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Research on the Sustainable System of Public Farmland
in the Suburban Area of a Large City:

The Example of Minuma Rice Fields in the Tokyo Metropolitan Area

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**Research on the Sustainable System of Public Farmland
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Abstract

Due to rapid urbanization, farmland is declining in suburban areas. The environment of agriculture in suburban area is severe as reflected in changes in rural societies, encroachment of farmland and invasion by urban land use such as residential place, commercial areas, increasing land prices and the problem of inheritance tax. In order to deal with such circumstances, preservation of farmland is essential, and various policies and activities regarding preservation of farmland are implemented. Public ownership of farmland is one of these methods. Its purpose is that public organizations acquire the private farmland which cannot be managed by its legal owners, and manage it in such a way that its productive potential is preserved. The importance of this method is increasing in suburban areas. Public farmland is managed by its continuous use as farmland, but the sustainable management system of public farmland in suburban areas is not clear enough. Sustainable management system is defined as continuous utilization of public farmland by people. Therefore, this research aims to clarify the working of the sustainable system of public farmland in suburban areas.

This research is based on the systems theory for management of agriculture of Bryant and Johnston (1992), which looks at the elements of planning, land, labor, capital and management, as the key elements of the system. In order to apply it to public farmland, however, capital and management (which are conducted by the administrative body and as a consequence remain stable) can be ignored and only planning, land and labor variables are considered. Taking into consideration the characteristics of public farmland, the following relationships and activities are considered in place of planning, land and labor respectively: the relationship between the managing entity, which is a general term for the land owner entity, the management entity and the

user entity, and the type of activity (planning), the relationship between the public farmland and the function of farmland exerted by the type of activity (land), and the leisure and educational activities (labor). In addition, based on the private interest and the public interest in the main functions of farmland in urban fringes conceptualized by Bryant and Johnston, the 4 functions of production, protection, play and education are considered in the case of public farmland, and the framework of this research is formulated.

Minuma rice fields in Saitama prefecture is focus of the present research. Minuma rice fields suffered severe damage by typhoon No. 12 (Kanogawa typhoon) in 1958. All the areas of Minuma rice fields were flooded and most part of the urban area of Kawaguchi city, which is downstream from Minuma rice fields, was inundated. The water storage function of Minuma rice fields was reconsidered inspired by the Kanogawa typhoon, and "Minuma 3 principles," which does not allow using the farmland in Minuma rice fields for other purposes such as residential areas and industrial areas, was set in 1965; afterwards, the public land promotion policy was decided in the "Basic policy for sustainable management, use and preservation of Minuma rice fields" in 1995. After that, Saitama prefecture commissioned Saitama Agriculture & Forestry Corporation and civic groups to manage the public farmland acquired for Minuma rice fields public land promotion policy. Therefore, Saitama Agriculture & Forestry Corporation and civic groups are used as examples for this research.

Saitama Agriculture & Forestry Corporation has implemented works for maintenance and management including mowing as preparation for tillage based on the discussion with the land owner, Saitama prefecture since they were commissioned management in 1998. First, the activities were conducted only by Saitama prefecture and Saitama Agriculture & Forestry Corporation, and they started from

mowing, and cultivation of landscape amenity crops was added in 1999 in order to improve the landscape. Later on, activities such as hands-on farming experiences, communion (Fureai) farm for residents of the prefecture, agricultural prep school and School children's farm, which is part of the hands-on farming activities were added one by one, and those activities accepted citizens, neighboring residents, corporations and educational institutions to participate as user entities. In spite of the fact that the number of activities increased, the system that only one activity is allocated to one plot of public farmland has not changed, but multiple functions of farmland are exerted by one activity, and the farmland is therefore smoothly managed.

Civic groups conduct activities in different ways. They decide the land management policy with Saitama prefecture, but the actual content of activities is decided by the civic groups. They have implemented multiple activities since they started maintenance and management of the public farmland, and multiple user entities including Kawaguchi city, civic groups other than the management entity, citizens, neighboring residents and corporations and sustaining entity have participated in them. In addition, multiple activities are allocated to one plot of public farmland, and as a consequence, various functions of farmland are exerted. As they continued organizing activities, the number of types of activities increased, and educational institutions were added to the original list of user entities, civic groups, citizens, neighboring residents and corporations. According to our survey, when the management entity implements multiple activities on one plot of public farmland, that means that multiple functions of farmland are exerted, and the farmland is thus smoothly maintained.

The two case studies of an agriculture and forestry public corporation and a local civic group, revealed the fact that the sustainable management system of public farmland in a suburban area is a system

which maintains the farmland by a combination of the following processes: (1) increase of land managing entities, (2) diversification of activities, (3) increase in the units of activity in farmland, and (4) increase in the range of functions of farmland. Although previous research on the sustainable management system of farmland concluded that the sustainable management system of private farmland is influenced only by the increase in the range of functions of farmland, the sustainable system could not be discussed only by increase in the range of functions of farmland in case of public farmland. The originality of this research is that it reveals the fact that the sustainable management system of public farmland involves a combination of processes (1)(2)(3)(4), and the flow of those processes are (1)→(2)→(4) or (1)→(2)→(3)→(4), while the processes (1) and (2) lead to the process (4). Whether (3) is existed or not is not mandatory to the presence of the sustainable management system. Therefore, for the sustainable management system of public farmland, it is important to promote (1) and (2) and to promote activities concerning leisure of people and educational activities, because there are more activities related to them.

I. Introduction

1. Background of the research

Since prehistoric age, agriculture and cities have been tied in a complex way (Benevolo, 1980). Agriculture was not only the basic condition for the cities to emerge (Bairoch, 1988), but also has contributed to the world economy and the development of cities throughout history. Most of the cities in the world are surrounded by high-quality farmland (Hill, 1986), and when a city expands, good-quality farmland is always diverted. Especially, the progress of urbanization in large cities boosted diversion of farmland into urbanized land use such as suburban residential areas. (Best, 1981; Best and Coppack, 1962; Bogue, 1956; Crerar, 1963; Hind-Smith and Gertler, 1963). Therefore, a pattern of unique land use appeared in urban fringes, and it was observed in various countries including the United States (Hart, 1976; Vining et al., 1977; Zeimetz et al., 1976), France (Bryant, 1981), The United Kingdom (Best, 1978; Cruickshank, 1982; Embelton and Coppock, 1968; Wibberly, 1959) and New Zealand (Land use Advisory Council, 1983; Meister, 1982).

According to research pointing to social changes in agricultural villages and the relation between farmland and distance from the city (Cloke, 1978), agricultural land use such as farmland and woodland has been shifting to urban land use such as suburban residential areas by rapid urbanization. As a result, city and agricultural village residents came to share the same living space (Iwata et al., 1985; Takahashi, 1985), and problems like insufficient urban infrastructures and deterioration of agricultural production base occurred (Tabuchi, 1978). Therefore, there are attempts to control the expansion of urban areas, and opinions that highly productive land which has high capacity of food production should not be used for urban development emerged (Robinson, 1968). Based on such a

social background, ways to preserve and manage farmland in urban fringes have become a major issue.

Farmland resources in urban fringes have been researched mainly from two viewpoints so far: the value of the land when it is used for urban land uses and the proximity to the urban market for agricultural production. Because of proximity to cities, land prices increase, due to its potential to be diverted to urban land use. The problem is compounded on the other hand by the lack of successors caused by the decline in a motivation for farming and the increased burden of inheritance tax and such factors make the environment of agriculture in urban fringes severe (Bryant and Johnston, 1992). Since the value of farmland when used for agriculture in urban fringes is compared with its value when used for urban land uses, it is closely linked with the management of farmland. Some studies proved that the value of the farmland when used for agriculture is decided by the distance from the city, and a specific pattern of agricultural land use develops around a central market place, as suggested by von Thünen's theory (Chisholm, 1962; Hall, 1996).

Furthermore, the expectation of non-agricultural development of farmland and its impact on agriculture are researched from the aspect of expectation of development of a city (Sinclair, 1967), as well as the impact on the shipping cost and the transportation cost to customers (Bryant, 1981). Both researches are conducted the value of farmland and its sustainable management systems. In addition, Moran (1979) found that the location of agriculture and agricultural land use are decided by the total conditions of local natural environment, social and economic environment and political and policy conditions, and introduced this new finding to the theory of location of farmland. The comprehensively framework of these conditions was developed in studies of sustainable systems of agriculture, sustainable systems of agricultural villages and sustainable management of farmland (Pacione, 1983, 1986; Ilbery, 1998; Bowler, 1992; Bowler et al., 2002).

There is another type of research which considers agricultural management entities and agricultural entrepreneurs as management systems, and studies the ways a farm manages the farmland, which is one of the management resources, by keeping the management system (Morgan and Munton, 1971; Olmstead, 1970). Especially, use of financial institutions, assets of agricultural management entities and evaluation (Caldwell, 1988), decision making systems of agricultural management entities (Found, 1971; Bryant, 1989) and goals and values of farmers (Clark and Simpson, 1959; Ilberry, 1985; Kivlin and Fliegel, 1968; Mitchell, 1969; Taylor, 1949; Gasson, 1973) have been the focus of studies on management systems of farms.

Other studies applied systems theory to the agriculture at the level of an agricultural management entity, and considering it as a management system which functionally integrates land, planning, labor, asset and management into one system (Bryant, 1984a). Furthermore, it has become widely known that farmland, which is a place for agricultural production and a means of livelihood for farmers, has multiple functions such as a place for fostering wildlife, a role in environmental preservation and so forth. Most of values and concerns placed on farmland resources are very high especially in urban fringes. Therefore, it is narrow-minded to consider farmland only as a place for production during management and planning stages of farmland. Values, functions and interests in diversified farmland resources play very important roles in shaping a sustainable system of farmland in urban fringes (Bryant and Johnston, 1992). This sustainable management system is defined as continuous utilization of public farmland by people. In other words, farmland does not exist only as agricultural space, but as multifunctional space, which includes green space as urban amenity, leisure space for urban residents, emergency relief space for evacuation at the time of disaster and so forth (Kikuchi, 2004).

Therefore, a new movement emerged, which aims to preserve the farmland itself utilizing its diverse functions, not by considering farmland

exclusively as a place for the livelihood of farmers. The concept of utilizing the multiple functions of farmland is reflected in the policy for management of agriculture of Policy Research Institute, Ministry of Agriculture, Forestry and Fisheries (PRIMAFF) in Japan (Policy Research Institute, Ministry of Agriculture, Forestry and Fisheries (PRIMAFF), 2005). In addition, from the viewpoint that multifunctions of farmland are linked with public utility, some people try to go beyond agriculture which pursues only the function of production and preserve farmland and its multiple functions in urban fringes. The importance of preservation of farmland has been considered from the aspect of functions of farmland. Research on functions and interests in farmland (Bryant et al., 1982; Russwurm, 1977) mainly considers the functions of production (Bryant and Russwurm 1979), protection (Blunden and Curry, 1988; van Oort, 1984), place (Bryant and Johnston, 1992) and play (Coppack et al., 1988; Crabb, 1984), and indicates that in urban fringes many people are interested in functions other than agricultural production (Blunden and Curry, 1988). It has also been argued that increasing the number of functions of farmland largely contributes to the preservation and management of farmland (Bryant and Johnston, 1992). Functions of farmland include public utility which has non-agricultural values. However, the issue of lack of rules which take into consideration the sacrifices demanded from the farmers and the land owners for protecting non-agricultural values of farmland still remains (Bryant and Johnston, 1992).

Meanwhile, official intervention to decide rules on private farmland has largely affected the management of the farmland. Policies to protect farmland are implemented in urban fringes (Trzyna, 1984). The regulations which have impacts on farmland and are most often mentioned with regard to agriculture in urban fringes are land use planning, setting aside for areas of certain land use, and regulations which accompany those measures to regulate operations of land subdividing and various farmland protection

policies. Aspects of benefit and rights on land and the roles of land ownership and land markets (Barlowe, 1986; Bryant, 1972; Goodchild and Munton, 1985) and limitation of private land ownership by official intervention (Barlowe, 1986; Bryant, 1972; Denman and Prodano, 1972) have also been researched. These studies revealed the situation that private farmland has been maintained in the state that the private land ownership is not an absolute right, since private rights can be limited by national intervention to a certain degree.

In other words, rights and benefits of land ownership and land resources are always changing (Grove-Hills, 1990), and new rights on the land are obtained on the market, and also limited for public utility and collective benefit (Braden, 1982). There are also exceptional situations where both public like local governments, local areas, counties, states, provinces and the central government and public department's profit increased according to protection and sustainable development of the land (Munton, 1983b; Phillips, 1985). For example, encouragement of farmers to introduce agricultural techniques which aim to sustain the land forms new public utility in the farmland. If that public utility limits the types and the amount of usable pesticides, chemical fertilizers and so forth, it obviously limits the right. If the right on the land is limited, the market price of the land decreases, and also affects the value of the farmland (Munton, 1983b; Phillips, 1985).

Consideration of various interests is related to consideration of how the people concerned with various issues of farmland react. Among the actors directly concerned with issues of farmland are farmers. Farmers agree with the general principle that good farmland should be reserved for agriculture, but once their own land is going to be developed, they are willing to sell their land (Detwiler, 1980; Macpherson, 1979). It is because they are land owners as well as farmers. Since there are many farmers who have experienced hard times with low-profit agriculture, there may be cases

when farmer groups object to a policy to protect farmland (Detwiler, 1980; Macpherson, 1979). On the contrary, there are situations where farmer groups which aggressively promote policies to protect farmland (Little, 1974). Another group of actors are politicians. Some politicians oppose farmland protection because they are against direct intervention of the government in economy, but some politicians support farmland protection policies for ideological reasons. Since it has been clarified that the attitude of the general public including farmers has significant effect on the adoption of farmland protection policies in democratic systems, it can be said that the general public also plays a role as an actor (Furuseth, 1985a, 1985b). Accordingly, various actors have been involved in farmland protection policies and protection of farmland considerably.

The efforts and methods of official intervention on farmland in urban fringes have been discussed as farmland issues. There are four main types of methods of official intervention: passive regulation like the kind of regulations which attach importance to private property right, and minimize public intervention, persuasive regulation like negotiation between government and farmer, active regulation by legal control, and general and comprehensive regulation by proper use of these regulation (Bryant et al., 1982). Passive regulation is steadfastly conducted in every country (Rickard, 1991), but according to rapid urbanization and economical changes, it turned to persuasive regulation. However, the persuasive regulation generally could not adequately deal with many problems which accompany development of the areas centering around a city, and it shifted again to active regulation. In this method, the central government establishes a centralized system including planning of land use, and it was implemented in the U.K. (Whitby et al., 1974), France (Alduy, 1983; Bryant, 1986), and North America.

However, since the central government did not take into consideration humans, which are the most important factor for considering

the development strategy, such movements have always been criticized for reasons that peoples opinion do not reflect (Frankena and Scheffman, 1980; Gardner, 1977; Gramm and Ekelund, 1975). Recently, there is a movement to conduct general and comprehensive regulation, which is in its early stage now. In a report on an agricultural village development plan of the Netherlands, it is argued that government can be persuasive to farmer and farmer can be cooperative to government appropriately when adopting an active regulation strategy (Kerstens, 1989).

Another general framework regarding the method of official intervention on farmland is how the farmland itself is considered, and Bryant and Russwurm(1982) observe five types of views on farmland. The first type views farmland as the remainder after the land is allocated to other uses, and farmland is viewed as real estate for buying and selling rather than a resource in North America (Bunce, 1984, 1991). The second type views farmland as a special resource. It comes from an idea that farmland has a special position, and mixture of agriculture and other uses is not admitted. The third type view farmland as one of the constituents of the agricultural system. It is linked with the idea which takes preference of agriculture that land should be sustained as a part of the economically and socially viable agricultural system (Daniels et al., 1989; Lapping and FitzSimons, 1982; Lapping et al., 1983; Penfold, 1990).

The fourth type views that farmland supports other functions including amenity and landscapes. The main function of land is considered to be the function to support the landscape as a whole while the land use is agricultural. This idea has been developed from various conditions such as historic and cultural values of agricultural landscapes, aesthetic characteristics of agricultural landscapes, complementary relationship between agricultural landscapes and the natural environment, the fact that farmland is an essential factor in the total configuration of the local landscape centering around a city (Bryant and Johnston, 1992). The fifth

type is a comprehensive view centered on non-agricultural concerns, and views farmland as the land which has the function of agricultural production among many other functions.

The regulations on farmland and views on farmland have been discussed in policy planning to solve the problem of urbanization of farmland. Most of the developed countries rely on the idea that layout of land use through zoning contributes to clarification and promotion of the plans at the level of local societies (Daniels and Reed, 1988; Aitchison, 1989; Berteloot, 1972; Cloke, 1989a; Geay, 1974; Listokin, 1974; Nelson, 1977). Other than those, the detail of various methods used in farmland protection policies has already been discussed and commented in many studies (Cloke, 1989; Coughlin et al., 1977; Corbett, 1990; Dawson, 1984; Furuseth and Pierce, 1982a, 1982b; Goldman and Strong, 1982; Held and Visser, 1984; Rose, 1984; Trzyna, 1984).

In summary, conventional research mainly discusses private farmland from the aspect of farmers' means of livelihood focusing on farmland resources, markets, sustainable systems of agriculture and sustainable systems of agricultural villages that is a village where most of the residents do agriculture as a means of livelihood, agricultural management entities and agricultural entrepreneurs, functions of farmland and official intervention on farmland. Public farmland is taken up as a subject in very few studies, and the function of leading the expansion of a city, the function of greenbelts and green wedge areas to support leisure and recreation, and partially the function of protection of resources of agricultural villages are discussed (Bryant and Johnston, 1992). However, most of users of greenbelt benefit from the function of recreation and the function of environmental protection. According to public comments in the U.K., people place importance on means of controlling the expansion of the city (Munton, 1983; Strachan, 1974; Thomas, 1970). Therefore, research on greenbelts in the UK focus on control of urbanization, prevention of mergers

of cities and preservation of the cities' own characters (Elson, 1986). In addition, it is mentioned that for the purpose of public intervention in agricultural areas, public security and compensation for farmland will become necessary in the near future for agriculture in any of the following three types of agricultural areas: agricultural degeneration, agricultural adaptation and agricultural development, but there is no research which discusses the publicly secured farmland in detail (Bryant 1984b, 1986).

However, as Bryant (1984b, 1986) mentions, public acquisition of farmland is now found with some policies for sustaining farmland such as Minuma rice fields public land promotion policy of Saitama prefecture, "Yokohama Green Up Plan (new and expanded policy" of City of Yokohama. It implies there is the situation that farmland cannot be maintained unless private farmland is publicly purchased because of abandonment of cultivation and payment of inheritance tax. There is a contradiction that publicly obtained farmland can be diverted to various usage such as parks and schools, but if the government which includes national, prefectural and municipal does not decide to sustain it as farmland and fails to establish a system to sustain it as farmland, the public farmland cannot be maintained healthily, and this will result in an increase in abandoned fields and rice paddies. The government commissions maintenance and management to civic groups, residents, corporations, Agriculture & Forestry Corporations to sustain public farmland. The public utility of multiple functions of public farmland is expected to receive more and more attention for the reasons of leisure of people, environmental protection and education from now. The era of declining population and aged societies is arriving in many developed countries including Japan, and it is expected that more importance will be attached to the roles of farmland in suburban areas as local resources such as the functions that local residents can enjoy, in addition to the role of environmental preservation. It is required to sustain the farmland by effective use of it considering the functions of the public farmland as local

resources, the managing /maintaining entities (use by diversified entities) and the purpose of use (e.g. nonindustrial usage which does not pursue profit) from now. It is considered that the public farmland in suburban areas will play many roles as an open local resource for people. It is therefore, imperiously necessary to study the sustainable management system of public farmland in suburban areas from now.

2. Purpose of this research

The purpose of this research is to clarify the management system of public farmland. The definition of the terms used in this research is given below. The term "a metropolitan area" is widely used in disciplines such as geography and urban/ rural planning, but there is not any precise definition, and it is used according to each research or each example. However, it is commonly used to indicate the close and peripheral area of a "city" (the Japanese word which indicates a suburban area, "Kinkou," includes a Chinese character which means the area outside of, but close to the wall of an ancient city state). The difference in usage depends on the definition of the concerned "city" or the scale of it. In this research, a "city" is considered to be an existing urban area in city regions such as a metropolitan area, and the area on the outer edge of the existing urban area is called "an urban fringe"; such an area of the world's largest cities is called "a metropolitan area."

Farmland indicates the "land which is used for the purpose of cultivation. (Dictionary of agricultural statistics 1975)" Therefore, orchards, pastureland, nursery gardens, wasabi fields, lotus ponds, et al. are also included in farmland if they are preserved and properly managed for cultivation. In addition to the currently cultivated land area, any plot with potential to be cultivated anytime, idle fields and non-cultivated land which are objectively recognized to be used for cultivation are also included in the

farmland area even if the land is not cultivated at present (Dictionary of agricultural statistics 1975). In other words, land is considered to be farmland if it has potential to be cultivated in the future regardless of whether it is currently used for production or not. Public farmland indicates the land owned by public organizations, and management of public farmland designates private farmland which cannot be managed by individual farmers because of abandonment of cultivation and payment of inheritance tax and is acquired by public organizations, and managed in such a way as to preserve its agricultural potential.

Next, the management system of public farmland, which is the purpose of this research, is defined below. According to systems theory regarding agriculture (Bryant and Johnston, 1992), each agricultural management entity is a management system which functionally integrates various factors such as planning of all kinds, Land which indicates farmland, Labor which indicates farmers and agricultural workers including employers, Capital which indicates the fund required for starting and maintaining agriculture, Management which indicates to conduct agriculture continuously in a planned way into one system. However, the capital and the management of public farmland are more stable than those of management entities of individual farmers because they are conducted by strategic policy of public organizations. Therefore, in this research, attention is focused on the organic relationship among the factors of planning, land and labor, as a management system of the public farmland, and the influence that exerts over the functions of public farmland as a whole. Capital and management are mentioned with regard to the administrative policies of Saitama prefecture, Saitama city and Kawaguchi city, but in the management system of public farmland, they are considered to be more stable factors than individual farmers, and disregarded. In this study, the planning is replaced with the purposes of activities, and the land is equated with the public farmland. Since the public farmland is not used

for private profits, labor is replaced with leisure activities, educational activities.

