the gardeners started inviting parents and children from a children’s center to the garden with the promise of providing them with opportunities to grow vegetables and experience harvest cooking. In the same year, second-year students from an elementary school visited the garden as part of a class. In 2010, the gardeners started to visit several kindergartens to deliver seminars on how to recycle kitchen waste and grow vegetables. From 2010 onward, the local neighborhood association and the garden organized a harvesting event for taro plants. A waste-collection-related collaboration with a facility for people with disabilities was also started in 2010. From 2011 onward, children from some nurseries began to work on certain gardening activities such as planting gingers, wheat, and sweet potatoes and plucking flowers. In the same year, the garden requested another facility for people with disabilities for help in packing and delivering bamboo powder, which

| Type of stakeholder | 2008 | 2009 | 2010 | 2011 | 2012 | 2014 | 2017 | 2018 |
|---------------------|------|------|------|------|------|------|------|------|
| Waste Reduction Division of Hino City | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Children’s center | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Elementary school | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Kindergarten | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Neighborhood association | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Facility for people with disabilities | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Nursery | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| High school | ✓ | | | | | | | |

Table 1 Record of stakeholder involvement in the activities at Seseragi Nouen (based on year)
promoted kitchen waste fermentation. These people obtained an opportunity for earning money and participating in the society through this collaboration. In 2012, the garden received its first high school student volunteers. Then, in 2014, or perhaps in 2013, the gardeners restarted a collaborative class with the abovementioned elementary school. In this way, the variety of involved stakeholders has been growing richer over the years.

In addition to the actors who are actively involved in the garden’s activities, further supporting actors are found within the neighborhoods. For example, the garden receives okara, a byproduct of tofu production, which can be used as an organic fertilizer, from a local tofu maker. Thus, the garden takes advantages of containing a food cycle to involve both private and public actors. The governance structure of Seseragi Nouen is described in Figure 4 and can be regarded as a bottom-up type with public support.

### Table 2: Distance to Seseragi Nouen from places of residence of gardeners and kitchen waste providers

| Distance to garden | Gardener | Kitchen waste provider |
|--------------------|----------|------------------------|
| <1 km              | 63       | 172                    |
| 1–2 km             | 17       | 21                     |
| 2–3 km             | 5        | 0                      |
| >3 km              | 5        | 0                      |
| Total              | 90<sup>a</sup> | 193                   |

<sup>a</sup>Three of the 93 gardeners’ addresses are unknown.

### Table 3: The interaction that made neighbors kitchen waste providers

| How the households started providing kitchen waste | Number |
|---------------------------------------------------|--------|
| Recommendation by a gardener                      | 130    |
| Questionnaire through neighborhood association    | 51     |
| News from neighborhood association                | 5      |
| Event                                             | 5      |
| Others                                            | 2      |
| Total                                             | 193    |

### 3.3 Interaction between gardeners and kitchen waste providers in the food cycle

Regarding the structure of the gardening organization, there were 193 households that provided organic waste to Seseragi Nouen and 93 gardeners who often worked in the garden in 2011. Among the gardeners, 39 were also registered as kitchen waste providers. Their places of residence are shown in Figure 5. They were distributed mostly on the same side the river flowing through in the middle of Hino City. This was expected because of the limited number of bridges and the time to reach the other side. Counting the plots in the buffers showed that most of the participants, 63 gardeners (70%) and 172 kitchen waste providers (89%), lived within 1 km of the garden (Table 2). Considering that most of the remaining gardeners (17 gardeners, 19%) and all of the remaining kitchen waste providers (21 providers, 11%) also resided within 2 km of the garden, almost everyone could reach the garden easily on foot or by bicycle. The garden founder explained that the area of the kitchen waste collection was controlled so that it would fit within the school district of an elementary school nearby.