Among the types of activity described in this research there is "hands-on farming experience". "Agriculture" can be summarized as "industry of growing animals and plants by working on the land to produce profits," and "farming" as "the activities of growing animals and plants by working on the land" based on the definitions of "agriculture" and "farming" in agriculture, folklore and other disciplines (Nakao 2004; Kashiwa 1962; Krzymowski 1954); Tsuno 1975). Therefore, "farming," can otherwise be summarized as the cultivation itself by working on the land while the cultivation which produces profits is "agriculture." Based on the summaries above, "hands-on farming experiences" can be defined as activities of cultivating crops for purposes other than profits by Agriculture & Forestry Corporations, non-farmers. In addition, the entities which are concerned with public farmland through various activities are classified below. The public organization which owns the land is called the "land owner entity," the entity which preserves and manages the land commissioned by the land owner entity is called "management entity," and the entity which participates in the activities implemented by the land owner entity and the management entity and uses the public farmland is called "user entity." In addition, "land owner entity," "management entity," and "user entity" are called "managing entities" as a whole. And "Sustainable" in this dissertation indicates that it is possible to continue the management or that it is possible to maintain continuously.

3. Research framework

As a framework for researching the management system of public farmland, the research is conducted from the 3 viewpoints of planning, land and labor. Planning is conducted by the land owner, the management entity and the

user entity in cooperation, and the types of activities is linked to be the complex of functions of the farmland. Land refers to the public farmland. Labor indicates the activities of implementing the plans for management of the farmland by the managing entities, and includes the relationship among such entities. In order to study the organic relationship among the three factors above, the present research focuses on the relationship among the managing entities and the way the activities of the managing entities and the public farmland are related to each other. In addition, paying attention to the multifunctionality of public farmland of a metropolitan area, how the management entities decide the types of activities in order to enhance the multifunctionality of farmland is reviewed. By analyzing the relationship between the usage of the public farmland and the multifunctionality of farmland enhanced by such activities, the management system is clarified.

1) Main functions of and interest in farmland

Table 1-1 shows private interests and collective interests from the point of agriculture by main functions of farmland (Bryant and Johnston, 1992). It views private/public farmland from the viewpoint of agriculture, and it is considered that some points are common with the public farmland and other points are not.

In the case of public farmland, the crops to be privately distributed on the market are not cultivated normally and market-oriented production is not pursued. However, the productive function of public farmland fits the demand of the people who are not farmers and are therefore satisfied at the level of hobby. People who are not able to try their hands at farming in daily life can participate in these hands-on farming experiences easily, and can also interact with local farmers and the groups which implement these activities. It is also expected to result in maintenance and fostering of agricultural population and local agricultural communities. In addition, the productive system is sustained by the help of people who consider the

hands-on experiences of agriculture as recreation and learning. Regarding the functions of protection of farmland, the same functions as in Table 1-1 are seen with the public farmland. Since sustenance of archetypal images is one of major social challenges in Japan, addition of sustenance of archetypal images is considered important. Regarding the functions of PLACE, since land focused on in this research is public farmland, it cannot be personally used for commercial, industrial, or residential purposes. Therefore, the functions of PLACE are not exerted within the public farmland as mentioned by Bryant and Johnston (1992). The functions of play of public farmland are similar with those in Table 1-1 except the agricultural management and business activities on private farmland. In addition, as seen in the School children's farm, some educational institutions use public farmland for educational activities, and it may be said that farmland also plays an educational function. Based on the above, private and collective interests in public farmland by broad function are described in Table 1-2.

2) Relationship between functions of farmland and the type of activities

By purposes of activities, multiple functions of public farmland are fulfilled. For example, in the type of activities of hands-on farming experiences, the following functions of farmland are exerted: production through farming operations, protection such as preserving the environment and wildlife habitat, recreational function for people participating to such activities as a hobby, education because they acquire knowledge and experience through these activities. The functions exerted always vary according to the situation such as the participant, the instructor, the type of activities even if the purpose is the same. In other words, the purpose of activity is a complex of functions.

The present research is original in its attempt to identify the multiple functions in the type of activities promoted, and to elucidate which

functions the managing entities seek from the use of public farmland and it is expected to bring a meaningful contribution to the research of the management system of public farmland.

II . Project of public land ownership at Minuma rice fields

1. Outline of Minuma rice fields

By Minuma rice fields, the local administrative office normally indicates the farmland on the tongue-shaped swale which is surrounded by Omiya upland. This research also refers to Minuma rice fields as the deer-horn-shaped area formed by the line of farmhouses, which was used as a guideline for defining Minuma rice fields by the administrative office. Minuma rice fields span over two cities, Kawaguchi city and Saitama city at the southern central part of Saitama prefecture. It is within 20-30 km from Tokyo, spreads about 14km from south to north with the circumference of about 44km and the area of about 1,260ha (Figure 2-1). Minuma rice fields are a lowland area with an altitude of about 5m, surrounded by uplands: Omiya upland and Angyo upland made of Kanto loam, whose altitude is 10~15m. Minuma substitute drains (Minuma-daiyousui) supplies agricultural water to Minuma rice fields, and Shiba river (Shiba kawa) at the center is used for draining the agricultural water.

2. The opportunity of public ownership promotion project at Minuma rice fields

This chapter is described based on interview with Agriculture & Forestry Corporation and Agricultural Business Support Division, Department of Agriculture and Forestry, Saitama Prefecture. According to interviews with Land and Water Management Division of Saitama Prefecture, Shiba river, which runs through at the center of Minuma rice fields, had overflowed repeatedly, and at the time of the typhoon No. 12 in 1958 (Kanogawa typhoon), large scale damage occurred including flooding all over the Minuma rice fields and inundation of most of the urban area of Kawaguchi

city, which is at the downstream area of the river (Figure 2-2). At that time, almost all area of Minuma rice fields looked like a dam lake, and the amount of flood water was estimated to be about 10 million m³. In other words, if there was not the water storage function of Minuma rice fields, it is expected that the damage in Kawaguchi city would have exceeded immersion above the floor level, and many lives could have been endangered. After this Kanogawa typhoon, the water storage function of Minuma rice fields was reviewed, and administrative guidelines which prohibits diversion of the farmland of Minuma rice fields was issued by Mr. Kurihara, Governor of Saitama prefecture in order to stop development of agricultural land for housing, a process very active in the urban fringe on 1958.

Mr. Kurihara considered that if development of Minuma rice fields for housing proceeded continuously, the residents living in the downstream area could not avoid the damage from the flood. In other words, development for housing would deteriorate the water storage function, and the urban area in the downstream area would suffer the flood damage again, or suffer severer damage. Governor Kurihara therefore instructed the River Division of Saitama Prefecture to review and promote the river improvement plan, and the Agricultural Policy Division of Saitama Prefecture to prohibit diversion of the farmland of Minuma rice fields in order to stop the foreseeable development of Minuma rice fields for housing. Based on the governor's instructions, Saitama prefecture started the reclamation for housing control measures, and by explaining the risk of floods and the necessity of the area as water storage they persuaded the applicants to cancel their applications for diversion of the farmland (even if the application was legal when they came to receive permission based on the Agricultural Land Law). However, because of the soaring land prices in the urban area, the number of cases seeking the land for housing and plants in Minuma rice fields increased from around 1963, and the tendency of urbanization became more acute at the time of Tokyo Olympic, so that more

powerful regulations were required (Land and Water Management Division of Saitama Prefecture).

It was considered that the measures controlled only by the Agricultural Land Law were too weak, so that issues concerning the effect of Higashi-urawa station by the new installation of Musashino line, and the plan regulating pond of a large-scale, et al. were raised at the prefectural government council in December 1964. At the next prefectural government council held in March 1965, Governor Kurihara, who was listening to the remarks of the committee members, stopped them for a while, and he himself wrote the "Minuma rice fields farmland diversion policy and distributed it to the committee members. The principles were voted on the spot, and the Minuma rice fields farmland diversion policy took effect. The Minuma rice fields farmland diversion policy, which were again at the 5th prefectural government council held on March 5, prescribe that in the area north of Hacchobori, which exists on the south side of Minuma Tsusenbori and between the prefectural road Urawa Iwatsuki line and the cofferdam, the farmland should be preserved as is for future development plans in principle. On the other hand, in the area north from the prefectural road Urawa Iwatsuki line, development should be admitted if the plan is appropriate. However, abided by the policy above, it is considered that, if there is any hindrance to the Shiba river improvement plan to modify drainage of Shiba river, then diversion of the farmland is not allowed.

The Minuma rice fields farmland diversion policy was epoch-making as a policy to protect the water storage function, but it admitted development of the area north from the Daido bridge (Daido bashi), and the administrative guidance which approves overexploitation of the area 1 km from Omiya station and 1.5 km from Yono station from 1965 to 1969 was deployed, resulting in some public facilities and even many houses being constructed. However, tilt of the houses occurred on the land which used to be ponds and swamps because of several floods and soft ground.

The City Planning Law was revised in June 1969, and according to it, "The Revised Minuma rice fields farmland diversion policy" was decided by the prefectural government council on November fifth, 1969 for further preservation of water storage function and strict control of the development. The revised version prescribes that the all area should remain urbanization adjustment area, and the farmland in the area north of Hacchobori and between the prefectural road Urawa Iwatsuki line and the cofferdam should be managed by the administrative guidance and public purchasing of the land, while the farmland in the area north from the prefectural road Urawa Iwatsuki line should be preserved as much as possible, regulated by the City Planning Law and the Agricultural Land Law. By the Revised Three Principles, it was decided to preserve the farmland in the northern area from Daido bridge, and at the same time, more aggressive public purchasing of the land was decided. In addition, in December 1975 "farmland" was defined as permanent vacant spaces which do not interfere with water conservation. On this occasion the Minuma rice fields development regulation board, which included the River Division, the Farmland Division was established, and diversion of the farmland for development was prohibited unless the plan passes the examination by the board. There was development of some public facilities exceptionally, but the Minuma rice fields farmland diversion policy gradually became like an unwritten law, and have controlled the development of Minuma rice fields as a whole.

Since 1990s, the pressure for development of Minuma rice fields increased because of the progress of urbanization and the change in the farming environment (Land and Water Management Division of Saitama Prefecture). At the same time, there were new viewpoints and voices which request development as a large-scale farmland area, which is scarcely left in the metropolitan area. Specifically, Minuma rice fields farmland diversion policy requested cooperation mainly to farmers, but it became necessary to develop a new policy for the joint preservation, management,

and use of the Minuma rice fields by farmers, local residents including land owners, the urban residents and the administrative office in cooperation. In such circumstances, Saitama prefecture set the Minuma rice fields land use council in December 1991, considered the land use of Minuma rice fields comprehensively, and decided on a "Basic policy for preservation, management, and use of Minuma rice fields" (hereafter called the new basic policy), which is a new standard for land use that substitute "Minuma rice fields farmland diversion policy." Then, The Revised Minuma rice Fields Farmland Diversion Policy became invalid, and the new basic policy took effect instead of it. The basic policy is roughly divided into 3 parts.

The first part prescribes the land use of Minuma rice fields as farmland, parks, green area, et al. preserving the function of water conservation. The second part prescribes that Saitama prefecture, Kawaguchi city, the former Urawa city and the former Omiya city should preserve the high-quality farmland environment such as urban parks, should positively lobby at the national level to improve the safety of water conservation, and try to comprehensively promote agriculture and sustain the woods on the slope land. The third part prescribes the need to take the land into public ownership if the land use is remarkably limited by the new basic policy. In addition, the land use admitted in the Minuma rice fields is specified such as farmland, parks, green areas, et al., and the standard is set for each of them. When using the land for those land uses, it is compulsory to submit land use request prior to the legal procedure, which is then communicated and adjusted at the land use liaison conference composed of Saitama prefecture, Saitama city, Kawaguchi city, and for important cases, and to hear the opinion of the land use council composed of academic experts, et al.. The basic policy also clearly describes ways to preserve the functions of land: cultivation of aesthetic sentiments, leisure and relaxation, environmental preservation, rural landscape amenity, food production and supply, provision of wildlife habitat, education through

hands-on farming experiences in addition to the function of water conservation.

3. Public ownership promotion project

The Public ownership promotion project in Minuma rice fields was prepared in 1995 at the same time as the new basic policy, but because of adjustment to the Agricultural Land Law, preparation of specific acquisition method and the management system after acquisition were not ready, it was not possible to actually purchase the land. The Minuma rice fields land use liaison conference, composed of Saitama prefecture, the former Urawa city, the former Omiya city and Kawaguchi city considered the method to achieve public land ownership and the management method in 1997, and it became possible to actually purchase the land as a public owner in 1998. It is called Minuma rice fields public ownership promotion project. The financial resource for purchasing land is the Saitama environment preservation fund. Saitama prefecture started to raise the fund in 1993, targeting 10 billion yen, and because the agreement that the former Urawa city, the former Omiya city and Kawaguchi city contribute 1.7 billion yen each to the fund was made on February 5, 1996, the target was increased to 15.1 billion yen. The total accumulated amount is 12.81 billion yen as of March 31, 2010, and the balance of the fund is 10.05 billion yen. The total number of applications from landowners willing to sell land for the project was 100 as of December 2009, and the actually measured area was about 1,732 a in Saitama city, and about 216 a in Kawaguchi city, which was about 1,948 a in total.

With the Minuma rice field public ownership promotion project, all landowners' requests for purchasing are accepted if the land is within Minuma rice fields and it complies with the standard of the Minuma rice field public ownership promotion project. There are three requirements for purchasing. The first requirement is that the original purpose of use of the

land cannot be achieved because it is significantly limited by the new basic policy although it is expected to obtain the authorization for the land use based on various laws and regulations. In other words, public purchase of the land in this case has a meaning as a compensatory measure for inability to buy and sell farmland freely although they have private land ownership. The second requirement is that the land may be used for purposes which do not comply with the new basic policy because of inheritance. Giving up farming by farmers is the condition for purchasing. The third requirement is when the governor admits it is necessary. However, there has been no case where the land was taken into public ownership based on the third requirement yet. In other words, purchasing based on the first or the second requirements has been conducted as of December 2009. Most of the purposes of application are to apply for purchasing by Saitama prefecture as a compensatory measure because the land owner is in the situation that the land has to be sold to pay the inheritance tax, but the development of the land is not allowed because the land use does not conform to the new basic policy (although it was originally allowed based on previous laws and regulations).

The changes in land registers which were applied for public offering of purchasing show that, in 1998, which is the year the application started, not much land that was purchased, but that, in 1999, there was a marked increase, with the largest area of rice fields purchased. The total area of fields purchased was second largest in 1999 which is the peak in terms of area of land purchased. This can be explained by the possibility that the land owners of Minuma rice fields who wanted to relinquish the land recognized the benefits of the long-awaited Minuma rice field public ownership promotion project, and applied at once, although it took time for land investigation, application procedure and purchasing to be proceeded. The number of applications reduced temporarily in 2001. All of rice fields, fields, and the other land categories were purchased from 2002 to 2007.

However, the other land categories were not purchased in 2008, and rice fields were not purchased in 2009. After peaking in 1999, the number of applications has been decreasing, and there is a downward trend as a whole. The number of applications and the purchased area have increased and decreased repeatedly according to the changes in the social situation around Minuma rice fields and the situation of the local landowners/farmers. Rice fields and fields are mainly purchased, and the situation of application varies according to occurrences of inheritance tax and therefore changes randomly (Figure 2-3). However, since the land is purchased if requirements are satisfied, the total purchased area is expected to resume its upward trend in the near future.

The public farmland gained by Public ownership promotion project is managed and maintained by Saitama Agriculture & Forestry Corporation (hereafter called Agriculture & Forestry Corporation) and civic groups commissioned by Saitama prefecture. The land commissioned to each civic group is an intensive small area and they have their own places of activity. On the other hand, the land commissioned to Agriculture & Forestry Corporation is distributed in wide areas because they are in charge of the public land which is not managed and maintained by civic groups (Figure 2-4).

The number of civic groups which are commissioned to maintain and manage the land by Saitama prefecture is five. Among them, the group which is commissioned the largest area is Ground Work Kawaguchi (Table 2-1). Therefore, Agriculture & Forestry Corporation and Ground Work Kawaguchi are the main focus of the present research.

III. Maintenance of public farmland by Saitama Agriculture & Forestry Corporation

1. Outline of Agriculture & Forestry Corporation and activities on the public farmland at Minuma rice fields

This chapter is described based on interview with Agriculture & Forestry Corporation and Agricultural Business Support Division, Department of Agriculture and Forestry, Saitama prefecture. Saitama Agriculture & Forestry Corporation operates for the purpose of development of the agriculture in Saitama prefecture, rationalization of possession of farmland, fostering young farmers, securing new farmers, forest improvements. Since Minuma rice field public ownership promotion project of Saitama prefecture started in 1998, maintenance and management of the public farmland in Minuma rice fields are commissioned by the Agricultural Policy Division of Saitama prefecture to the Agriculture & Forestry Corporation.

The progress of maintenance and management activities of the public farmland by Minuma rice field public ownership promotion project shows that the activities, except mowing and landscape-amenity crops, which involves citizens, residents and educational institutions as the maintenance/user entities has been gradually increasing (Figure 3-1).

The activity started with mowing in 1998, landscape-amenity crops and hands-on farming experiences started in 1999, Communion (Fureai) farm for residents of the prefecture in 2003, Agricultural prep school in 2005, and School children's farm as one of hands-on experiences of farming, in 2009.

Mowing was conducted first after the management of the public land was commissioned. According to the Agriculture & Forestry Corporation, they were requested to utilize the land effectively regarding the manage find a way to manage the land effectively by Saitama prefecture, and they were still searching for the best solution. Therefore, only mowing

was conducted during the first year. Mowing has been conducted continuously since then. It is because the area of the public land to which they were commissioned from Saitama prefecture, and while they were searching for the way to manage the land, mowing had been the only activity during the first year. Since then, mowing has been conducted continuously so that the land is kept as farmland and can be tilled anytime. They introduced landscape-amenity crops and hands-on experiences of farming as new attempts in 1999. Cultivation of landscape-amenity crops is conducted only by the Agriculture & Forestry Corporation. The crops are cultivated to improve the landscape, and the purpose is not the sales of the cultivated crops. Rape blossoms, sunflowers, cosmos, *Lippia repens* and clovers were grown.

There are three types of hands-on experiences of farming: harvesting experience, planting and School children's farm. Such farming experiences were held as events for citizens, and the crops for the experiences have been sweet potatoes (since 2000), potatoes (since 2004), autumn potatoes (only in 1999) and autumn vegetables (only in 2002). School children's farm has been held since 2009 as a program for educational institutions. It started because "Saitama green school farm promotion policy" was laid down in October 2008. The learning opportunity through actual farming experiences along with the other educational programs is provided for children from local educational institutions.

Communion (Fureai) farm was introduced to provide a chance to rent residents of the prefecture a plot of land and experience farming there, and 99 lots were rented as of 2010. The purpose is to maintain and manage the farmland while providing recreation opportunities for prefectural residents. Agricultural prep school was opened to foster young farmers, which is one of the purposes of Agriculture & Forestry Corporation. The Agriculture & Forestry Corporation instructors teach agricultural techniques to the students at the training field, and the students learn

agriculture through practical training at the lent farmland. The training field and the farmland lent to the students are all public farmland of Minuma rice fields, and the system also contributes to maintenance and management of the farmland (Agriculture & Forestry Corporation).

Among the seven management categories of public farmland, the area of landscape amenity crops has become largest since 2002, and the next largest category is mowing. According to the Agriculture & Forestry Corporation, mowing is the simplest management method, as it provides the maintenance and management without actually using the land for farming, but the Corporation's policy is to keep mowing at the minimum level, and increase the cultivation of landscape-amenity crops, which is the second easiest land management technique. In order to host the hands-on farming experiences, the Agriculture & Forestry Corporation have to undertake various tasks such as printing and distribution of flyers, development of and preparations for the hands-on farming experiences, the activities on the day and the working load on Agriculture & Forestry Corporation is heavy. In addition, as part of Communion (Fureai) farm for residents of the prefecture, Agriculture & Forestry Corporation monitors if the residents maintain and manage the farm well. Therefore if the area that they need to monitor expands, the burden of Agriculture & Forestry Corporation also increases. Therefore, the area used as part of Communion (Fureai) farm has slowly been decreasing. On the other hand, Agricultural prep school has been positively promoted and the area has been increasing because the students who learn agriculture help maintain and manage the public farmland, which resultantly eases the burden of Agriculture & Forestry Corporation for managing the public land. In this sense, it is also suitable for the original purpose of establishment of Agriculture & Forestry Corporation that they aim to foster young farmers.

2. Types of activities and their meaning

Mowing (Figure 3-2) is the only activity that has been conducted continuously since 1998, when the management of public farmland was first requested by Saitama prefecture. Mowing is conducted to remove weeds so that the land can be used as farmland when needed, and so that it can be tilled as necessary. Because of the purpose of Agriculture & Forestry Corporation to rationalize possession of farmland, one of the purposes is to manage the public land as farmland that can be used for production, and the land must be preserved to be land for cultivation, which can be tilled anytime even if it is not cultivated as of now. In that sense, mowing is a means of management which requires minimum workloads for keeping the land as productive farmland.

The **landscape-amenity crops** (Figure 3-3) are planted after mowing, and managed as crops to improve the landscape without harvesting or removing of landscape-amenity crops. Another reason for cultivating landscape-amenity crops is to prevent a reduction in soil fertility by planting organic matter. Cultivation of landscape-forming crops is more troublesome for Agriculture & Forestry Corporation than mowing because the works are conducted according to the seasons of cultivation of landscape-forming crops, but as the fact that the largest area has been used for cultivation of landscape-forming crops since 2002 shows, it is a main land use of Minuma rice field public ownership promotion project. Since only mowing is not productive alone, and landscape-amenity crops represent cultivation of crops to some extent, and also contribute to landscape amenity, Saitama prefecture promotes landscape-amenity crops and has been trying to keep mowing to a minimum for effective uses of farmland.

Therefore, **hands-on farming—experience activities** have been implemented since 1999 in addition to landscape-amenity crops. As of 1999

there were two types of hands-on farming activities: harvesting experiences and growing experience. The purpose of these activities is to attract participation of local citizens, and the Agriculture & Forestry Corporation provides the opportunity of such hands-on farming experiences with the citizens. Harvesting and growing experience are provided year-round from 9 a.m. to 3 p.m. at public farmland. Potatoes planting and harvesting experience, and sweet potatoes growing (one time) and harvesting experience (two times) have been provided in 2010. Agriculture & Forestry Corporation provide the information on the hands-on farming activities by placing flyers at various institutions and neighboring educational institutions, and the people have to apply in advance to participate (Figure3-4).

The flyers placed at the above-mentioned institutions play a role of providing information mainly to citizens and neighboring residents, and 50 copies are placed every year. At the educational institutions, the target is children who wish to learn through practical experiences, and flyers for all students are distributed (Table 3-1). Citizens and neighboring residents also participate, but most of them are children from local nursery schools and kindergartens and their parents. The participants in the planting experience of potatoes have priority in harvesting potatoes. On the contrary, crops are given to the participants in the harvesting experience of sweet potatoes even if they did not participate in the planting experience, so more people participate in the harvesting experience of sweet potatoes (Table 3-2). The seeds and seedlings of potatoes and sweet potatoes are financed from the budget of Saitama prefecture. In addition, a lot of preparations such as provision of information, communication with participants, purchasing seeds and seedlings, tillage are required, so this is an activity which puts heavy burden on Agriculture & Forestry Corporation. Therefore, the Corporation does not intend to expand the hands-on farming experiences, but since the activity is popular among citizens, it is continued.

Ninety-eight plots of land are provided as **Communion (Fureai) farm for residents of the prefecture** as of 2010, and the residents, workers or students in Saitama prefecture who can manage the plot on a daily basis are eligible. The participants are able to choose from two types of plots, i.e., the plot for individuals and beginners and the plot for people with experience and seniors. Most of the plots are small, and are let mainly to individuals and beginners, for recreational/hobby farming. A hundred tsubo of Communion (Fureai) farm, are reserved for groups with previous farming experience and seniors, and the size of a plot is comparatively larger (Figure 3-5). The other plots can be used by any people including individuals, beginners, people with experience and seniors, if they win the lottery. The annual charge for use varies according to the size of the plot, and it ranges from around 10 thousand yen to 30 thousand yen per year (Table 3-3). Because of the reasonable charge for use, there are always many applicants, and they are chosen by drawing lots.

If Agriculture & Forestry Corporation judges that it has been used nicely throughout the year, the right to use the plot is automatically renewed for the next year. Therefore, applications are not sought for every year. The Communion (Fureai) farm is managed by the users as a recreational/hobby farm, so each person can plant crops freely. The Agriculture & Forestry Corporation always patrols to monitor to ensure that the fields are not left idle and that crops are cultivated by the users throughout the year. Seedlings of spring and summer vegetables are sold at the headquarters of the Agriculture & Forestry Corporation in late April to promote cultivation by the users, and consultation on cultivation is provided by the Agriculture & Forestry Corporation. In addition, the Agriculture & Forestry Corporation provides instruction about cultivation as necessary. Because of the reasons above, Communion (Fureai) farm for residents of the prefecture requires support from Agriculture & Forestry Corporation for the users such as instruction and consultation on

cultivation throughout the year, so the detail of its activities does not lighten the workloads of Agriculture & Forestry Corporation.

At the training farm, agricultural techniques are taught to applicants by an instructor of the Agriculture & Forestry Corporation, and beginners' classes, intermediate classes and advanced classes are provided. The purpose is to provide hands-on farming experience, to foster independent agricultural managers and secure new farmers. Agricultural technique training is provided throughout the year. Neighboring farmers and farming corporations are requested by Saitama prefecture to participate in the agricultural technique training as instructors in order to lend agricultural heavy equipment and to teach students how to use them. The annual schedule of the agricultural prep school as of 2011 is presented in Table 3-4. The classes are held by instructors at the Miura training field except when the opening ceremony is held in January, and when a lecture on basic techniques is offered in February (Figure 3-6). The students can practice agriculture according to the instructions at the allocated public farmland in Minuma rice fields. The eligible people are not limited to residents of Saitama prefecture as demonstrated by the fact that there are participants from Tokyo Metropolis (Table 3-4).

Many of the students of Agricultural prep school are seriously trying to learn agriculture, and aim to become farmers. Therefore, there are many students who enter the Agricultural prep school with some previous experience of agriculture, a certain level of knowledge of agriculture and interest in agriculture. It is assumed that people with a high awareness of farming issues tend to participate in the Agricultural prep school and acquire special knowledge there, and that some of them may help cultivate public farmland at Minuma rice fields. In other words, participants who can use farmland effectively from the perspective of agricultural production sustain and manage the public farmland in Minuma rice fields, and the burden on Agriculture & Forestry Corporation is thus light. In addition,

such activities are suitable to accomplish the corporations' purpose of fostering farmers. Therefore, Agriculture & Forestry Corporation plans to promote the Agricultural prep school further, and to expand the area of public farmland commissioned to it.

School children's farm started as one of the hands-on farming experiences in 2009. "Saitama green school farm promotion policy" was formulated in October 2008, and "Saitama green school farm promotion manual" was prepared in February 2009, and has been implemented since April 2009. Students from elementary and junior high schools in Saitama prefecture are eligible. The purpose of School children's farm is to educate children through hands-on farming experiences. The annual activity plan shows that it is linked with subjects like life environmental studies, social studies, science and integrated learning period, and the activities are conducted as an integral part of the curriculum. Six hundred and ninety-seven elementary schools and 232 junior high schools have participated in the School children's farm, and there are school children's farms for three schools in Minuma rice fields. School children's farms aim to provide activities about food and nature, and to cultivate participants' aesthetic sentiments through practical farming experiences.

Among the School children's farms at Minuma rice fields, the example of Omaki elementary school, whose scale is the largest, is well-known (Figure 3-7). The example of Omaki elementary school shows that the activities of growing crops at School children's farm are conducted by students from the 1st grade to the 6th grade throughout the year, and the practical activities are linked with the other subjects such as science, home economics and social studies. In this sense, the farmland provides school children with living educational materials. There are some activities which encourage children to cultivate the vegetable they prefer, considering the importance of the initiative of children important. In addition, there are

weeding as voluntary activity during summer vacation and cultivation of crops which are treated as extracurricular activities (Table 3-5).

Finally, the annual schedule of the Agriculture & Forestry Corporation by type of activity (Table 3-6) is explained below. Mowing is conducted as necessary according to the state of growth of weeds except the period of February to March when weeds grow slower. The landscape-amenity crops are cultivated according to the season of each crop. Crops with different blossoming seasons are chosen. For hands-on farming experiences, potatoes and sweet potatoes are chosen because they are popular among user entities and as their harvesting seasons are different, it is possible to avoid the situation that the activities overlap. For School children's farm, the Agriculture & Forestry Corporation implements mowing, tillage, mulching as necessary to help cultivation of crops by educational institutions, but cultivation is conducted by the educational institutions throughout the year. Since, though the Communion (Fureai) farm for residents of the prefecture as a user entity, the land is cultivated throughout the year, the activities of the Agriculture & Forestry Corporation are limited to management operations such as recruitment of user entities, collection of charge for use, farm management, which is mowing of the commonly used area.

The Agricultural prep school as a user entity also cultivates land throughout the year, and they support the other user entities by conducting mowing, which is one of the management operations. Among the types of activities implemented by the Agriculture & Forestry Corporation, mowing, landscape-amenity crops and hands-on farming experiences except School children's farm, managed by the Agriculture & Forestry Corporation, are conducted depending on the type of activities and according to needs, but for School children's farm, Communion (Fureai) farm for residents of the prefecture and Agricultural prep school, where user entities manage operations, activities are implemented by the user entities throughout the

year. This "rotation" ensures that land management activities are almost always implemented in some area of public farmland while diminishing the burden of the Agriculture & Forestry Corporation (Table 3-6).

3. Relationship between the type of activities and the managing entities

1) Relationship between land owner entities, management entities and the type of activities (1998)

Since the land owner entity, Saitama prefecture, cannot conduct both of management of the public farmland and the normal operation of the local government office because of too much workloads, Saitama prefecture commissioned management of the public farmland to the Agriculture & Forestry Corporation. Saitama prefecture considered that the purpose of the Agriculture & Forestry Corporation is suitable for promote the new basic policy at public farmland in Minuma rice fields. The Agriculture & Forestry Corporation consults with Saitama prefecture to decide the type of management operations conducted on the public land, and only starts the actual activity after the type of operation is agreed upon. In 1998, the policy to make the public farmland production-oriented were decided by discussions about the orientation of management, between Agriculture & Forestry Corporation and Saitama prefecture taking the purpose of Agriculture & Forestry Corporation into consideration. However, the actual specific details of activities were not decided then, and mowing was implemented because preparations for tillage come first in order to make the farmland productive (Figure 3-8).

Mowing was conducted by a staff member of Agriculture & Forestry Corporation using a tractor for mowing. The year of 1998 ended only with mowing, but Saitama prefecture and the Agriculture & Forestry Corporation discussed about what kind of activities that should be conducted from the following year many times throughout the year. The

result led to agricultural productive activities in 1999 and later.

2) Relationship among managing entities and the type of activities (2010)

Agriculture & Forestry Corporation and Saitama prefecture were still discussing the type of activities to implement, and landscape-amenity crops, hands-on farming experiences, Communion (Fureai) farm for residents of the prefecture and Agricultural prep school were activities added in 2010. Mowing and landscape-amenity crops are the activities conducted only by Agriculture & Forestry Corporation. Hands-on farming experiences provide harvesting experience, growing experience and offer the similar activities at the School children's farm. For harvesting and growing experience participants are solicited from neighboring residents and citizens.

In the case of the School children's farm, public farmland is lent to educational institutions as part of School children's farm in order for them to cultivate crops. Agricultural corporations participate as technical providers, and support the students who try their hand at farming. Agriculture & Forestry Corporation solicits for Communion (Fureai) farm participants from residents of the prefecture, and farmland plots are provided to the applicants. The people who actually cultivate at Communion (Fureai) farm participants from residents of the prefecture are the people who applied and won the lottery. The Agriculture & Forestry Corporation solicits neighboring residents and citizens for Agricultural prep school, and the applicants become the students. One of the purposes of Agricultural prep school is to foster farmers, and it provides its service not only for hobby. Therefore, the agricultural corporations which are requested by the Agriculture & Forestry Corporation adding to the Agriculture & Forestry Corporation participate and instruct the students in agriculture. As described above, mowing and landscape-amenity crops appeared in the early period and were conducted by Agriculture & Forestry Corporation. Only the activities which provide opportunities of hands-on experiences of

agriculture to user entities were added in the latter period (Figure 3-9).

4. Type of activities and public farmland

The type of activities allocated to each lot of public farmland shows that only one category of activity is allocated to one plot of public farmland in 1998 because only mowing was performed then. Allocation of one activity to one plot has not changed although the number of categories of activity has increased to five as of in 2010 (Figure 3-10). In other words, only one category of activity is allocated per plot of public farmland, and the purpose of use is decided. Multiple categories of activity are not performed one one plot. The management entity, Agriculture & Forestry Corporation manages the land by deciding the type of activity per plot discussing with the land owner entity, Saitama prefecture, and the management is implemented according to the decided plan. It is because Agriculture & Forestry Corporation judges that it is not necessary to assign many details of activities to one slot since there are many plots of public farmland which are not adequately used.

In addition, as far as there is no special problem, the allocation of one category of activity to one land plot simplifies the management. Since the user entities are fixed for a certain period with Communion (Fureai) farm for residents of the prefecture, Agricultural prep school and School children's farm, where user entities are involved in land management, there is a merit that the land is maintained and managed as responsibility of the user entities. If the user entities do not sustain and manage in a responsible manner, they will receive instructions and advices from Agriculture & Forestry Corporation, and if it is not improved after that, Agriculture & Forestry Corporation may take the measure of stopping the use. Thus, Agriculture & Forestry Corporation allocates one type of activities per plot and clarifies the responsibility of the user entities to realize the stable and

management of public farmland.

5. Relationship between the state of participation of managing entities and the functions of public farmland

Mowing is conducted to keep the farmland in a state that it can always be tilled for its productive function. Therefore, if just mowing is implemented and actual productive operations are not conducted, the productive function is not exerted adequately. In addition, the function of play and education has never been exerted in the slots of farmland where only mowing is conducted. Only the management entity, Agriculture & Forestry Corporation, and the land owner entity, Saitama prefecture are concerned with management of this activity. The purpose of landscape-amenity crops is not commercial, and crops are cultivated and left un-harvested on the land to improve landscape, so it is considered that such crops exerts the productive and protective function providing habitat for wildlife and improving the amenity value of agricultural landscape. In the case of landscape-amenity crops, only the management entity, Agriculture & Forestry Corporation, and the land owner entity, Saitama prefecture are concerned with management of this activity. Hands-on/practical farming experiences are attended by neighboring residents, citizens and educational institutions.

The users of Communion (Fureai) farm for residents of the prefecture are residents, workers and students in Saitama Prefecture who can manage the farmland daily. Therefore, Trial experiences of farms and experiences of agriculture of Communion (Fureai) farm for residents of the prefecture exert the functions of production and protection. In addition, the function of play and the function of education are exerted because citizens use it for leisure and experiences of agriculture are a place for learning. The Agricultural prep school accepts students not only from among residents of

Saitama prefecture, but also from Tokyo Metropolis, so the participants are not only the neighboring residents, but citizens participate from wider area, and agricultural corporations instruct techniques. Therefore three types of user entities are concerned. Educational institutions, agricultural corporations as instructors of agricultural techniques, and neighboring residents and citizens as volunteers are involved in School children's farm. Through the experiences of agriculture at School children's farm, the functions of production and protection are exerted, and at the same time, the function of leisure and the function of education are exerted because it is an activity implemented by volunteers during their leisure time and it is a place for education of students. Of course, in addition to the user entities, management entities and land owner entities are also involved in hands-on farming experiences, Communion (Fureai) farm for residents of the prefecture, Agricultural prep school and School children's farm.

Based on the above, we shall now consider the ways the functions of farmland are exerted in each activity. Four types of functions of farmland are exerted in as hands-on farming experiences, Communion (Fureai) farm for residents of the prefecture, Agricultural prep school and School children's farm. Even the least participated Communion (Fureai) farm for residents of the prefecture is participated by residents and citizens. Mowing and cultivation of landscape-forming crops have been implemented since short time after management was commissioned, and as the commission of management is continued, the details of activities which user entities can participate were added. It shows that the addition of activities has led to the larger number of available functions of farmland were added. The relationship between the maintaining entities and the functions of farmland shows that only the functions of production and protection of farmland are exerted with the activities which are conducted-exclusively by the management entity and the land owner entity such as Agriculture & Forestry Corporation and the Saitama prefecture. It is because they conduct

the activities as part of their jobs, and educational activities are not implemented. On the other hand, if neighboring residents and citizens participate, the functions of play and education of farmland are exerted in addition to the functions of production and protection of farmland.

However, the neighboring residents and citizens participate in hands-on farming activities only as a hobby, and in order to exert the functions of production and protection of farmland adequately, the support from other managing entities is required. Agricultural corporations provide instruction on agriculture for user entities, and the function of education of farmland is exerted. The purpose of educational institutions is to educate students, so educational institutions exert the function of education from the aspects of both teaching by the teachers and learning by the students. Since corporations and educational institutions are not the entities which exert the function of play, other entities exert the function of play (Table 3-7).

**6. Management system of public farmland
by the Agriculture & Forestry Corporation
(An example of public interest of the functions of farmland)**

The relationship among sustenance entities, the purpose of activity, the unit of activity in the public farmland and the exerted function of farmland have been discussed so far. The relationship among maintaining entities is considered as follows. When commission of management of the public farmland started in 1998, the land owner entity and the management entity consulted and decided the purpose of activity. In 1998, they implemented only mowing activities in order to maintain the productive capacity of land while discussing the details of management. Therefore, mowing was conducted at all of the commissioned lots of public farmland. Since mowing is preparation for cultivation, only the exertion of mowing does not leas

either to the function of production of the farmland or to the other functions of farmland. Thus, the farmland is not multifunctional yet.

However, by 2010, the user entities such as neighboring residents, citizens, agricultural corporations and educational institutions have been involved as the user entities. The situation that the purpose of activities is decided by discussion between the management entity and the land owner entity has not changed since 1998, but the management entity and the land owner entity choose the user entities according to the purpose of the activity, and work as a mediator for the user entities. As the number of user entities increased, the number of purposes of activities also increased: mowing, landscape-amenity crops, hands-on farming experiences, Communion (Fureai) farm for residents of the prefecture, Agricultural prep school and School children's farm. Even after the number of purposes of activities increased, all the plots which were commissioned were allocated only one purpose of activity each, and there is no example that multiple activity purposes are implemented on one plot of public farmland. Since single activity purpose is allocated to one plot of public farmland and it is fixed, the user entities implement single purpose activities.

The relationship between the functions of public farmland and the activity purposes of managing entities are as follows. In the activities conducted only by land owner entity and management entities, the public farmland's functions of production and protection are exerted. When user entities join the activities, the public farmland's functions of play and education are exerted. The exerted functions vary by user entity as follows. The public farmland's function of play and education is exerted with involvement of citizens and neighboring residents. Education functions are exerted by educational institutions and agricultural corporations since they are in the position of instructors. Since management entities implement activities centering on agriculture because of their role, the public farmland's function of production is exerted the most, along with the

function of protection, which is exerted by implementing agriculture, and the functions of play and education, which are exerted by participation of user entities, follow. Because a public organization is the management entity, the purpose of maintenance and management of public farmland is public interest, but since the activities implemented by the Agriculture & Forestry Corporation is opened to outside user entities, private interests of functions of farmland are also exerted. The functions of production, protection, play and education are exerted more in 2010, when both of public interest and private interest are met, than 1998, and as a result, multi-functional use of public farmland has advanced (Figure 3-11).

IV. Maintenance of public farmland by civic groups

1. History of Ground Work Kawaguchi and their activities at public farmland in Minuma rice fields

This section is described based on the interviews with Ground Work Kawaguchi which were held from July to December in 2010. The volunteer section, Ground Work Kawaguchi Executive Committee, was launched at the Civic Life Department of Kawaguchi city in 1998. As a memorial event for it, citizens, corporations and the administrative office started an activity to sustain the environment for *Luciola lateralis* in collaboration using the method of Groundwork, which promotes improvement of neighboring environment, and it became an occasion for Ground Work Kawaguchi to start. In December 1998, when it started, the name was Ground Work Kawaguchi Executive Committee. The members were three parties: citizens who provide labor, corporations which provide heavy equipment such as machines and trucks and the administrative office which provides the place of activity. The first activity started in cooperation with the Park and Farmland Division of Kawaguchi city in 1998 and the Junior Chamber International Kawaguchi and Kawaguchi Rotary Club which belong to the Junior Chamber International Japan based at Kawaguchi Natural Park. The fireflies which inhabit around the east edge of Minuma substitute drain (Minuma-daiyousui), which is close to Kawaguchi Natural Park (Kawaguchi Shizen Kouen) were captured, then cultured and released in Kawaguchi Natural Park for 3 years.

However, since it was not successful because of the number of fireflies were not increased, the activity in Kawaguchi Natural Park was discontinued. As the first activity, the fireflies which originally inhabit the area around the eastern edge of Minuma substitute drain, which is a little far from Kawaguchi Natural Park, were captured and released in an area

not naturally inhabited by fireflies in Minuma rice fields to increase their numbers . The fireflies which originally inhabit around the east edge of Minuma substitute drain were not artificially cultured or released in order to grasp the causes of fluctuations in the number of fireflies in that habitat. Ground Work Kawaguchi Executive committee was requested to be commissioned the management of the public farmland, which was acquired by Minuma rice field public ownership project by Saitama prefecture via the Planning and Finance Department of Kawaguchi city in 2000. Saitama prefecture was looking for an entity to which they could commission management of the public land in Kawaguchi city purchased by Minuma rice field public ownership promotion project in Kawaguchi city since August 1998, and they approached Ground Work Kawaguchi before 2000.

At that time, Ground Work Kawaguchi Executive Committee considered that breeding of fireflies was not working well, but that organic agriculture may naturally lead to realization of breeding of fireflies with their confidence as a nature conservation group, and agreed to manage the public rice fields. The public land which Saitama prefecture purchased and was trying to commission to Ground Work Kawaguchi Executive Committee was originally used for rice fields, but since cultivation was abandoned, it was a reed bed at that time. Therefore, Saitama prefecture commissioned tillage of rice fields to agricultural corporations from February to March in 1999. Ground Work Kawaguchi Executive Committee started management of the rice fields from 2000, and started Minuma nature school, which provides a place for hands-on farming experiences as requested by Saitama prefecture. Then, the activity regarding fireflies was merged with the hands-on farming experiences, and downsized from 2001 because workload to manage rice field by Minuma nature school is increased.

After that, the Volunteer section of Civic Life Department of Kawaguchi city changed its name to Volunteer Support Station to support voluntary activities by citizens such as volunteering and town development

activities in June 3, 2000. The institution was expanded and started with a new name, Kawaguchi citizens' Partner Station, on July 1, 2006. Ground Work Kawaguchi Executive Committee also moved their office to the same place as the Volunteer Group of Civic Life Department of Kawaguchi city. The group name was changed to Ground Work Kawaguchi in 2006.

The main request from Saitama prefecture to Ground Work Kawaguchi Executive Committee was to do farming at the rice fields, the public field which was returned from the reed bed. They cultivated white rice from 2000 to 2001. In addition, they started the experimental cultivation of glutinous rice and ancient rice in 2002, and the format of cultivating glutinous rice and ancient rice has not changed since 2003. Management of additional public land was commissioned to Ground Work Kawaguchi by Saitama prefecture from 2008 to 2009 in addition to the land commissioned in 2000 (Figure 4-1). The added land from 2008 to 2009 was all managed as reed bed, though there is a possibility that it may be used as rice fields or fields as necessary. Because Ground Work Kawaguchi is originally an environmental protection group, Saitama prefecture and Ground Work Kawaguchi discussed and decided to manage the land as reed bed, which is scarce in Minuma rice fields, to contribute to the preservation of wildlife habitat and protection of the ecosystem.