Table 3 summarizes the interaction that brought about neighbors’ participation in the provision of kitchen waste;
130 neighbors (67%) started providing kitchen waste after they were recommended to do so by a gardener. The second major interaction involved communication through neighborhood associations, such as questionnaires or news circulation, which led to the participation of 56 kitchen waste providers (29%). Questionnaires were distributed to neighborhood associations between 2008 and 2011; the intention was to invite new kitchen waste providers until the garden’s capacity for receiving kitchen waste was reached. Those who were willing to provide waste received a face-to-face individual orientation. This shows that most of the providers were in direct contact with the gardeners before joining the project. Even without such close connections, the rest of the providers were reached through neighborhood associations. Furthermore, the gardeners distributed another kind of questionnaire to the kitchen waste providers at the end of every fiscal year; the aim was to ask them about their opinions about the garden’s activities, including waste collection, and their willingness to continue providing waste. These opinions have been reported in the annual reports in order to obtain feedbacks. It can thus be said that close communication was carried out between the gardeners and kitchen waste providers.

Afterward, the number of kitchen waste providers gradually decreased to 167 households in March 2018. However,
the gardeners had no significant action to obtain more new participation of neighbors in providing kitchen wastes because the capacity of the garden to receiving kitchen wastes was considered to be approximately 200 households.

The harvested crops are mostly distributed to gardeners who join collective gardening activities on each working day. Gardeners can take an equal number of vegetables regardless of how long they work. Additionally, harvested crops are sold at some events such as local festivals; however, this is limited to only a few opportunities per year. Therefore, the area in which food is served can be regarded as the same geographic area of the gardeners’ residences. These data indicate that the sphere of this neighborhood food cycle covered a distance of ∼2 km from the garden, mostly on one side of the river flowing in the middle of the city; this was a reachable distance for residents in this area.

What is grown by the gardeners varies from ordinary to locally traditional vegetables. Table 4 shows the list of horticultural crops grown collectively in 2018; the area for growing each crop could not be precisely identified. Therefore, the amount of harvest was calculated by multiplying the area of Seseragi Nouen by the amount of harvest per area proved in a typical urban garden by Tahara et al. (2011). The exact calculation is as follows: $2,600\text{m}^2 \times 4.16 \left(\frac{\text{kg}}{\text{m}^2}\right) = 10,816\text{kg} \approx 11\text{t}$. One family with two members or more in central Tokyo (the closest area to Hino City in the available data) purchased 179.5 kg of vegetables a year (Statistics Bureau of Japan, 2020). Therefore, Seseragi Nouen provided vegetables roughly equivalent to the annual consumption of vegetables for 60 families. This is sufficient for the gardeners because 10–20 people appear on each working day, which is why they can sell or cook harvested vegetables at events like local festivals.

### 4 DISCUSSION

The first research question, which dealt with facts regarding the history of Seseragi Nouen, showed that the strong initiative and motivation of the garden founder established the garden and that the garden evolved gradually by dealing with problems as they arose. The founder explored what actions she could take for the environment and then started the garden by using available resources in her surroundings; furthermore, she collected kitchen wastes from local households with the increasing number of the gardeners. Thus, she overcome the challenge posed by the closure of the livestock farm—where she had worked on composting—by starting a CG with several acquaintances. Within a few years, almost 100 gardeners joined her endeavor, and the number of kitchen waste providers reached a level that was enough to fill the waste treatment capacity of the garden. The problem of land tenure, which affected the garden at the beginning, was also solved by