2. Meaning of the activities

This section is described based on the on-site investigation of the public farmland managed by Ground Work Kawaguchi, which was conducted from July to December in 2010. When they were commissioned management of public land from Saitama prefecture in 2000, Ground Work Kawaguchi Executive Committee started Minuma nature school which is implemented on public farmland in addition to their conventional activity of fireflies habitat protection. The activities in 2000 were transplanting and

improvement of vegetation (Figure 4-2), nature observation (Figure 4-3), experiences of agriculture (Figure 4-4), Crafts making (Figure 4-5), fireflies habitat protection (Figure 4-6) and exploration of food culture (Figure 4-7).

Transplanting and improvement of vegetation were closer to management work of the public farmland by Ground Work Kawaguchi. Nature observation provides a place to learn about nature through direct observation of nature, and it works as an education tool about environmental preservation. Since there are few places where people in cities and urban fringes can experience agriculture because the decrease of farmland in cities and urban fringes, the experiences of agriculture provide activities where participants can learn and experience not only agriculture but also Japanese food culture and history of living. The purpose of various workshops is to make things such as toys and accessories using natural vegetables and soil, and to have communion with natural blessings. Improvement of the farming environment is implemented to preserve the original natural environment of Minuma rice fields mainly by eradicating ragweed which is introduced species.

The Fireflies habitat protection is the original purpose of the civic group Ground Work Kawaguchi, and it aims to breed *Luciola lateralis* (a species of firefly), which used to live in Minuma rice fields, and to preserve high-quality natural environment where fireflies and other wildlife can prosper. Fishing crayfish seems irrelevant to Making home for fireflies, but crayfish eats marsh snails, which are food for larvae of fireflies, so getting rid of crayfish by fishing helps reduction of marsh snails, and helps breeding fireflies. The purpose of exploration of food culture is to explore food culture through eating the crops produced by those conducting farm works by themselves.

The area of the public farmland in Minuma rice fields whose management is commissioned to Ground Work Kawaguchi was fixed in 2010, and by that time, the variety of activities has increased compared with

those in 2000. The activities added to those which had already been implemented in 2000 are collecting natural material (Figure 4-8), experiences of volunteers (Figure 4-9), charcoal making (Figure 4-10) and experiences in the workplace (Figure 4-11).

Collecting natural materials was implemented for the participants to observe various acorns, timbers, which can be collected in Minuma rice fields, and to utilize them to make crafts and so forth. Experiences of volunteers is an activity in which Kawaguchi city recruits people who want to experience volunteer activities, and they help the operations of Ground Work Kawaguchi. Charcoal making is implemented to experience such a traditional activity, and the charcoal produced is brought home and used. The purpose of experiences in the workplace is to let children from educational institutions experience the work of agriculture. Therefore, different from the experiences of agriculture, whose detail is like hobbies, it provides a program from a viewpoint that what the job of a farmer is like.

3. Relationship between the type of activities and the managing entities

1) Relationship among managing entities and the type of activities (2000)

Since Saitama Prefecture, the land owner entity, cannot conduct both of management of the public farmland and the normal operation of the local government office because of too much workloads, management of public farmland was commissioned to Ground Work Kawaguchi Executive Committee by Saitama prefecture in 2000. Saitama prefecture considered Ground Work Kawaguchi Executive Committee can promote the types of activities from the new basic policy at public farmland in Minuma rice fields because it is an environmental protection group. Ground Work Kawaguchi Executive Committee was requested to implement Minuma nature school, where Saitama prefecture provides the place for practical farming experiences, and since Ground Work Kawaguchi Executive Committee is an

environmental protection group, to manage the place which was then kept as reed bed for environmental preservation and wildlife. Based on this agreement, Ground Work Kawaguchi Executive Committee decided the types of activities conducted on the public farmland, which were reported to Saitama prefecture once every three months.

There were two types of activities, individual activities and hosting activities in the activities of Ground Work Kawaguchi Executive Committee in 2000. The individual activities of Ground Work Kawaguchi Executive Committee were those attended only by its members, and the activities placed emphasis on management. On the other hand, the hosting activities were held inviting user entities such as neighboring residents and citizens to participate in the event, and Ground Work Kawaguchi Executive Committee played the role as an organizer. If there were people who wanted to participate, they applied to Ground Work Kawaguchi, and participated in the hosted activities. In the hosted activities, Agricultural corporations provided techniques, heavy equipment and helped for the smooth proceeding of the activity. In both of individual activities and hosting activities, Ground Work Kawaguchi Executive Committee considered the place of activity according to the type of activity, and implemented them (Figure 4-12).

2) Relationship among management entities and the type of activities (2010)

The relationship between Saitama prefecture and Ground Work Kawaguchi Executive Committee and the agreement started in 2000 and have continued as of 2010. Therefore, the scheme of independent activities and hosting activities by Ground Work Kawaguchi are the same as those in 2000. However, the activities held by Ground Work Kawaguchi in 2010 have increased both as number of types of activities and number of events implemented compared to those in 2000. The types of activities have

diversified with the activities commissioned by Kawaguchi city and educational institutions. The activities requested by Kawaguchi city and educational institutions are evaluated by Ground Work Kawaguchi and implemented according to the type of activities. For the activities they undertake, the suitable people are chosen from the members of Ground Work Kawaguchi, to work as instructors (Figure 4-13).

4. Types of activities and public farmland

There are two types of activities conducted by Ground Work Kawaguchi Executive Committee in 2000: the activities conducted independently by Ground Work Kawaguchi Executive Committee and the activities hosted by Ground Work Kawaguchi Executive Committee with participation of other user entities participated. The details of activities which are listed in Table 4-1 as the names of activities can be classified into 6 types: improvement of natural environment, nature observation, experiences of agriculture, manufacturing, making home for fireflies and exploration of food culture (Table 4-1). The types of activities conducted independently by Ground Work Kawaguchi Executive Committee are: Preparation of rice fields and Mowing of the reed bed. Preparation of rice fields is conducted as a preparatory activity for Hands-on farming experience, which is one of the activities hosted by Ground Work Kawaguchi Executive Committee and conducted at the Minuma nature school. Mowing of the reed bed is a land management operation to remove introduced species such as ragweed and to preserve the original nature of Minuma rice fields. These two activities correspond respectively to Experiences of agriculture and Improvement of natural environment.

Among the type of activities hosted by Ground Work Kawaguchi Executive Committee in 2000, cleaning is conducted in all areas of Minuma nature school for Fireflies habitat protection. The purpose is to pick up

garbage to contribute to the creation of an environment where fireflies can develop. Cleaning also improves natural environment polluted with garbage. In October, observation of wildlife including fireflies was conducted in all areas of Minuma nature school to deepen participants' knowledge about natural environment. In addition, Crafts making using natural materials was conducted in vacant lots of Minuma nature school, and Crafts making of flutes was conducted in May, balance toys in July, sacred straw festoons in December, and reed screen in February. These activities were designed to raise participants' awareness of the various uses of natural materials (collected by the staff of Ground Work Kawaguchi Executive Committee and participants at Minuma nature school) by making things such as musical instruments, toys, livingware and develops their attachment to nature.

Hands-on farming experiences are conducted in the rice fields of Minuma nature school, and the types of activities are mainly manual farm work which require manpower such as rice planting and rice harvesting. In the harvest festival the crops are distributed among people who helped rice planting and rice harvesting and participants enjoy tasting of some of the crops on site (Table 4-2). The land use of the public farmland and the purpose of activities are as follows: for the reed bed and grassland areas, three types of activities, which are Improvement of natural environment, Nature observation and Fireflies habitat protection were conducted, while five types of activities including Improvement of natural environment, Nature observation, Hands-on farming experiences, Fireflies habitat protection and Exploration of food culture were conducted in the rice fields. Further, five types of activities including Improvement of natural environment, Nature observation, Crafts making, Fireflies habitat protection and Exploration of food culture were conducted in vacant lots (Table 4-1, 4-2 and Figure 4-14).

The main characteristic of activities conducted in the reed bed and grassland areas is their focus on preservation of natural environment. In

the rice fields, practical farming experiences are conducted adding to the preservation of natural environment. Vacant lots is a space where various works and meetings can be conducted while trying to preserve the environment for wildlife by keeping the surface soil, since it is at the peripheral part of farmland and the reed bed. Therefore, Crafts making workshops are also conducted in vacant lots adding to the activities such as Improvement of natural environment, Nature observation and Fireflies habitat protection.

There were four types of activities conducted by Ground Work Kawaguchi in 2010, which include the two types of activities unchanged since 2000. The four activities are the activities independently conducted by Ground Work Kawaguchi Executive Committee and the activities hosted by Ground Work Kawaguchi Executive Committee and attended by other user entities, the activities implemented upon request from Kawaguchi city and the activities implemented upon request from Educational institutions. The details of activities in public farmland which can be observed with the 4 kinds of activities above can be categorized into ten types adding to the six types conducted in 2000: the 6 types including Improvement of natural environment, Nature observation, Hands-on farming experience, Crafts making, Fireflies habitat protection and Exploration of food culture, while the new four types include Collecting natural materials, Experience as volunteers, Charcoal making and Experiences in the workplace.

Most of the independent activities of Ground Work Kawaguchi Executive Committee are conducted in the rice fields, and they comprise mainly the Hands-on farming experience. The activities related to Hands-on farming experience are mostly conducted in rice fields, but there are some activities such as Drying the harvested rice hanging on racks, Grain threshing, Hulling rice, A Milling and Pruning trees for rice-hanging racks, which are all conducted in vacant lots.

Fireflies habitat protection was conducted in all area of Minuma

nature school, and night observation for watching fireflies was implemented in 2010 adding to the cleaning and the investigation of the number of fireflies implemented in 2000. Gathering acorns was implemented in all areas of Minuma nature school, and the type of activity is Nature observation through acorns and Collecting natural material which can be used during Crafts making workshops, which is one of the activities hosted by Ground Work Kawaguchi. Pruning trees in grassland areas is an activity meant to maintain grassland. The purpose of Making rice-husk charcoal, an activity conducted by the members of Ground Work Kawaguchi is to produce charcoal, and use it as a natural deodorant. There were six types of activities, and Hands-on farming activities were conducted 16 times, Improvement of natural environment, Nature observation, fireflies habitat protection, Collecting natural material and Charcoal making were conducted once each. The names of activities show that most of the activities were the management works of Minuma nature school and the preparation for the activities hosted by Ground Work Kawaguchi (Table 4-3).

For the activities hosted by Ground Work Kawaguchi in 2010, they invite the other user entities to join in, and the activities which can provide a place that the user entities can enjoy are preferred. Making mugwort-flavored rice cake in April was conducted in vacant lots by the members of Ground Work Kawaguchi and the user entities who seldom have opportunities to make rice cakes using the glutinous rice harvested in the rice fields of Minuma nature school in 2009. Spring wild herb meal is an activity to collect edible wild herbs looking for them in the whole area of Minuma nature school and cook and eat the collected wild herbs when they go back to a vacant lot. The activities such as Nature observation and Collecting natural materials were conducted in all areas of Minuma nature school, but the activity of Exploration of food culture was conducted only in vacant lots. Rice planting and Rice harvesting as Hands-on farming

experiences were conducted in the rice fields. The Harvest festival was conducted in the rice fields during the period of harvesting, and then the festival to taste the harvests was conducted in vacant lots. Night observation, which was implemented as an activity integrated with Fireflies habitat protection, was conducted for the user entities to observe the fireflies. Cleaning operations were conducted to preserve the habitat of fireflies. Activities related with Fireflies habitat protection are conducted in all areas of Minuma nature school. Regarding the activity of Crafts making, Making a sacred straw festoon for New Year was conducted for the user entities in vacant lots (Table 4-4).

The activities implemented by Ground Work Kawaguchi upon request from Kawaguchi city are classified into three types: Volunteer school, Nature observation and Crafts making. Kawaguchi city has established a volunteer school for education of the students from educational institutions which wish to conduct experiences as volunteers, and one of its programs was Hands-on farming Experience. Ground Work Kawaguchi accepts applicants for this activity, and the people who wish to work as volunteers participate in voluntary activities including hands-on farming experiences and improvement the rice fields. For the experiences of agriculture, Ground Work Kawaguchi accepted applicants for volunteers, and conducted voluntary activities, which were mainly mowing in the rice fields and grassland. In addition, Nature observation and Crafts making, planned by the Greenery Division of Kawaguchi city and commissioned to Ground Work Kawaguchi for implementation, were conducted. Nature observation was implemented in all areas of Minuma nature school. Crafts making was conducted in vacant lots of Minuma nature school. Accordingly, there are four different types of activities, including Improvement of natural environment Nature observation, Hands-on farming experiences, Crafts making and Experiences of volunteers (Table 4-5).

The details of activities implemented by Ground Work Kawaguchi

upon request from educational institutions were nature observation implemented in the whole area of Minuma nature school, in which wildlife such as wild birds and vegetables was observed, and experiences in the workplace, which was implemented in the rice fields of Minuma nature school. Experiences in the workplace were conducted for students to experience the workplace of farmers and know the detail of the works of the occupation of farmer. Therefore, three types of activities, Nature observation, Hands-on farming experience and Experiences in the workplace are confirmed (Table 4-6).

Regarding the usage of public farmland and the purposes of activities in 2010, there were 5 kinds of purposes of activities at the public farmland used as reed bed and grassland: improvement of natural environment, nature observation, fireflies habitat protection, exploration of food culture and collecting natural material. The rice fields are used for eight types of activities: Improvement of natural environment, Nature observation, Hands-on farming Experience, Fireflies habitat protection, Exploration of food culture, Collecting natural materials, Experiences of volunteers and Experiences in the workplace, while vacant lots is used for eight types of categories: Improvement of natural environment, Nature observation, Hands-on farming Experience, Crafts making, Fireflies habitat protection, Exploration of food culture, Collecting natural materials and Charcoal making (Table 4-5, 4-6 and Figure 4-15).

5. Relationship between the state of participation in the activities of managing entities and the functions of public farmland

The activities independently conducted by Ground Work Kawaguchi Executive Committee in 2000 are Preparation of rice fields and Mowing in the reed bed. Since preparation of rice fields is implemented to prepare for cultivation of crops, the function of production is exerted. In addition,

unlike primeval nature, to create rice fields exerts the function of protection because such secondary nature is sustained by the hands of human. Mowing in the reed bed is an activity to maintain the original reed bed of Minuma rice fields by mowing the ragweed which is introduced species with the goal of improving the vegetation. Maintenance of the reed bed contributed to the preservation of the original natural environment of Minuma rice fields and of wildlife habitat, and the function of protection of farmland is thus exerted. All of the members of Ground Work Kawaguchi Executive Committee pay the membership fee to the office of Ground Work Kawaguchi Executive Committee, and come to the activities for fun in their leisure time. In addition, they deepen and share their knowledge by discussing during activities, and the educational function of farmland is also exerted among members. Therefore, both the play and educational functions of farmland are always exerted in the activities independently implemented by Ground Work Kawaguchi Executive Committee (Table 4-7).

The activities hosted by Ground Work Kawaguchi Executive Committee are positioned as activities where other user entities also participate in. Participation by user entity in all activities held in 2000 was as follows: no participation by educational institutions, 3 times by other civic groups, and participation in all activities by the other sustenance entities. However, the other user entities participated in all activities. The activities were led by the leaders and staff of Ground Work Kawaguchi Executive Committee, Kawaguchi city and agricultural corporations. The members of Ground Work Kawaguchi Executive Committee, the staff of Park Division of Kawaguchi city, agricultural corporations, citizens and residents gathered at the empty lot of Minuma nature school. Cleaning as part of Firefly habitat protection activities is conducted by the whole Minuma nature school. The garbage is separated by types and the cost for discarding large-size garbage is born by Kawaguchi city. The Park Division of Kawaguchi city requests to a corporation to arrange the garbage

collection truck, and the garbage is transported. Therefore, adding to the function of protection of farmland, the function of play is exerted by participation by citizens and neighboring residents. The function of education is also exerted when instruction in protection of natural environment is provided to the participants through cleaning and separation of garbage by Ground Work Kawaguchi Executive Committee, Kawaguchi City and agricultural corporations.

In the observation of birds, insects and plants as part of Fireflies habitat conservation activities, the participants learn the ecology of wildlife by grasping and observing the state of wildlife through investigation and observation. The leaders among the staff of Ground Work Kawaguchi Executive Committee, Kawaguchi city and invited corporations to instruct the members of Ground Work Kawaguchi Executive Committee, Citizens and neighboring residents who participate in their leisure time. Therefore, the functions of protection, recreation and education of farmland are exerted. In Crafts making using natural materials, the leaders among the staff of Ground Work Kawaguchi Executive Committee, Kawaguchi city and Corporations instruct the citizens and residents who participate in their leisure time how to make things such as a flute, a balance toy, a sacred straw festoon and a reed screen using natural materials. Therefore, the functions of play and education of farmland are exerted.

In the experiences of agriculture like rice planting, rice harvesting and harvest festival, there is participation by other civic groups concerning nature conservation and social welfare adding to citizens and neighboring residents. Rice planting and Rice harvesting require manpower, and the leaders among the staff of Ground Work Kawaguchi Executive Committee, Kawaguchi city and Corporations instruct the members of Ground Work Kawaguchi Executive Committee, citizens, neighboring residents and other civic groups. The Harvest festival is conducted to celebrate the harvests of the year, thank the people who helped planting and harvesting rice, and

allocate the crops and taste them. In the Hands-on farming experiences including rice planting, harvesting and the harvest festival, the function of production of farmland is exerted, while by creating rice fields and using the secondary nature, the function of protection of farmland is also exerted. By the participation of members of Ground Work Kawaguchi Executive Committee, citizens and neighboring residents in their leisure time, the functions of play and education of farmland are exerted. In addition, the role of Ground Work Kawaguchi Executive Committee, which is an environmental protection group, is to provide environmental education to people, by educating the participants by the leaders of the staff of Ground Work Kawaguchi Executive Committee in collaboration with Kawaguchi city and corporations through the hands-on farming experience in the rice fields therefore the educational function of farmland is also exerted (Table 4-8).

In the activities independently conducted by Ground Work Kawaguchi in 2010, the function of protection of farmland using secondary nature is exerted in addition to the function of production of farmland with the activities integral to Hands-on farming experiences. However, the activities like Drying the harvested rice hanging on racks, Grain threshing, Hulling & Milling rice are conducted not in the rice fields, but in vacant lots, so the function of production of farmland is exerted, but the function of protection of farmland is not. Observation of fireflies hosted by Ground Work Kawaguchi, which was conducted as a part of Fireflies habitat protection activities, does not have the functions of production and protection of farmland, because it is basically the investigation of the number of fireflies. Gathering acorns and Making rice-husk charcoal do not exert the functions of production and protection of farmland either. Since the main purpose of Pruning trees in grassland is the improvement of secondary natural environment, the function of protection of farmland is usually exerted. However, Pruning trees for rice-hanging racks is to prepare

racks for Drying the harvested rice, so the function of protection of farmland is not exerted. In all the activities conducted independently by Ground Work Kawaguchi, the play and educational functions of farmland are exerted because Ground Work Kawaguchi is a civic group, and the members participate in the activities as leisure, and deepen and share their knowledge by discussing during the activities (Table 4-9).

Many of the activities hosted by Ground Work Kawaguchi in 2010 are the most popular activities attended by many people in order to help in or just enjoy. Therefore, there is no participation of educational institutions, but the other managing entities participate. During such activities the following functions of farmland are exerted: Making mugwort-flavored rice cakes is an activity conducted using the glutinous rice harvested beforehand and making rice cakes, so the function of production of farmland is exerted. Spring wild herb meal is an event where participants have to find and collect spring wild herbs which they cook together and enjoy eating. Therefore, the functions of production and protection of farmland are not exerted. The functions of production and protection of the farmland are exerted with Hands-on farming experience including rice planting, rice harvesting and the Harvest festival. In the Night observation activity, part of Fireflies habitat protection, the functions of production and protection of farmland are not exerted. In the Cleaning activities, called Minuma Clean & Clean, the function of protection of farmland is exerted.

In Making a sacred straw festoon, a new year livingware is made, and the functions of production and protection of farmland are not exerted. In all activities, the leaders among the staff of Ground Work Kawaguchi Executive Committee, Kawaguchi city and Corporations instruct the members of Ground Work Kawaguchi, other civic groups, citizens and residents, and implement the activities. Other civic groups, citizens and residents participate using their leisure time, so the functions of play and education of farmland are exerted in all activities (Table 4-10).

In 2010, there are new activities implemented by Ground Work Kawaguchi upon request from Kawaguchi city, which had not been implemented in 2000. Kawaguchi city has established a volunteer school that targeted at the students from educational institutions who want to experience voluntary activities, and one of its programs is Hands-on farming experience. As one of the places where Hands-on farming experience activities are held, Ground Work Kawaguchi accepts people who offer to do voluntary work upon request from Kawaguchi city, and voluntary activities such as improvement of rice fields are implemented. Therefore, the functions of production of farmland and the function of protection of farmland using secondary nature are exerted. In addition, since members of Ground Work Kawaguchi participate for leisure, and education is provided in the voluntary activities, so the functions of play for the members of Ground Work Kawaguchi and education for the voluntary participants and Ground Work Kawaguchi members by Kawaguchi city of farmland are also exerted. Nature observation and Crafts making, planned and organized by the Greenery Division of Kawaguchi city, which commissions the implementation to Ground Work Kawaguchi, are intended for citizens and neighboring residents. The leaders of the staff of Ground Work Kawaguchi Executive Committee, Kawaguchi city and Corporations instruct the members of Ground Work Kawaguchi, citizens and neighboring residents, and implement the activities on all activities requested by Kawaguchi city. Therefore, the functions of play and education of farmland are exerted (Table 4-11).

The activities implemented by Ground Work Kawaguchi upon request from educational institutions, which were not seen in 2000, are implemented in 2010, and three types of activities, Nature observation and Experiences in the workplace including hands-on farming experiences, are conducted. Nature observation and Experiences in the workplace are linked with the subjects of science, social studies, et al. taught at educational

institutions, and they are implemented as educational programs positioned as extracurricular learning by the educational institutions. Nature observation is directly requested to Ground Work Kawaguchi is requested to offer Nature observation directly by the educational institutions. Kawaguchi city is the contact for Experiences in the workplace including hands-on farming experiences, and many places which can provide Experiences in the workplace are introduced to the educational institutions. Ground Work Kawaguchi is a receiver to experience farming, and they provide Hands-on farming Experience for the educational institutions introduced by Kawaguchi city. Therefore, the function of education of farmland is exerted by Nature observation, and the functions of production, protection and education of farmland are exerted by Experiences of agriculture of Experiences in the workplace for the educational institutions. In addition, the members of Ground Work Kawaguchi participate in all activities as leisure, so the function of play of farmland is also exerted (Table 4-12).

6. Management system of public farmland by a civic group
(An example of private interests in the functions of farmland)

The relationship among managing entities, purposes of activities, units of activities in public farmland, and exerted functions of farmland according to the framework of this research have been discussed so far. The relationship among managing entities is as follows. The land management policy was decided by consultation between the land owner entity, Saitama prefecture, and the management entity, Ground Work Kawaguchi Executive Committee, when management of public farmland was commissioned to Ground Work Kawaguchi Executive Committee in 2000. Since then, the land owner entity has received reports about activities from the management entity, but it has not participated in the actual activities. Therefore, the

managing entity acts as a mediator for user entities, which are Kawaguchi city, other civic groups, corporations, citizens and neighboring residents participating in the activities. The relationship between user entities and the purposes of activities is as follows. The management entity recruits participants like widely citizens, neighboring inhabitants, educational institutions, other citizen groups, agricultural corporations and accepts user entities which applied for participation without limiting the applicants. There are six types of purposes of activities, and some activities have multiple purposes. The relationship between the purposes of activities and public farmland is as follows. All public farmland whose management was commissioned to Ground Work Kawaguchi Executive Committee is divided into functional zones like reed bed, grassland, vacant lots, rice fields, and the purposes of activities are allocated according to these zones. Therefore, multiple purposes of activities are allocated to a plot of public farmland because zones comprise many plots.

With regard to the functions of public farmland, managing entities and the purposes of activities, the functions of production, protection, play and education are exerted with civic groups and Kawaguchi city. When the management entity is a civic group, functions of play and education are mainly exerted, but in some situations the functions of production and protection are also exerted depending on the purposes of activities. With regard to the user entities, functions of play and education are exerted with other civic groups, citizens and neighboring residents, and the educational function is exerted with corporations from the position of instruction. Functions of production and protection are also exerted depending on the purposes of activities with all sustaining entities including other civic groups, citizens, neighboring residents, corporations and educational institutions.

Concerning the relationship among management entities, the relationship between the land owner entity and the managing entities, and

the situation that the management entity works as a mediator for user entities have not changed as of 2010. Compared with 2000, educational institutions were newly added to the user entities, along with Kawaguchi city, other civic groups, corporations, citizens and neighboring residents. With regard to the relationship between user entities and purposes of activities in 2010, the purposes of activities realized by requests from user entities to management entities were added to those in 2000, and the purposes of activities also diversified up to 10 types. The situation that multiple purposes of activities are included in one activity (depending on the activity) has not changed since 2000. The number of times activities are held also increased in 2010 compared with 2000, and multiple purposes of activities are allocated to one plot of public farmland more often because zones comprises many plots. Since educational institutions were added to the user entities, the function of education was more exercised to the functions exerted by farmland compared to those in 2000. In other words, when other civic groups are user entities, functions of play and education are always exerted, while the functions of production and protection are exerted or not exerted depending on the activity.

When a civic group, which is a private organization, becomes the management entity, the private interests related to the functions of farmland are reflected in the management of public farmland. By opening the activities to outside user entities, the activities which attract public interests are implemented by the civic group, and the public interests related to the functions of farmland are also raised. Regarding the functions of public farmland, the functions of production, protection, play and education are exerted wider because of the increase of frequency and kind of activities in 2010 compared to 2000, so we could conclude that multi-functionalization of public farmland has been proceeding fast. (Figure 4-16).

V . Sustainable system of public farmland

1. Comparison between sustainable systems of the Agriculture & Forestry Corporation and civic groups

The relationship between land managing entities, the relationship between the mentioned managing entities and their activities, the relationship between the purpose of activities and public farmland, and the relationship between, on the one hand, the functions of public farmland and managing entities and their activities have been discussed using the case studies of the Agriculture & Forestry Corporation and a civic group. In this chapter, based on the findings from the above case studies, sustainable management systems of public farmland are compared. (Table 5-1)

First, the relationships between management entities of the two land management systems are compared as below. The land owner entity is a public organization, Saitama Prefecture, in both cases of the Agriculture & Forestry Corporation and the civic group, Ground Work Kawaguchi (Executive Committee). The management entity is a public organization in the case of Agriculture & Forestry Corporation, and a private organization in the case of the civic group.

The user entities are all private organizations in both cases, and there were two patterns regarding the number of user entities: it gradually increased, along with the number of activities in the case of the Agriculture & Forestry Corporation, and it did not show significant change in the case of the civic groups, which from the beginning started their activities with the broad participation of user entities.

Second, the relationships between the land managing entities and the activities they organize in the two systems are as follows. The land owner entity and the management entity play the central role, since they discuss and decide the activity purposes in both cases, of the Agriculture &

Forestry Corporation and the civic group. User entities are in the position that they participate in the activities implemented by the management entity. When activities are implemented for entities, there are two patterns that the land owner entity and the management entity solicit user entities and that the user entity request the management entity to implement the activity like the case with civic groups. The activities of the Agriculture & Forestry Corporation are activities concerning agriculture, since development of agriculture in Saitama prefecture is one of the main purposes of the Agriculture & Forestry Corporation. The civic group Ground Work Kawaguchi on the other hand, is an environmental protection group, which started with the goal of protecting fireflies' habitat, so that preservation of public farmland as a biotope is their major purpose. The difference in the activity unit of farmland is also affected by difference in the management policy and the management plan which are created based on the area of farmland managed by the management entity and the relationship with the land owner entity.

Third, the relationships between the purpose of activities and public farmland of the two systems are as follows. The Agriculture & Forestry Corporation allocates one activity/purpose to one plot of public farmland, while the civic group allocates multiple purposes to the activities held on one plot of public farmland. Agriculture & Forestry Corporation has a purpose to promote agriculture, and the conventional agricultural management method which allocates one agricultural work to one slot of farmland was adopted. On the other hand, the civic group has the purpose of environmental protection, and they try to use the farmland in various ways by creating a biotope as a place to educate about environmental protection. The difference of management entity causes difference in the management policy and the management plan, and has a considerable influence on the activity unit in one slot of farmland.

Forth, the relationship between the functions of public farmland

and the activities of the managing entities are compared as below. When the management entity is only the Agriculture & Forestry Corporation, the functions of production and protection are exerted, but without the participation of user entities, the other functions of public farmland are not exerted. On the other hand, when the management entity is the civic group, all of the 4 functions of public farmland, production, protection, play and education are exerted. The Agriculture & Forestry Corporation implements activities as a part of their job tasks, but the civic group implements activities for recreational purposes of its members, and the members share their knowledge through mutual exchanges, so the functions of play and education are exerted, and the functions of production and protection are also added depending on the type of activity. The land owner entity participates just in discussing and deciding the activities in both cases of the Agriculture & Forestry Corporation and the civic group, and it does not participate in the actual activities, so it can be said that it is an entity which concerns which function of the public farmland. The exerted functions of farmland vary according to the user entity as follows.

When the Agriculture & Forestry Corporation is the management entity, the functions of production, protection, play and education of public farmland are exerted with the participation of citizens and neighboring residents. Since corporations are the user entities which participate as instructors, the function of education of public farmland is exerted, and with the activity, the functions of production and protection of public farmland are exerted. The function of education is exerted by the participation of corporations as instructors in some activities, and the functions of production and protection are also exerted depending on the activity. Since teachers and students teach and learn when educational institutions are the user entities, the function of education is exerted. The functions of production and protection are also exerted depending on the activity.

When the civic group, Ground Work Kawaguchi (Executive Committee), is the management entity, the following functions of public farmland are exerted with each user entity. Kawaguchi city participates in the activities as a management entity by helping the civic group and providing opportunities for activities of public utility. Such activities mainly exert the educational function of public farmland, and depending on the activity, may also stimulate the functions of production and protection. The functions of production, protection, play and education of public farmland are exerted with the participation of citizens, neighboring residents and other civic groups as user entities. Since corporations are the user entities which participate as instructors, the function of education of public farmland is exerted, and with the activity, the functions of production and protection of public farmland are exerted. The function of education is exerted by the participation of corporations as instructors in some activities, and the functions of production and protection are also exerted depending on the activity. Since teachers and students teach and learn when educational institutions are the user entities, the function of education is exerted. The functions of production and protection are also exerted depending on the activity.

That is to say, when citizens, neighboring residents and other civic groups are the user entities, the functions of play and education of public farmland are always exerted, and when Kawaguchi city or some corporations are the user entities, since they are in the position of instructors, the function of education of public farmland is exerted by the participation of citizens, neighboring residents and other civic groups. The user entities which bring out all of the 4 functions of public farmland, production, protection, play and education are civic groups, citizens and neighboring residents. Therefore, citizens, neighboring residents and other civic groups become the most important user entities for the Agriculture & Forestry Corporation and the civic group to stimulate more functions of

public farmland.

Fifth, the models of the sustainable management systems of public farmland of the Agriculture & Forestry Corporation and the civic group are compared as follows. The number of managing entities and the number of activities are increasing in both cases. However, the activities and the activity unit of public farmland are different. As explained above, the Agriculture & Forestry Corporation implements one activity on each plot of farmland, but the civic group implements multiple activities on one plot of farmland. Such difference in the activity unit of farmland affects the functions exerted by the public farmland. Since the Agriculture & Forestry Corporation allocates one activity to one plot of public farmland, the exerted functions of public farmland are fixed, and do not change. However, an increase in the number of activities stimulates more functions of public farmland, leads to an increase in the number of functions of public farmland. On the other hand, multiple activity units are implemented in one slot of public farmland in the case of the civic group, so the number of functions of public farmland exerted by one activity may be small, but by implementation of multiple activities, the other functions of public farmland are added, and more functions of public farmland are exerted compared to the case when only one activity is implemented. Increase in the number of times of activities and the number of managing entities also increases the opportunities to exert the four functions of public farmland in various combinations.

The Agriculture & Forestry Corporation is a management entity which seeks to stimulate the functions of public interest of public farmland, but it also provides a place for exerting the functions of private interests by letting user entities participate in the activities on public farmland. The civic group is one of the agents which stimulate the functions related to private interests, but by implementing activities as a management entity and opening them to outside participation of user entities, the functions of

public interest are also exerted. In other words, both the Agriculture & Forestry Corporation and the civic group can bring out the functions of public interest and private interest by letting user entities participate in the activities. In addition, when the number of activities increases, there is an increasing diversity of the functions of private interest and public interest exerted. Agriculture & Forestry Corporation implements only one activity unit in one slot. However, each activity exerts all of the four functions of public farmland, and each function is related to private interests and public interests. Therefore, each activity is implemented for a long term, and four functions of public farmland are exerted continuously.

2. Differences between the sustainable systems of public farmland and private farmland

The management systems of the Agriculture & Forestry Corporation and the civic group are compared above. Based on the comparison, it is considered that a sustainable management system of public farmland have the following basic characteristics: (1) increase in the number of involved entities, (2) diversification of activities, (3) Increase in the number of activity units implemented in one slot of farmland, and (4) Increase of the opportunities to exert the four functions of farmland in various combinations in one slot of farmland. Two types of flow were confirmed with such characteristics: the flow of (1)→(2)→(4) in the case of The Agriculture & Forestry Corporation and the flow of (1)→(2)→(3)→(4) in the case of the civic group. The difference between the 2 flows is whether (3) is included or not. In the case of Agriculture & Forestry Corporation, which does not include the step (3), and it creates a situation where multiple functions of public farmland are exerted by implementing activities which bring out more functions of public farmland, though the number of activities per unit of land remains single. The activities implemented by the civic group do not

necessarily exert all of the four functions of public farmland, but it increases the opportunities to exert the four functions of public farmland in various combinations by having multiple purposes of activities and increasing the number of times of implementation (Figure 5-1).

The basic characteristics of a sustainable management system of private farmland are considered as follows. As mentioned in the explanation about existing researches, agricultural corporations and agricultural management, which are run by the families of farmers and hired workers, normally do agriculture as a means of livelihood in private farmland (Bryant and Johnston 1992). In contrast to public farmland, which increases unspecific managing entities which do not pursue profit making, the managing entities of private farmland are normally agricultural corporations and agricultural management. The activities are diversified in order to respond to the needs of managing entities in the case of public farmland, but it is the activity for the means of livelihood in case of private farmland, and it is not diversified. Single or multiple activity units are implemented in one slot of public farmland. In the case that the number of activity units is one, long-term activities for agricultural use are implemented. In the case multiple activity units are implemented, implementation of short-term activities such as nature observation and crafts making adding to long-term agricultural use was observed. On the contrary, the long-term activity of agriculture as a means of livelihood is the main activity in the case of private farmland. The number of functions increases according to the increase in the number of user entities and farmland and the number of activities in the case of public farmland, but the functions of production and protection of farmland are mainly exerted with private farmland (Table 5-2).

VI. Conclusion

Through the case study of an Agriculture & Forestry Corporation and a civic group, it can be said that the sustainable system of public farmland in a suburban area is a system which sustain the farmland by combination of the following processes: (1) increase of sustenance entities, (2) diversification of activities, (3) increase in the unit of activity in farmland, and (4) increase in the range of functions of farmland. Conventional research on sustainable management systems of farmland has been focusing mainly on private farmland, and the 2 flows of (1)→(2) and (1)→(2)→(3) are not observed, so that it is concluded that sustainable management systems of farmland are influenced only by (4). However, in the case of public farmland, the sustainable management system could not be discussed only by increase in the range of functions of farmland. There are combinations of the processes (1) (2) (3) (4) in the case of sustainable management of public farmland, and there are two flows with those processes: (1)→(2)→(4) and (1)→(2)→(3)→(4). The interaction of processes (1) and (2) create the process (4).

The reason why diversification of activities does not lead to increase in the activity unit of public farmland is that there are differences in the use of public farmland, which emerge from the allocation of activities to each lot of farmland or allocation of activities to the zones after zoning of the lots of farmland. Such difference occurs because of the difference in the point of view that one views the public farmland just as farmland for conducting agriculture and the other views it to be the space for multiple purposes including farmland for agriculture. Both of private interest and public interest in the functions of public farmland are exerted regardless of whether the management entity is a public organization or a private group, since diversification of activities is accelerated by letting user entities participate in the activities. User entities have an important role in the sustainable management system of public farmland. In addition, it can be

said that promotion of (1) and (2) and promotion of activities of user entities, which leads to more activities related to play and education on public farmland, are important in enhancing sustainable management systems of public farmland.

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(*: in Japanese, **: in Japanese with English abstract ***: in Japanese and English)

Interview and on-site investigation

Interview

Agricultural Business Support Division, Department of Agriculture and Forestry, Saitama Prefectural Government

The author visited once in two weeks and interviewed by phone once a week since November 2, 2011, and saw a staff member who has been temporarily transferred to Agriculture & Forestry Corporation before to hear the situation about the detail of activities they request to Agriculture & Forestry Corporation and the managing entities, the situation about the detail of activities and the land usage of the subject farmland, the situation about the detail of activities and the functions of public farmland, the situation about the management system of public farmland, and the situation about the collaboration between Agriculture & Forestry Corporation and Agricultural Business Support Division, Department of Agriculture and Forestry, Saitama Prefectural Government.

Agriculture & Forestry Corporation

The author interviewed a staff member of Agricultural Business Support Division, Department of Agriculture and Forestry, Saitama Prefectural Government who has been temporarily transferred to Agriculture & Forestry Corporation before and the person in charge of Minuma rice fields of Agriculture & Forestry Corporation at Agricultural Business Support Division, Department of Agriculture and Forestry, Saitama Prefectural Government on May 14, 2012 to hear the overview of Agriculture & Forestry Corporation, the situation about the detail of activities and the maintaining entities, the situation about the detail of activities and the land usage of the subject farmland, the situation about the functions of public farmland, and the situation about the detail of activities and the management system of public farmland.

Interviews with Ground Work Kawaguchi on Minuma nature school

-The author interviewed face to face with the director of Ground Work Kawaguchi at Kawaguchi Support Center on February 17, 2011 and interviewed by phone once a week from February 18, 2011 to hear the overview of Ground Work Kawaguchi, the situation about the detail of activities and the maintaining entities, the situation about the detail of activities and the land usage of the subject farmland, the situation about the functions of public farmland, and the situation about the detail of activities and the management system of public farmland.

Land and Water Management Division, Saitama Prefectural Government

-The author interviewed the person in charge of Minuma rice fields of Land and Water Management Division, Saitama Prefectural Government face to face or by phone once a month since July 2010 to hear the overview of Minuma rice fields, the history of protection of Minuma rice fields, the situation about acquisition of public farmland by Minuma rice field public ownership promotion project, and the situation about collaboration with civic groups which Saitama prefectural government commissions management of public farmland in Minuma rice fields mainly about Ground Work Kawaguchi.

On-site investigation

Observation of Minuma nature school

-The author received explanation about Minuma nature school, the detail of activities, the situation of land usage, and the relationship between the place where activities are implemented and the detail of activities from the director of Ground Work Kawaguchi on February 5, 2011. The author also visited Minuma nature school once in two weeks for investigation about land usage and activities.

Observation of the public farmland obtained by Minuma rice field public ownership promotion project

-The author visited the site to grasp the activities and the situation of land usage once in two weeks since November 3, 2011.

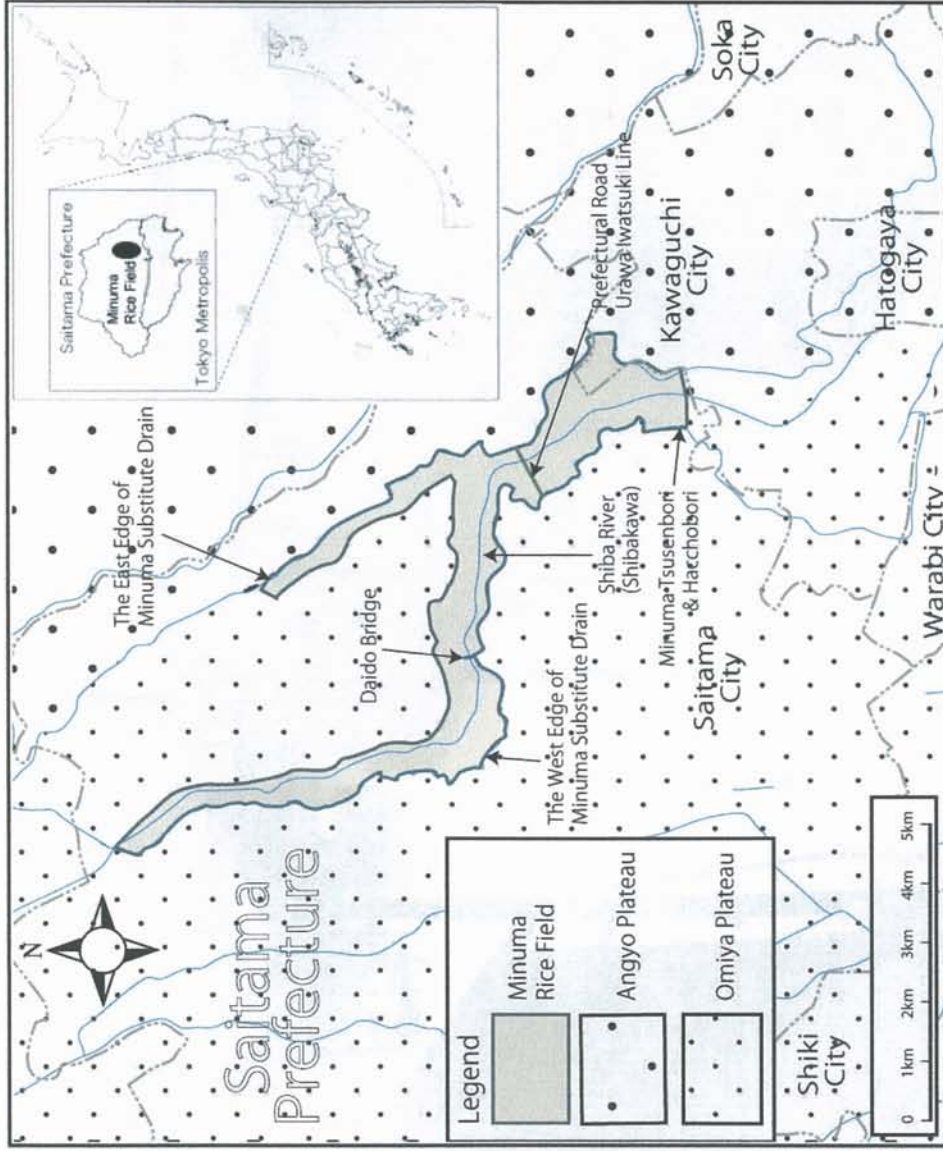


Figure 2-1. The location of Minuma rice field

Source: Digital map of Geospatial Information Authority of Japan (GSI), 1/25,000 (spatial data infrastructure),

Saitama (issued on 1/3/2003)