| TABLE 4 List of horticultural crops grown in Seseragi Nouen |
|---------------------------------------------------------------|
| **In spring and summer**                                       | **In autumn and winter** |
| Beefsteak plant                                               | Boston lettuce          |
| Bitter melon                                                  | Canola flower           |
| Carrot                                                        | Carrot                  |
| Chili pepper                                                  | Crown daisy             |
| Chinese chive                                                 | Edible chrysanthemum    |
| Corn                                                          | Garlic                  |
| Cowpea                                                        | Green beans             |
| Cucumber                                                      | Green onion             |
| Eggplant                                                      | Komatsuna               |
| Garlic                                                        | Lettuce                 |
| Ginger                                                        | Norabou                 |
| Grape                                                         | Onion                   |
| Green beans                                                   | Purple-stem mustard     |
| Green onion                                                   | Radish                  |
| Green pepper                                                  | Rucola                  |
| Green soybeans                                                | Snow peas               |
| Jerusalem artichoke                                           | Spinach                 |
| Jew’s mallow                                                  | Sweet potato            |
| Lettuce                                                       | Taro                    |
| Malabar spinach                                               | Turnip                  |
| Okra                                                          | Wheat                   |
| Onion                                                         | Variety of herbs        |
| Parsley                                                       |                         |
| Peanuts                                                       |                         |
| Potato                                                        |                         |
| Pumpkin                                                       |                         |
| Radish                                                        |                         |
| Shallot                                                       |                         |
| Snap peas                                                     |                         |
| Snow peas                                                     |                         |
| Sorgo                                                         |                         |
| Soybeans                                                      |                         |
| Strawberry                                                    |                         |
| Sweet potato                                                  |                         |
| Taro                                                          |                         |
| Tomato                                                        |                         |
| Tree onion                                                    |                         |
| Turnip                                                        |                         |
| Winged beans                                                  |                         |
| Yacon                                                         |                         |
| Zucchini                                                      |                         |
| Variety of herbs                                              |                         |
maintaining a good relationship with the landowner and the municipality. The result of the current negotiations to save or relocate the garden under the land readjustment project remain unclear thus far; however, the municipality is at least considering the significance of the garden in the neighborhood. The leadership in the garden management is regarded as a key to long-term success and sustainability of CGs (Gilbert et al., 2020). In the case of Seseragi Nouen, the founder’s firm belief and flexible mind may also have played an important role in securing participants, land, funding, and the necessary components for long-term operation.

However, this model has some limitations. The vulnerability in collapsing the garden group can be pointed out if the leadership of the garden management is totally dominated by a single person. There is always a risk that the founder may leave the project for some reason. Therefore, it is necessary to decentralize responsibility, in general, for the sustainable governance of CGs. The necessity of a high level of community interest and a shared CG vision was also pointed out in a previous study on Western CGs (Fox-Kämper et al., 2018). Additionally, considering the operations necessary for maintaining a food cycle, specific knowledge regarding sharing and enlightenment of the philosophy will be required for other community members as well. For this reason, sharing the philosophy through garden activities and local events may be important to secure human resources.

Regarding the second research question, the data elucidated that the Seseragi Nouen stakeholders included not only neighbors and the municipality as a whole but also local institutions such as facilities for people with disabilities, a children’s center, kindergartens, nurseries, schools, neighborhood associations, and so on. The gardeners gradually expanded the scope and area of the collaboration with every passing year. The operation of a food cycle can create various work opportunities such as regular kitchen waste collection and education materials such as observations regarding soil fermentation. By working together with the local institutions and by using these opportunities and materials, the CG contributed toward developing social cohesion between the community and people with disabilities and also helped to develop environmental education for children. The use of local resources (for example, byproducts of tofu, which were supplied by a local tofu maker and used in fertilization) is also an effective way to strengthen the food cycle. It is assumed that this network of stakeholders increased the prominence of the garden and drew the interest of newer people. Local environmental groups focusing on kitchen waste showed that most of the providers were recognized by appropriate waste separation. Most of the gardeners and providers lived within 1 km of the garden—a walkable distance. For local residents, this proximity of residence environment to the garden could increase chances of becoming acquaintances with gardeners or seeing the garden activities when passing by the garden. Then, it may be easy for gardeners to communicate with kitchen waste providers and advise them on proper waste. Indeed, an examination of the interactions that provided the neighborhood residents with an opportunity to start providing kitchen waste showed that most of the providers were recommended to do so by a gardener. The existence of neighborhood associations also helped to facilitate and maintain communications between the gardeners and kitchen waste providers. Thus, the strategy of collecting kitchen waste on a neighborhood scale helped to sustain close relationships between the gardeners and kitchen waste providers.

5 | CONCLUSIONS

In Western countries, CGs are often not secured in terms of land tenure (Fox-Kämper et al., 2018), as they are often established on the basis of temporary land use; this was also the case in Seseragi Nouen. However, if municipalities and citizens understood the importance of CGs in society, they would not get rid of such gardens easily.