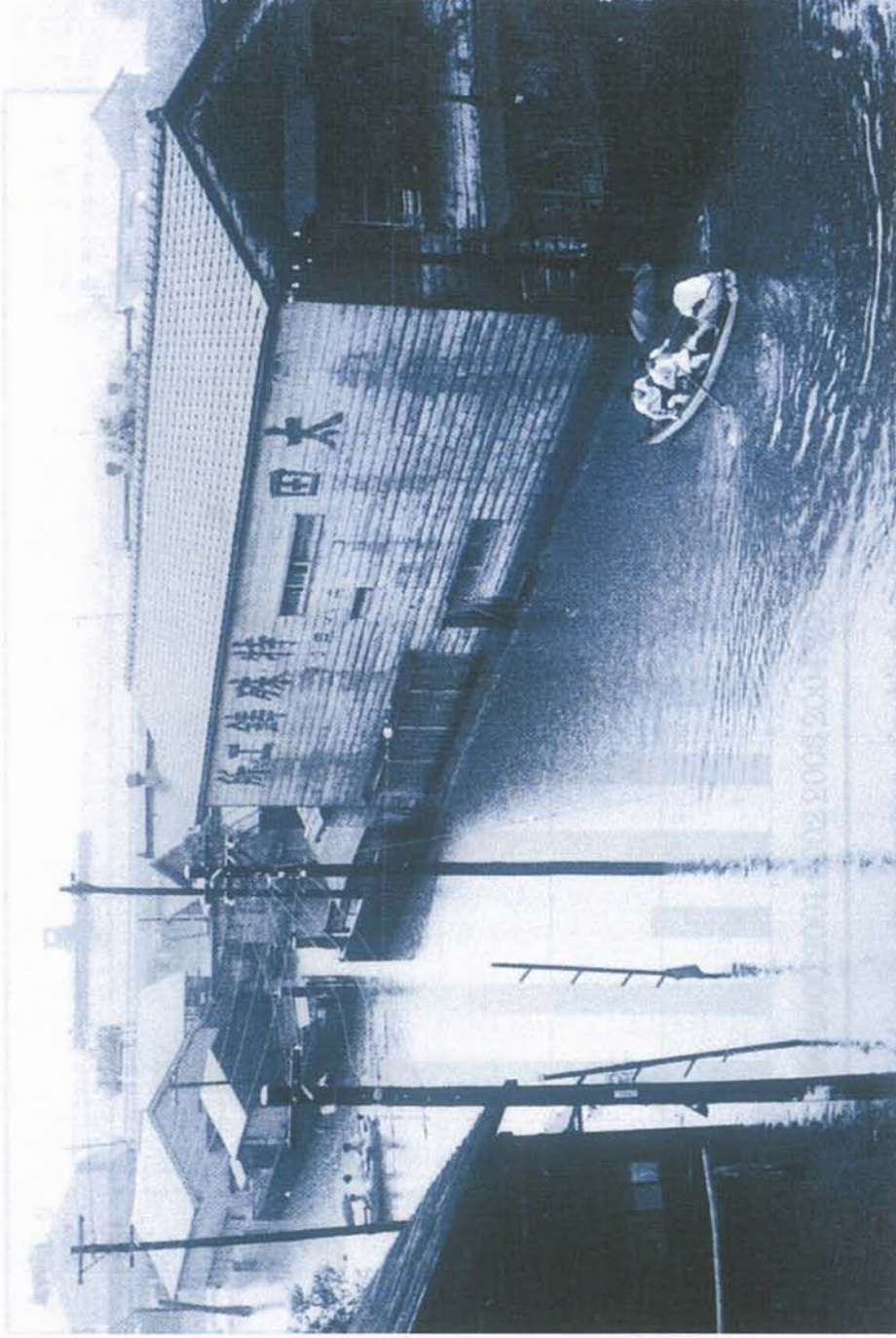


Figure 2-2. Kawaguchi prefecture sank by Kanogawa typhoon of September 1958
Source: Saitama prefecture, Kawaguchi city, Saitama city (1995) "For new sustainability, use and creation of Minuma rice fields"

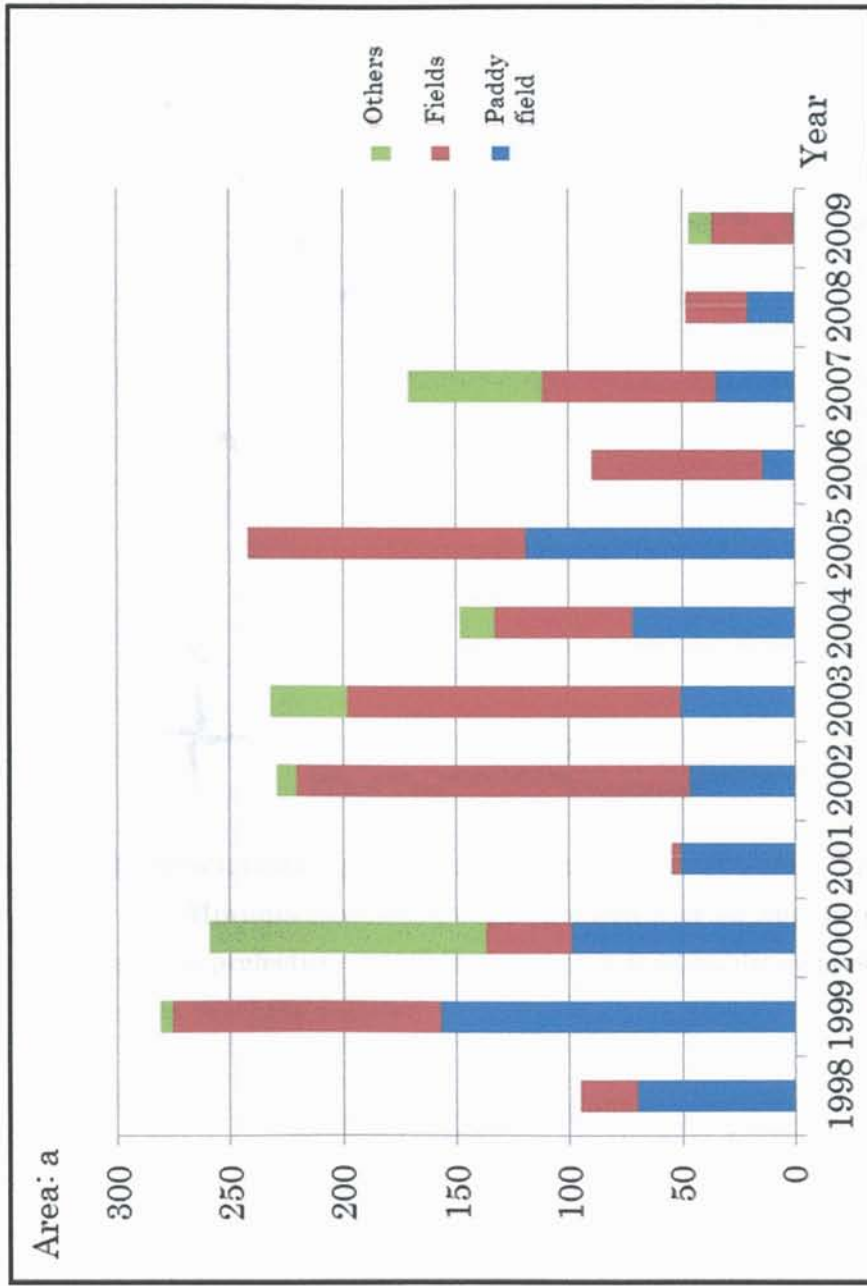


Figure 2-3. Area according to classification of public farmland acquired by Minuma rice field public ownership promotion project

Source: Saitama prefecture (2010) "Minuma rice field public ownership promotion project purchase register"

Note: The area of a lot is about 80~3600 m²

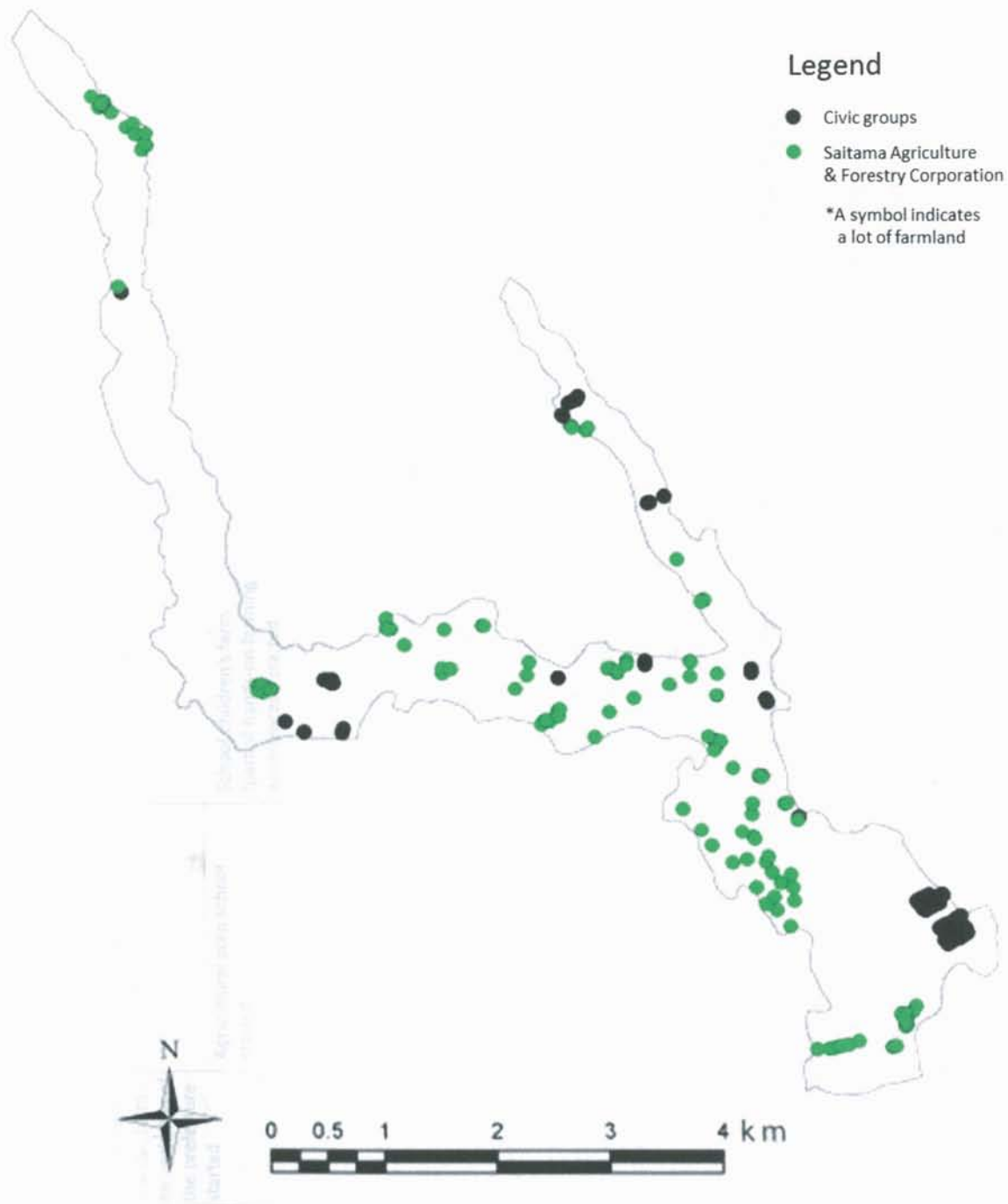


Figure 2-4. Area according to management subjects of public farmland acquired by Minuma rice field public ownership promotion project

Source: Saitama prefecture (2010) "Minuma rice field public ownership promotion project purchase register"

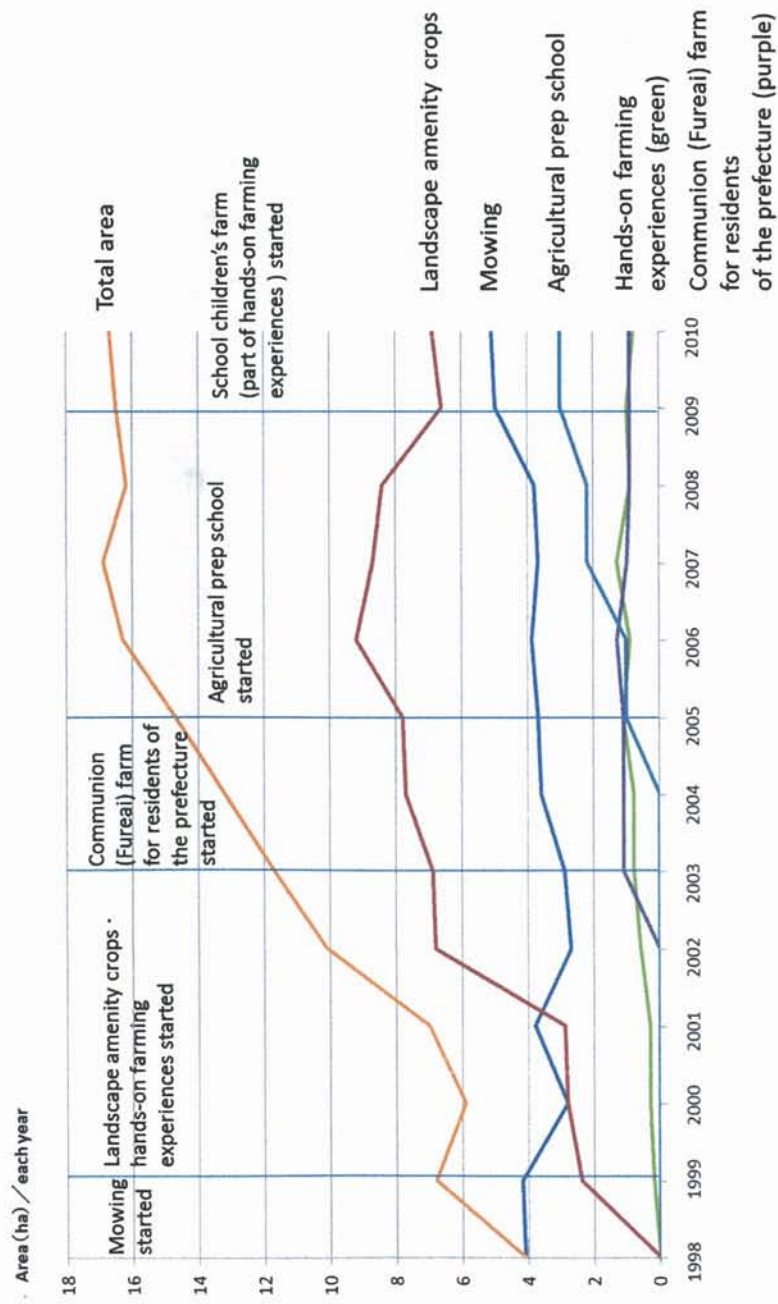


Figure 3-1. Transition of the area of public land in Minuma rice fields by management category and the purpose of activities of Agriculture & Forestry Corporation

Source: Interview survey of Department of Agriculture and Forestry of Saitama Prefecture and Saitama Agriculture & Forestry Corporation (2/11/2011 & 14/5/2012, Saitama prefectural Office, Officers of department of Agriculture and Forestry of Saitama Prefecture and Saitama Agriculture & Forestry Corporation)



Figure 3-2. Mowing by the staff of Agriculture & Forestry Corporation & Forestry Corporation (July 2010)

Photographed by Agriculture & Forestry Corporation



Figure 3-3. Landscape-amenity crops: the field carpeted with cosmos (August 2010)

Photographed by Agriculture & Forestry Corporation



Figure 3-4 . Parents and children enjoying potatoes harvesting experience (June 2010)

Photographed by Agriculture & Forestry Corporation



Figure 3-5. Communion (Fureai) farm for residents of the prefecture for individuals (November 2010)
Photographed by Agriculture & Forestry Corporation



Figure 3-6. Students participating in the training at Miura training field (October 2010)
Photographed by Agriculture & Forestry Corporation



Figure 3-7. School children's farm of Omaki elementary school (May 2010)

Photographed by Agriculture & Forestry Corporation

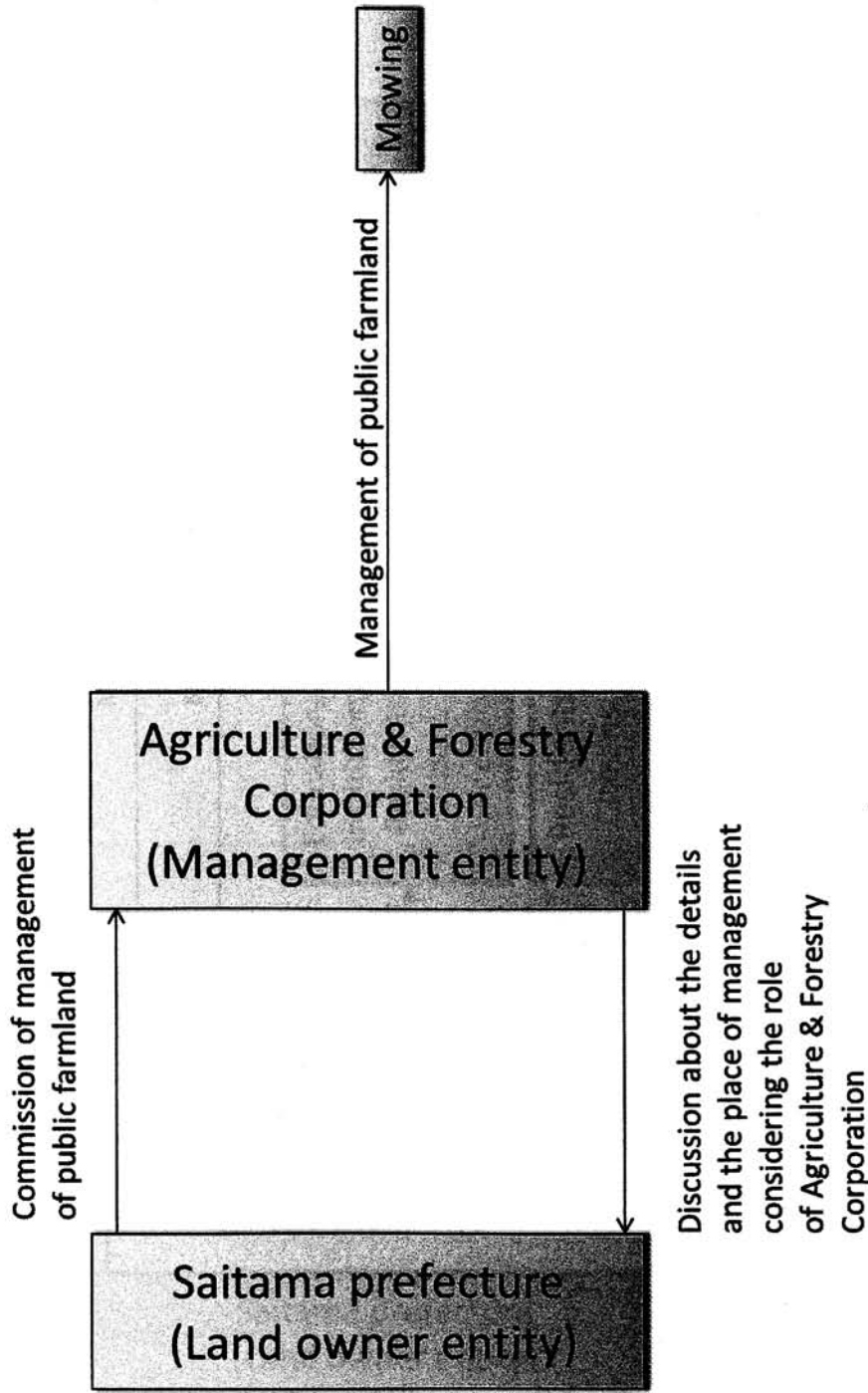


Figure 3-8. Flow of activities held by Agriculture & Forestry Corporation (1998)

Source: Interview survey of the Department of Agriculture and Forestry of Saitama Prefecture and Forestry of Saitama Agriculture & Forestry Corporation (2/11/2011 & 14/5/2012, Saitama Prefectural Office, Officers of Department of Agriculture and Forestry of Saitama Prefecture and Saitama Agriculture & Forestry Corporation)

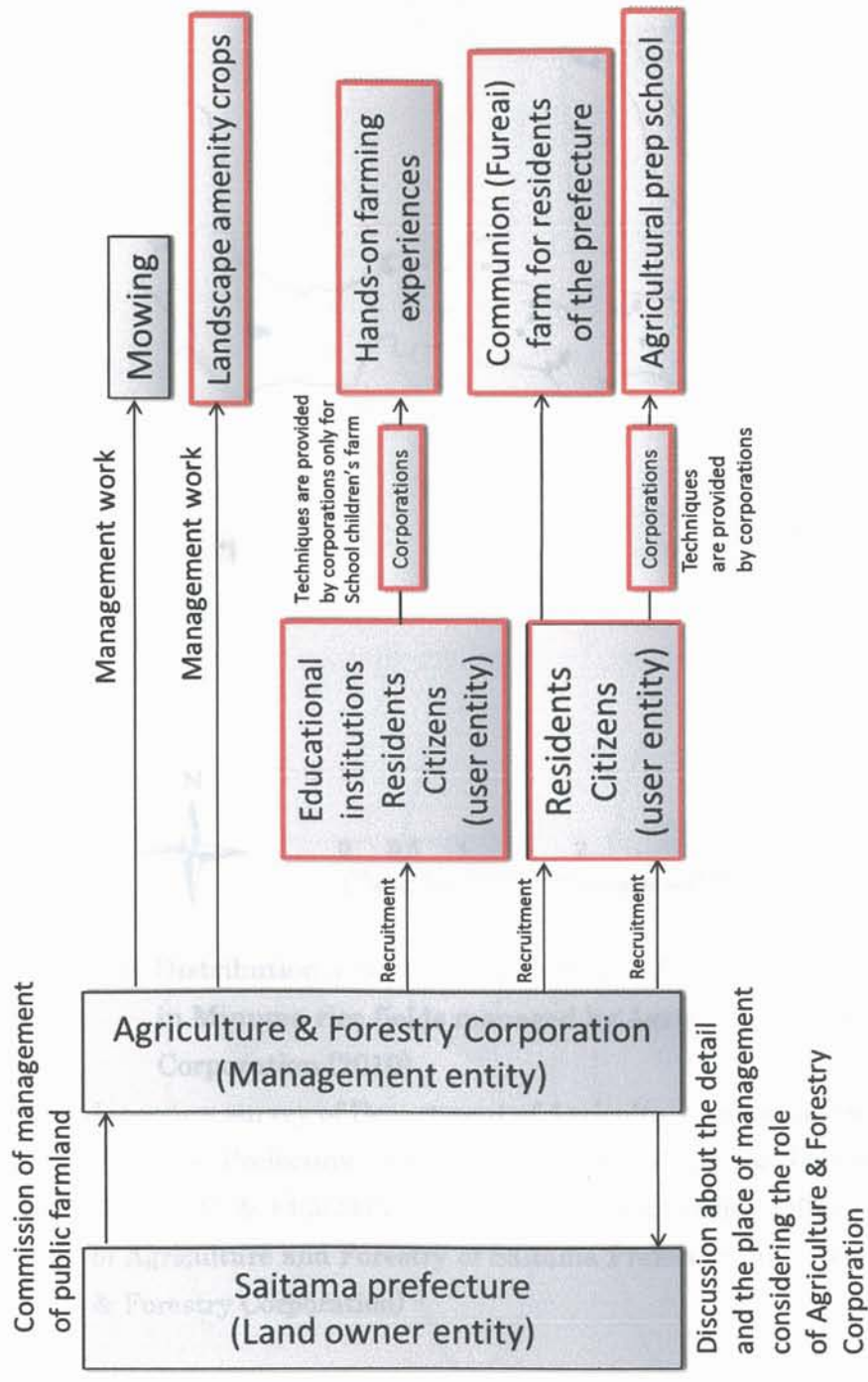


Figure 3-9. Flow of activities held by Agriculture & Forestry Corporation (2010)

Source: Interview survey of Department of Agriculture and Forestry of Saitama Prefecture and Saitama Agriculture & Forestry Corporation (2/11/2011 & 14/5/2012, Saitama Prefectural Office, Officers of Department of Agriculture and Forestry of Saitama Prefecture and Saitama Agriculture & Forestry Corporation)

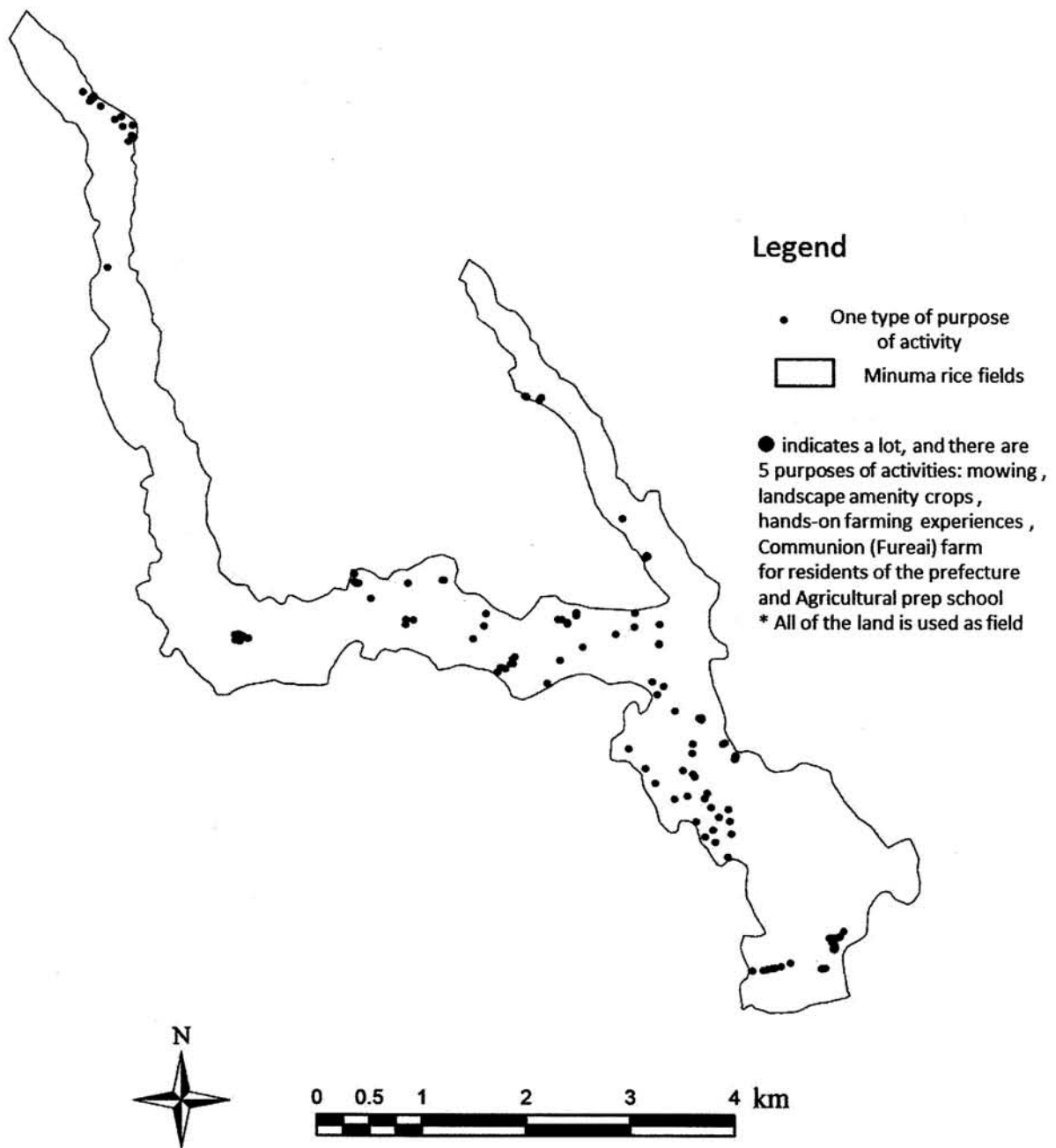


Figure 3-10. Distribution and the purpose of use of the public farmland in Minuma rice fields managed by Agriculture & Forestry Corporation (2010)

Source: Interview survey of Department of Agriculture and Forestry of Saitama Prefecture and Saitama Agriculture & Forestry Corporation (2/11/2011 & 14/5/2012, Saitama Prefectural Office, Officers of Department of Agriculture and Forestry of Saitama Prefecture and Saitama Agriculture & Forestry Corporation)

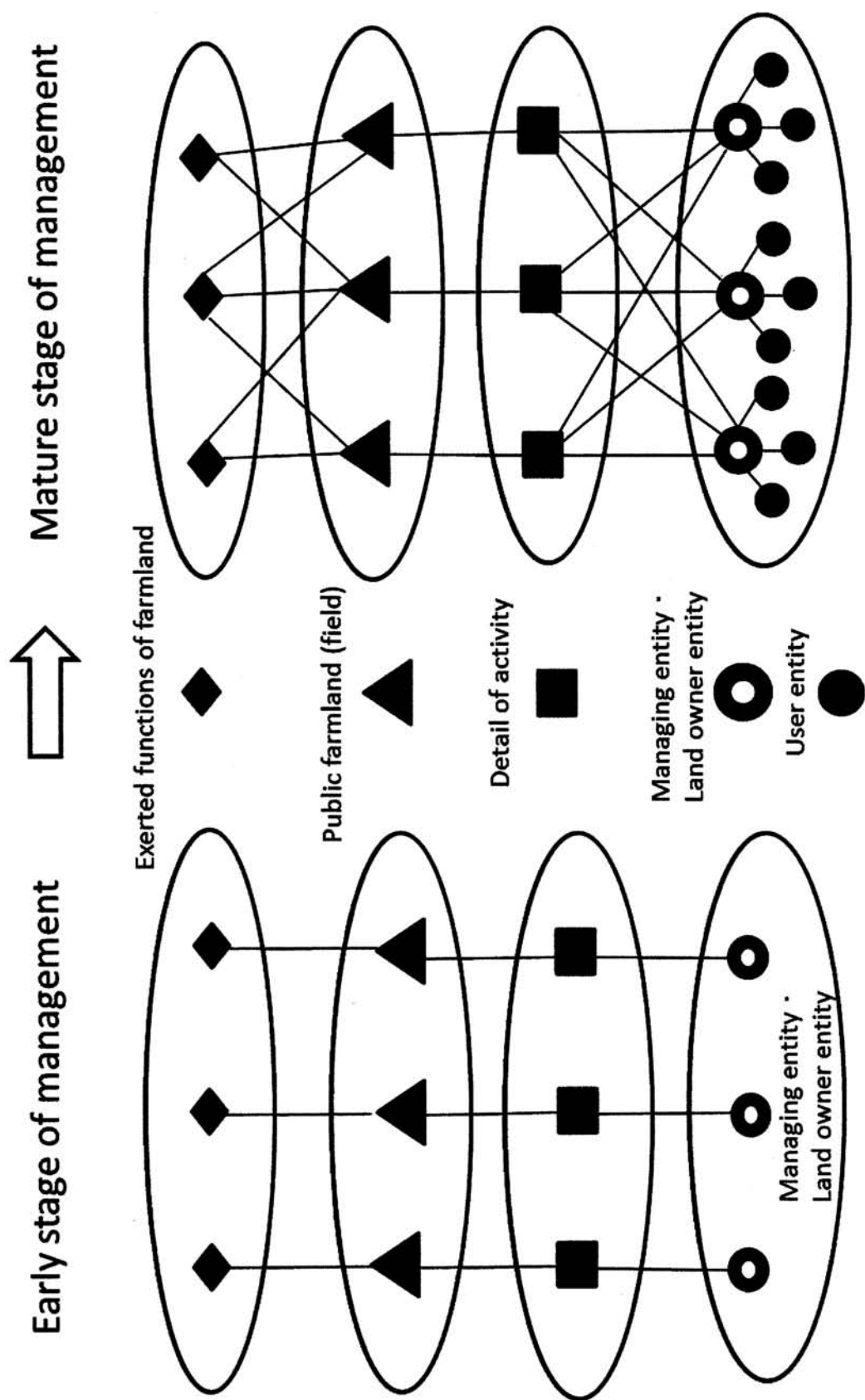


Figure 3-11. Sustainable system of public farmland by the Agriculture & Forestry Corporation

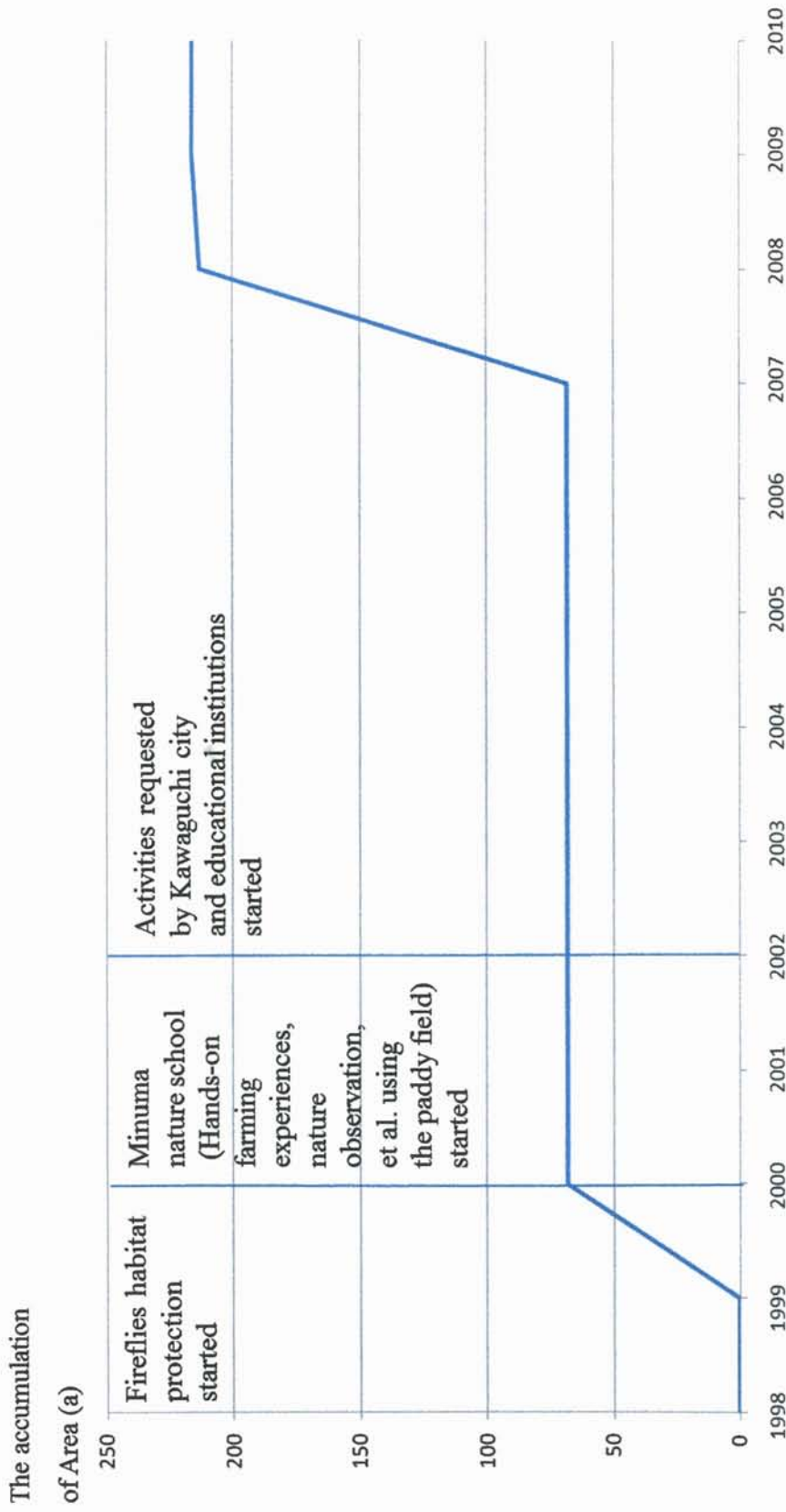


Figure 4-1. Transition of the area of public farmland managed by Ground Work Kawaguchi
 Source: Interview survey of Land and Water Management Division, Department of Planning and Finance, Saitama Prefecture and Ground Work Kawaguchi (18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)



Figure 4-2. Improvement of vegetation of grassland (September 2010)

Photographed by Ground Work Kawaguchi



Figure 4-3. Children observing nature (September 2010)
Photographed by Ground Work Kawaguchi



Figure 4-4. Children learning in the experiences of agriculture (June 2010)
Photographed by Ground Work Kawaguchi



Figure 4-5. Children experiencing crafts making (August 2010)
Photographed by Ground Work Kawaguchi



Figure 4-6. Night observation gathering of fireflies habitat protection (August 2010)

Photographed by Ground Work Kawaguchi



Figure 4-7. Participants tasting rice cakes and cooked wild herbs (April 2010)
Photographed by Ground Work Kawaguchi



Figure 4-8. Collecting acorns used in activities including crafts making (October 2010)
Photographed by Ground Work Kawaguchi



Figure 4-9. Experiences of volunteers (July 2010)
Photographed by Ground Work Kawaguchi

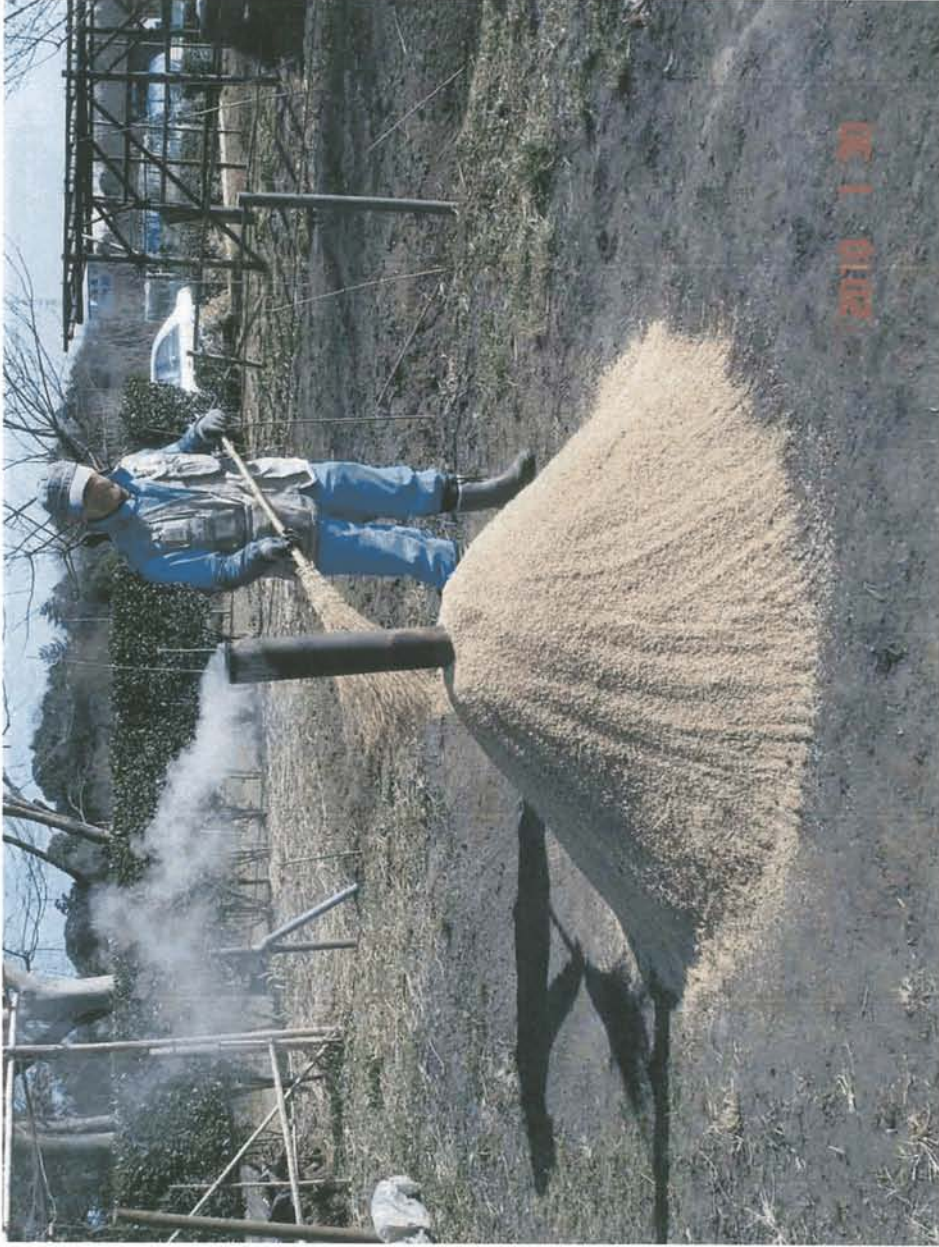


Figure 4-10. Charcoal making (January 2010)

Photographed by Ground Work Kawaguchi



Figure 4-11. Experiences in the workplace (January 2010)
Photographed by Ground Work Kawaguchi

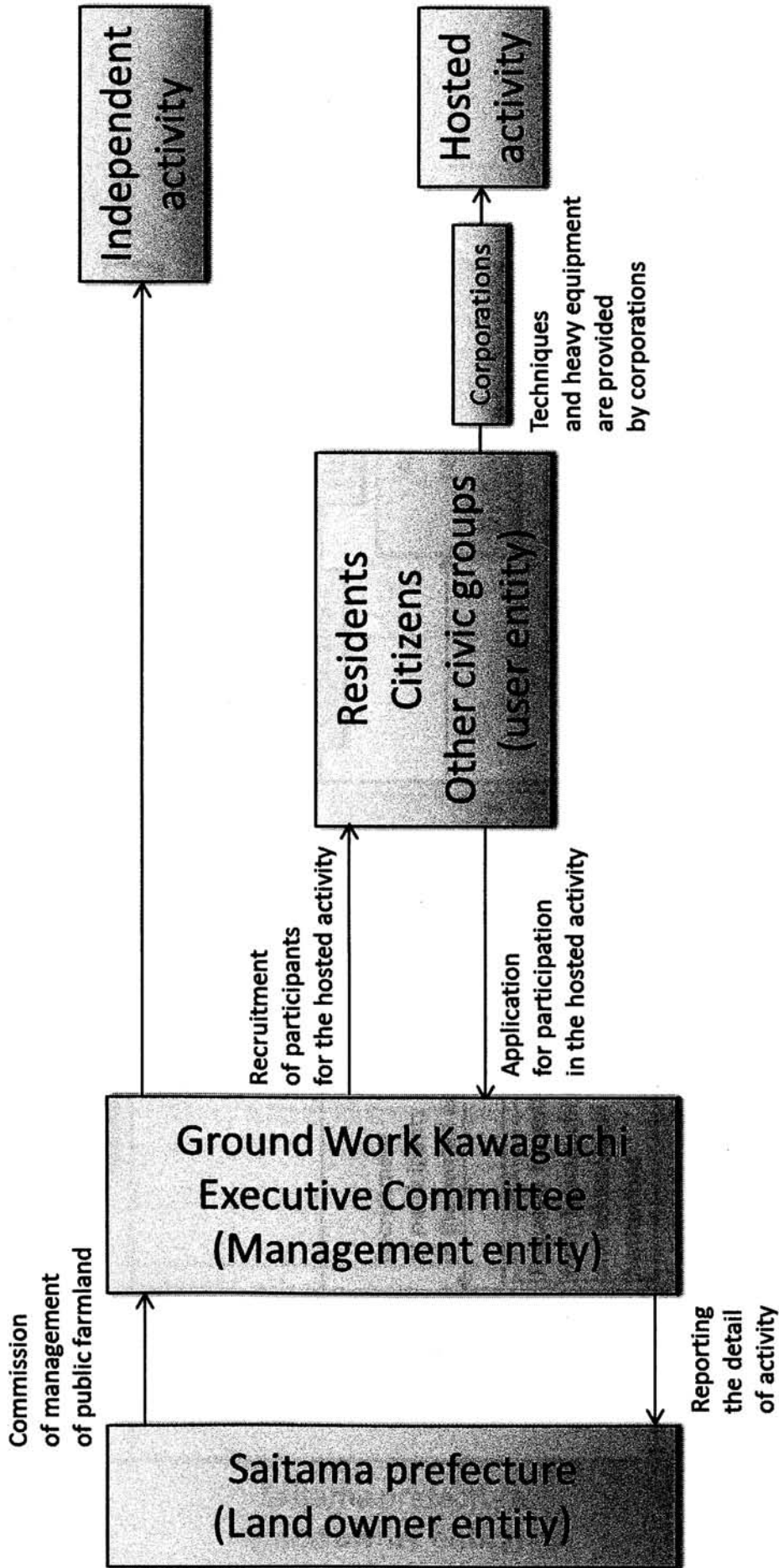


Figure 4-12. Flow of activities held by Ground Work Kawaguchi Executive Committee (2000)