In fact, the municipality and the founder of Seseragi Nouen established a council to realize a lifestyle incorporating urban agriculture and gardening. This council devised a plan for conserving farmland inside the city and opening a CG in each school district. This plan is now under examination and, if approved, it will be easier to start CGs on various land such as farmland, residential vacant land, parks, and other areas. This will lead to conservation and creation of green spaces, which, in turn, will contribute to environmental protection and education. Furthermore, each neighborhood can access sources of fresh food with ease. It can be said that Seseragi Nouen moved the municipality and residents to change the direction of public policies on land use control.

The third research question concerns the relationships between gardeners and kitchen waste providers—especially with regard to the maintenance of soil quality through appropriate waste separation. Most of the gardeners and providers lived within 1 km of the garden—a walkable distance. For local residents, this proximity of residence environment to the garden could increase chances of becoming acquaintances with gardeners or seeing the garden activities when passing by the garden. Then, it may be easy for gardeners to communicate with kitchen waste providers and advise them on proper waste. Indeed, an examination of the interactions that provided the neighborhood residents with an opportunity to start providing kitchen waste showed that most of the providers were recommended to do so by a gardener. The existence of neighborhood associations also helped to facilitate and maintain communications between the gardeners and kitchen waste providers. Thus, the strategy of collecting kitchen waste on a neighborhood scale helped to sustain close relationships between the gardeners and kitchen waste providers.
succeeded in receiving municipal support by using benefits of kitchen waste recycling, that is, reducing household wastes. The strategy of collaborating with local social welfare and education institutions in various activities involving food cycle operations may have worked to enhance the significance of the garden and its existence within the neighborhood. However, the land tenure issue is not completely solved yet. Interaction between gardeners and kitchen waste providers living in the contactable sphere may be another key for maintaining kitchen recycling quality. The coupling of agricultural values, which should include waste recycling, social cohesion, and environmental education, with understandings of the urban garden governance can support legitimate policy making (Piso et al., 2019). Therefore, this study’s outcomes could help us understand effective or challenging factors related to CGs in order to establish food cycles and obtain a hint to the sustainable city planning incorporating such CGs.

This study’s main limitation was that it included only one case study. Further cases should be examined and compared with this study’s discussed case in order to develop a robust theory on sustainable governance in CGs containing food cycles. The area where the studied CG was located had a mixture of urban and rural land uses. Depending on the degree of the mixture, that is, population density and farmlands distribution, the scale of food cycles may vary. Another future task in this regard should involve the precise estimation of the impact of establishing food cycles through a CG project, for example, how much kitchen waste can be reduced and how much food can be distributed to neighbors; this could prove the significance of such projects for building a sustainable future for cities.

CONFLICT OF INTEREST STATEMENT
The author has no conflict of interest relevant to the contents of this article.

ACKNOWLEDGMENTS
This work was supported by JSPS KAKENHI Grant Number 19KT0007 “Evaluation of Agricultural-related Resources in the Shrinking Suburbs of Mega Cities.” The author wishes to thank all the interviewees and supporters of this work for their help in conducting surveys.

AUTHOR CONTRIBUTIONS
Naomi Shimpo: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Writing-original draft

ORCID
Naomi Shimpo https://orcid.org/0000-0001-5271-6797

REFERENCES
Barthel, S., & Isendahl, C. (2013). Urban gardens, agriculture, and water management: Sources of resilience for long-term food security in cities. Ecological Economics, 86, 224–234. https://doi.org/10.1016/j.ecoleh.2012.06.018

Bendt, P., Barthel, S., & Colding, J. (2013). Civic greening and environmental learning in public-access community gardens in Berlin. Landscape and Urban Planning, 109, 18–30. https://doi.org/10.1016/j.landurbplan.2012.10.003

Caputo, S., Rumble, H., & Schaefer, M. (2020). “Like to get my hands stuck in the soil”: A pilot study in the acceptance of soil-less methods of cultivation in community gardens. Journal of Cleaner Production, 258: 120585. https://doi.org/10.1016/j.jclepro.2020.120585

Certomà, C., & Notteboom, B. (2017). Informal planning in a transactive governmentality: Re-reading planning practices through Ghent’s community gardens. Planning Theory, 16, 51–73. https://doi.org/10.1177/1473095515598177

Chambers, S., Lobb, A., Butler, L., Harvey, K., & Traill, W. B. (2007). Local, national and imported foods: A qualitative study. Appetite, 49, 208–213. https://doi.org/10.1016/j.appet.2007.02.003

Connolly, J. J. T., Svendsen, E. S., Fisher, D. R., & Campbell, L. K. (2014). Networked governance and the management of ecosystem services: The case of urban environmental stewardship in New York City. Ecosystem Services, 10, 187–194. https://doi.org/10.1016/j.ecoserv.2014.08.005

Cooper, A. M., Felix, D., Alcantara, F., Zaslavsky, I., Work, A., Watson, P. L., Pezzoli, K., Yu, Q., Zhu, D., Scavo, A. J., Zarabi, Y., & Schroeder, J. L., (2020). Monitoring and mitigation of toxic heavy metals and arsenic accumulation in food crops: A case study of an urban community garden. Plant Direct, 4, e00198. https://doi.org/10.1002/pld3.198

Davies, A. R., Cretella, A., & Franck, V. (2019). Food sharing initiatives and food democracy: Practice and policy in three European cities. Politics and Governance, 7, 8–20. https://doi.org/10.17645/pag.v7i4.2090

Drake, L., & Lawson, L. J. (2015). Results of a US and Canada community garden survey: Shared challenges in garden management amid diverse geographical and organizational contexts. Agriculture and Human Values, 32, 241–254. https://doi.org/10.1007/s10460-014-9558-7

Eriksson, M., Tollefsen, A., & Lundgren, A. S. (2019). From blueberry cakes to labor strikes: Negotiating “legitimate labor” and “ethical food” in supply chains. Geoforum, 105, 43–53. https://doi.org/10.1016/j.geoforum.2019.07.003

Fox-Kämper, R., Wesener, A., Münderlein, D., Sondermann, M., McWilliam, W., & Kirk, N. (2018). Urban community gardens: An evaluation of governance approaches and related enablers and barriers at different development stages. Landscape and Urban Planning, 170, 59–68. https://doi.org/10.1016/j.landurbplan.2017.06.023

Fernandez-Wulff, P. (2019). Collective agency in the making: How social innovations in the food system practice democracy beyond consumption. Politics and Governance, 7, 81–93. https://doi.org/10.17645/pag.v7i4.2111

Galvan, A. M., Hanson, R., & George, D. R. (2018). Repurposing waste streams: Lessons on integrating hospital food waste into a community garden. Journal of Community Health, 43, 944–946. https://doi.org/10.1007/s10900-018-0509-x
Ghose, R., & Pettygrove, M. (2014). Actors and networks in urban community garden development. *Geoforum, 53*, 93–103. https://doi.org/10.1016/j.geoforum.2014.02.009

Gilbert, J., Chauvenet, C., Sheppard, B., & De Marco, M. (2020). “Don’t just come for yourself”: Understanding leadership approaches and volunteer engagement in community gardens. *Journal of Agriculture, Food Systems, and Community Development, 9*, 259–273. https://doi.org/10.5304/jafscd.2020.094.019

Göttl, I., & Penker, M. (2020). Institutions for collective gardening: A comparative analysis of 51 urban community gardens in Anglophone and German-speaking countries. *International Journal of the Commons, 14*, 30–43. https://doi.org/10.1053/j.ijjc.961

Guitart, D., Pickering, C., & Byrne, J. (2012). Past results and future directions in urban community gardens research. *Urban Forestry & Urban Greening, 11*, 364–373. https://doi.org/10.1016/j.ufug.2012.06.007

Hamilton, H., Henry, R., Rounsevell, M., Moran, D., Cossar, F., Allen, K., Boden, L., & Alexander, P. (2020). Exploring global food system shocks, scenarios and outcomes. *Futures, 123*, 102601. https://doi.org/10.1016/j.futures.2020.102601

Hou, J. (2018). Governing urban gardens for resilient cities: Examining the ‘Garden City Initiative’ in Taipei. *Urban Studies, 57*, 1398–1416. https://doi.org/10.1177/0042098018778671

Hino City. (2020). Population, the number of households and area of Hino City. (In Japanese, with English translation.) https://www.city.hino.lg.jp/languages/english/1015149/1007645.html

Hirohara, T., Yokohari, M., Kato, Y., & Watanabe, T. (2002). A study of the small-scaled material cyclic between urban and rural land uses in urban fringe areas of Tokyo. (In Japanese, with English abstract) *Journal of The Japanese Institute of Landscape Architecture, 65*, 889–892. https://doi.org/10.5632/jila.65.889

Huang, W., Hashimoto, S., Hoshino, S., & Kuki, Y. (2015). Factors affecting the re-cultivation after the heavy metal decontamination treatment: Case study in Chang-hua in Taiwan. (In Japanese, with English abstract.) *Transactions of The Japanese Society of Irrigation, Drainage and Rural Engineering, 83*, 21–29. https://doi.org/10.11408/sjide.83.21

Jamal, M., Szefler, A., Kelly, C., & Bond, N. (2019). Commercial and household food waste separation behaviour and the role of local authority: A case study. *International Journal of Recycling of Organic Waste in Agriculture, 8*, 281–290. https://doi.org/10.1007/s40093-019-00300-z

Johnson, M. L., Locke, D. H., Svendsen, E., Campbell, L. K., Westphal, L. M., Romolini, M., & Grove, J. M. (2019). Context matters: Influence of organizational, environmental, and social factors on civic environmental stewardship group intensity. *Ecology and Society, 24*, 1. https://doi.org/10.5751/ES-10924-240401

Keng, Z. X., Chong, S., Ng, C. G., Ridzuan, N. L., Hanson, S., Pan, G. T., Lau, P. L., Supramaniam, C. V., Singh, A., Chin, C. F., & Lam, H. L. (2020). Community-scale composting for food waste: A life-cycle assessment-supported case study. *Journal of Cleaner Production, 261*, 121220. https://doi.org/10.1016/j.jclepro.2020.121220

Kikuchi, Y., Kanematsu, Y., Yoshikawa, N., Okubo, T., & Takagaki, M. (2018). Environmental and resource use analysis of plant factories with energy technology options: A case study in Japan. *Journal of Cleaner Production, 186*, 703–717. https://doi.org/10.1016/j.jclepro.2018.03.110

Krasny, M. E., & Tidball, K. G. (2009). Community gardens as contexts for science, stewardship, and civic action learning. *Cities and Environment, 2*, 8. https://doi.org/10.15365/cate.2182009

Mahrous, N. N., Columbus, M. P., Southam, G., & Macfie, S. M. (2019). Changes in microbial community structure and increased metal bioavailability in a metal-contaminated soil and in the rhizosphere of corn (*Zea mays*). *Rhizosphere, 11*, 100169. https://doi.org/10.1016/j.rhisp.2019.100169

Ministry of Agriculture, Forestry and Fisheries. (2019). The survey on areas. (In Japanese, without English translation) https://www.maff.go.jp/j/tokei/kouhyou/sakumotu/mensiki/

Mitchell, R. G., Slipefho, H. M., Ribaudo, L. N., Lopp, D. M., Shayler, H. A., Marquez-Bravo, L. G., Lambart, V. T., Ferenz, G. S., Russell-Anelli, J. M., Stone, E. B., & McBride, M. B. (2014). Lead (Pb) and other metals in New York City community garden soils: Factors influencing contaminant distributions. *Environmental Pollution, 187*, 162–169. https://doi.org/10.1016/j.envpol.2014.01.007

Modibedi, T. P., Masekoameng, M. R., & Maake, M. M. S. (2020). The contribution of urban community gardens to food availability in Emfuleni Local Municipality, Gauteng Province. *Urban Ecosystems*, https://doi.org/10.1007/s11252-020-01036-9

Morrow, O. (2019). Sharing food and risk in Berlin’s urban food commons. *Geoforum, 99*, 202–212. https://doi.org/10.1016/j.geoforum.2018.09.003

Nikolaidou, S., Klöti, T., Tappert, S., & Drilling, M. (2016). Urban gardening and green space governance: Towards new collaborative planning practices. *Urban Planning, 1*, 5–19. https://doi.org/10.17645/tp.v1i1.520

Pai, S., Ai, N., & Zheng, J. (2019). Decentralized community composting feasibility analysis for residential food waste: A Chicago case study. *Sustainable Cities and Society, 50*, 101683. https://doi.org/10.1016/j.scs.2019.101683

Paltseva, A. A., Cheng, Z., Egdendorf, S. P., & Groffman, P. M. (2020). Remediation of an urban garden with elevated levels of soil contamination. *Science of The Total Environment, 722*, 137965. https://doi.org/10.1016/j.scitotenv.2020.137965

Piso, Z., Goralnik, L., Libarkin, J. C., & Lopez, M. C. (2019). Types of urban agricultural stakeholders and their understandings of governance. *Ecology and Society, 24*, 18. https://doi.org/10.5751/ES-10650-240218

Rogge, N., Theesfeld, I., & Strassner, C. (2020). The potential of social learning in community gardens and the impact of community heterogeneity. *Learning, Culture and Social Interaction, 24*, 100351. https://doi.org/10.1016/j.lcsi.2019.100351

Scharf, N., Wachtel, T., Reddy, S. E., & Säumel, I. (2019). Urban commons for the edible city—First insights for future sustainable urban food systems from Berlin, Germany. *Sustainability, 11*, 966. https://doi.org/10.3390/su11040966

Schmelzkopf, K. (2002). Incommensurability, land use, and the right to space: community gardens in New York City. *Urban Geography, 23*, 323–343. https://doi.org/10.2747/0272-3638.23.4.323

Shimpo, N., Amemiya, M., & Yokohari, M. (2014). The organic waste recycling system based on the agro-activities of urban residents: A case study of a community garden in Hino City, Tokyo. (In Japanese, with English abstract.) *Journal of the City Planning Institute of Japan, 49*, 219–224. https://doi.org/10.11361/journalcpij.49.219

Skamlová, L., Wilkaniec, A., Szczepańska, M., Bačík, V., & Hencelová, P. (2020). The development process and effects of the
management of community gardens in two post-socialist cites: Bratislava and Poznań. Urban Forestry & Urban Greening, 48, 126572. https://doi.org/10.1016/j.ufug.2019.126572

Statistics Bureau of Japan (2020). Family income and expenditure survey 2019. e-stat. https://www.stat.go.jp/data/kakei/rank/singleyear.html

Tahara, S., Yokohari, M., Kurita, H., & Terada, T. (2011). A quantitative assessment of agricultural production from allotment gardens. (In Japanese, with English abstract.) Journal of The Japanese Institute of Landscape Architecture, 74, 685–688. https://doi.org/10.5632/jila.74.685

Yokohari, M., Murayama, A., & Terada, T. (2020). The value of grey. In T. Mino & S. Kudo (Eds.) Framing in sustainability science. Science for sustainable societies (pp. 57–96). Springer. https://doi.org/10.1007/978-981-13-9061-6_4

Yokohari, M., Takeuchi, K., Watanabe, T., & Yokota, S. (2000). Beyond greenbelts and zoning: A new planning concept for the environment of Asian mega-cities. Landscape and Urban Planning, 47, 159–171. https://doi.org/10.1016/S0169-2046(99)00084-5

How to cite this article: Shimpo, Naomi. The governance of a community garden with a food cycle in suburban Tokyo. Urban Agric Region Food Syst Urban Agric Region Food Syst, 2021;6:e20015. https://doi.org/10.1002/uar2.20015