Source: Interview survey of Land and Water Management Division, Department of Planning and Finance, Saitama Prefecture and Ground Work Kawaguchi (5/2/2011 & 18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

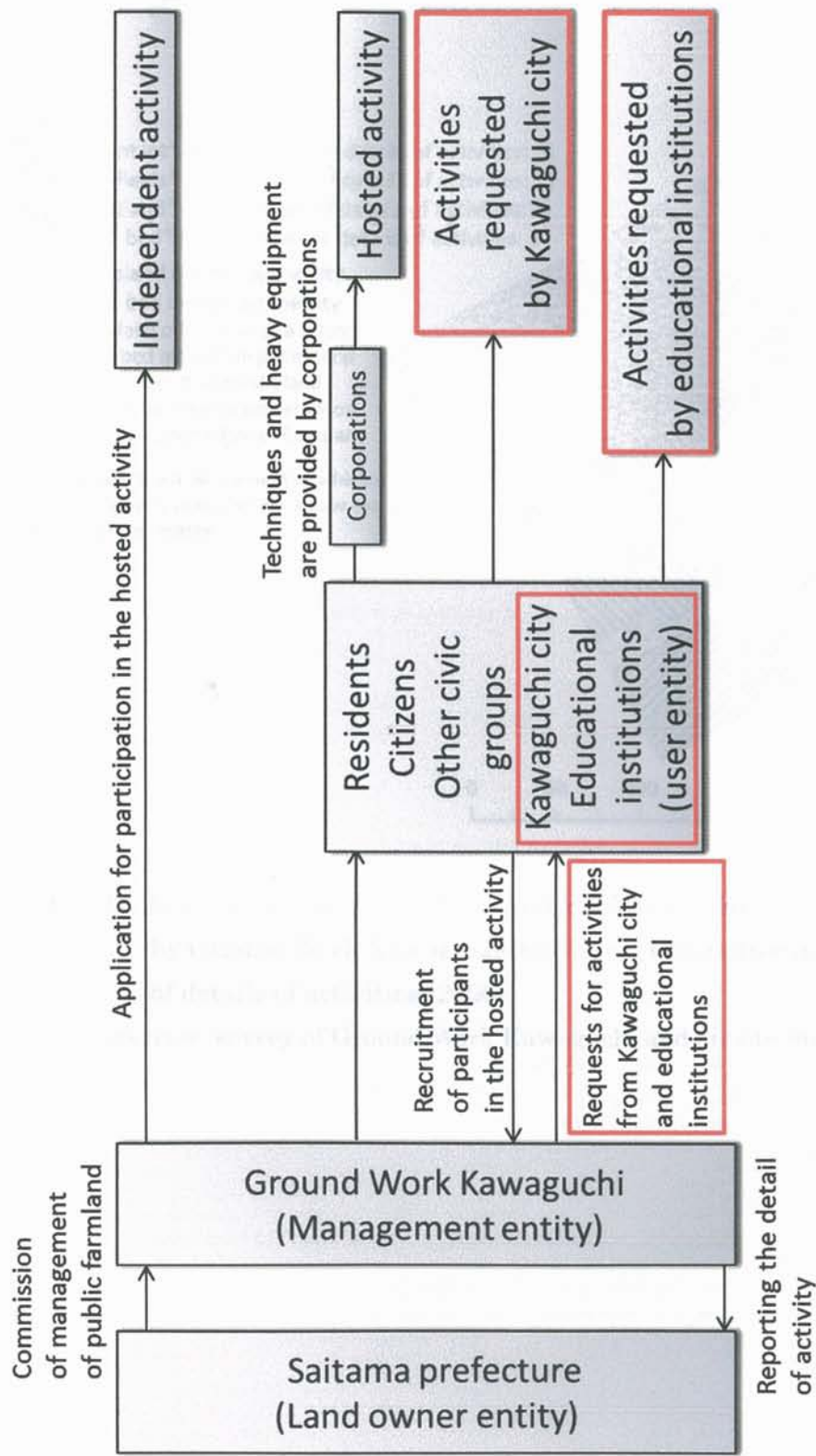


Figure 4-13. Flow of activities held by Ground Work Kawaguchi (2010)

Source: Interview survey of Land and Water Management Division, Department of Planning and Finance, Saitama Prefecture and Ground Work Kawaguchi (18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

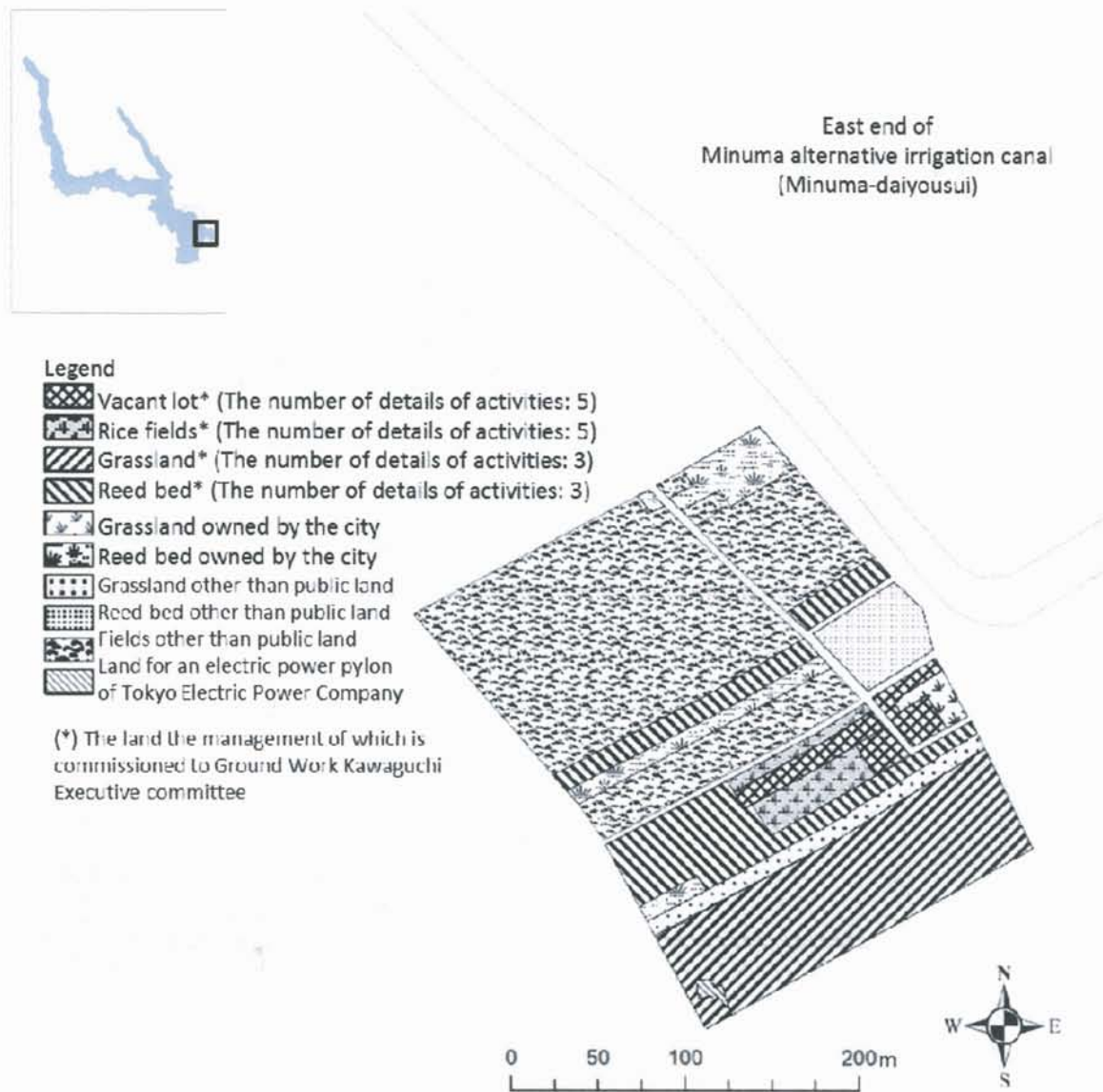


Figure 4-14. Land use of the public farmland at Minuma rice fields managed by Ground Work Kawaguchi Executive Committee and the number of details of activities (2000)

Source: Interview survey of Ground Work Kawaguchi and on-site investigation

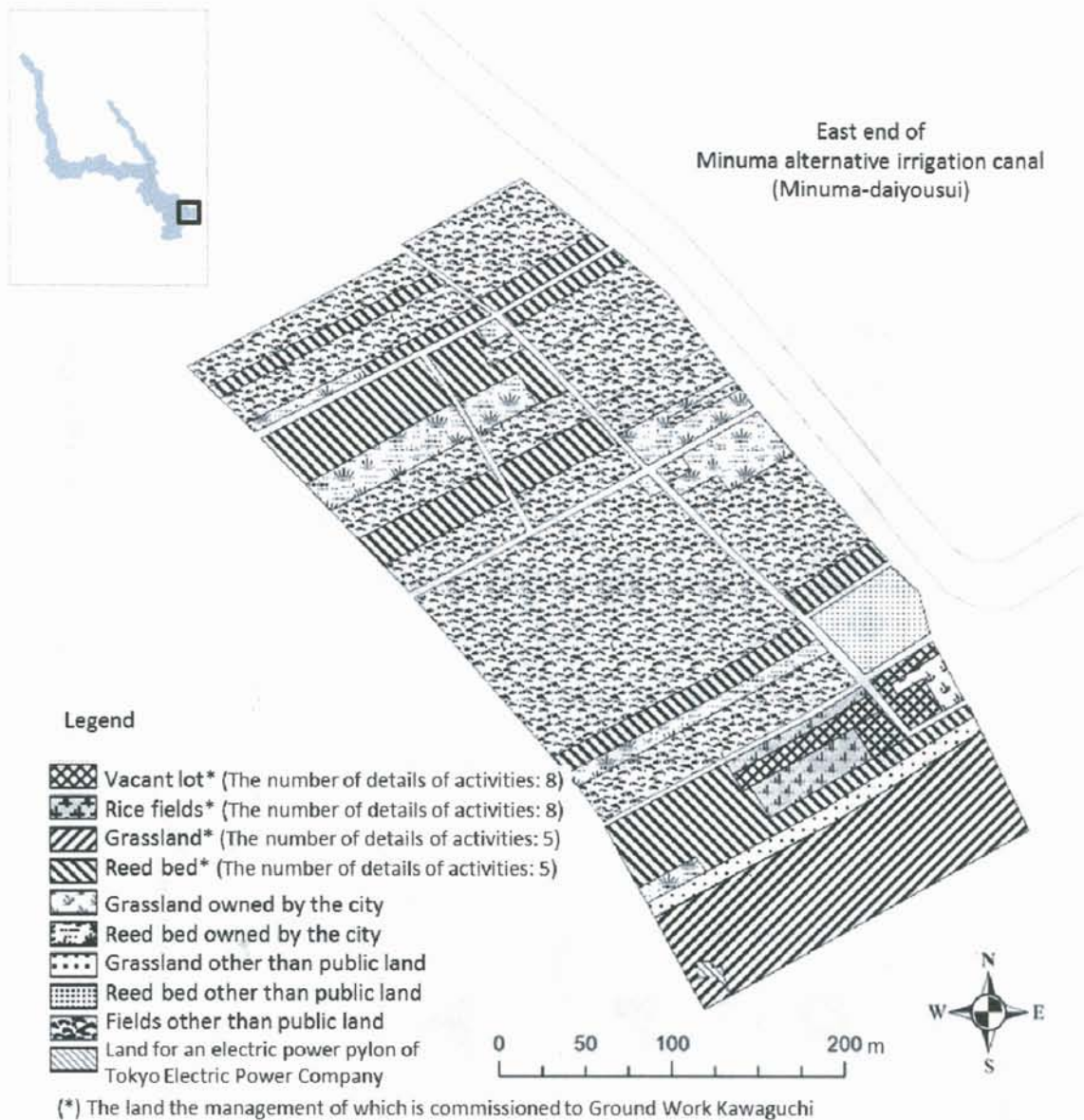


Figure 4-15. Land use of the public farmland at Minuma rice fields managed by Ground Work Kawaguchi and the number of details of activities (2010)

Source: Interview survey of Ground Work Kawaguchi and on-site investigation

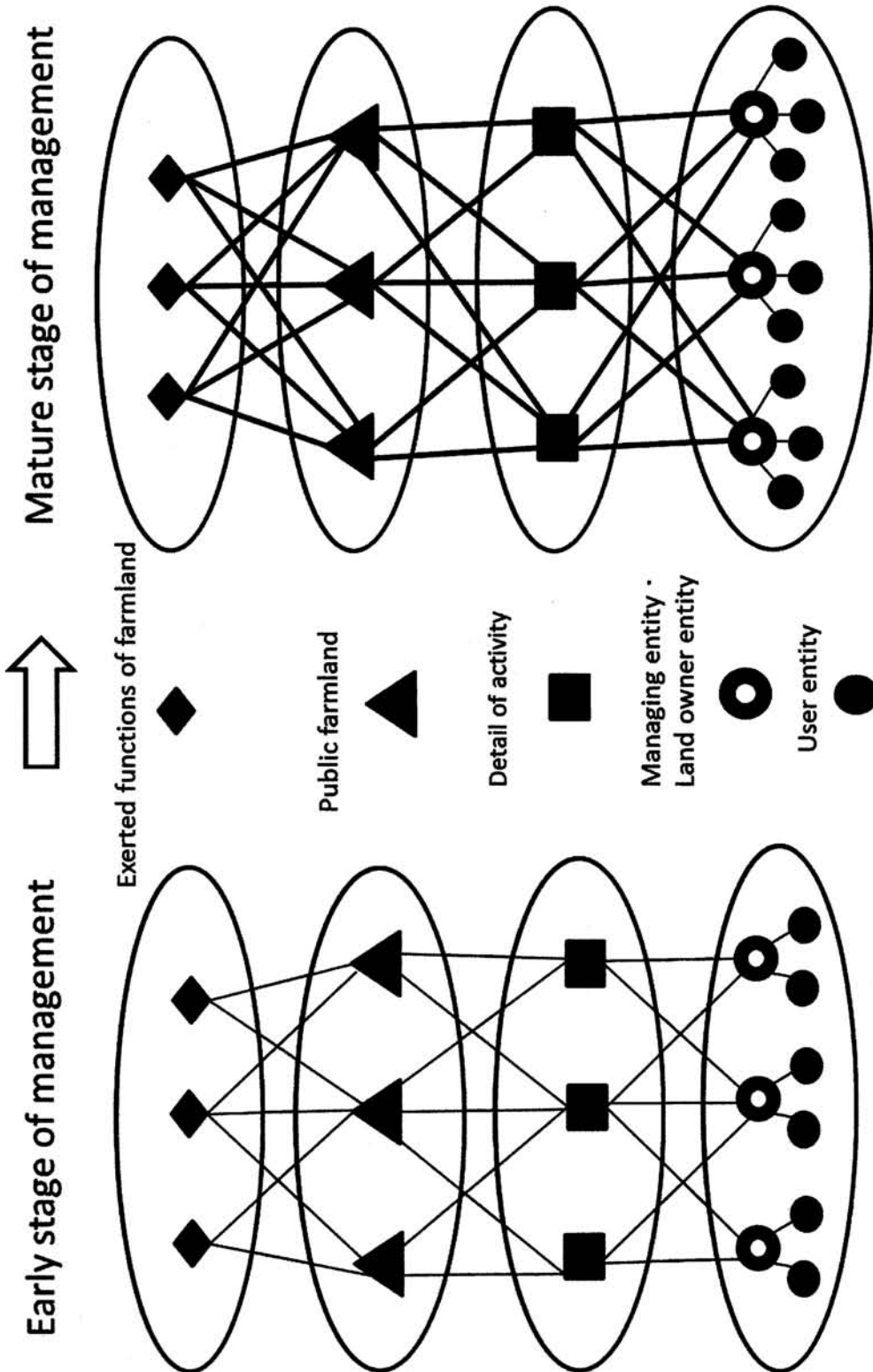


Figure 4-16. Sustainable system of public farmland by a civic group

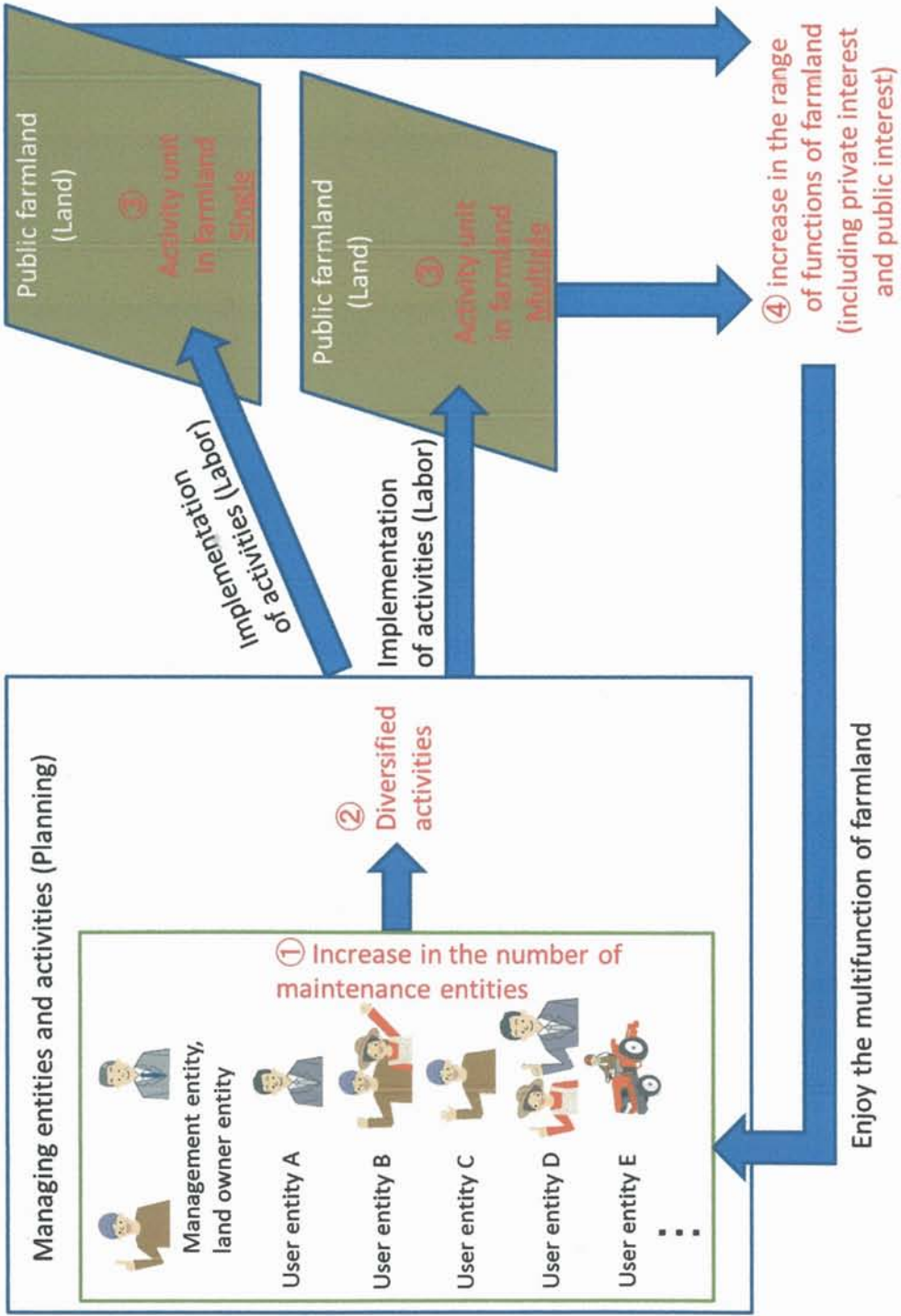


Figure 5-1. Sustainable system of public farmland

Source: Created by the author

Table 1-1. Private and public interests in agricultural land

Broad functions	Private interests	Collective interests
PRODUCTION	Farm level production -food -non-food products -services	Potential food production Access to food supply Support of food processing and agricultural supply industries Maintenance of a farm population and community Food aid
PROTECTION	Private reserves	Balance of payments Wildlife habitat support Water supply Flood plain management Soil conservation (erosion, degradation) Conserving open space to control urban structure
PLACE	Housing Industrial and commercial development Agricultural production oriented to specific markets Recreational enterprises	Access to housing Support for economic development and employment Infrastructure support
PLAY	Hobby farming Recreational enterprises on farms Public use of private (farmland) lands	Amenity value of agricultural landscapes Providing access to recreational opportunities for the residents

Source: Agriculture in the City's Countryside (Bryant and Johnston 1992)

Table 1-2. Private and public interests in public farmland by broad function

Broad functions	Private interests	Collective interests
PRODUCTION	Hobby level production -hobby level food -non-food products	Potential food production Maintenance and fostering of a farm population and community Maintenance of production system
PROTECTION	Preservation of local environment Value as local amenities	Wildlife habitat support Water supply Flood plain management Soil conservation (erosion, degradation) Conserving open space to control urban structure
PLAY	Recreation People exchanges Hobby farming	Amenity value of agricultural landscapes Creation of the place for people exchanges Providing access to recreational opportunities for the residents
EDUCATION	Hands-on farming experience Learning	Providing educational opportunities through hands-on farming experience Awareness program Fostering farmers

Source: Created based on Agriculture in the City's Countryside (Bryant and Johnston 1992)

Table 2-1. Civic groups commissioned management of the public farmland acquired by Minuma rice field public ownership promotion project by civic groups

Group name	Start year	Detail of management	Area (a)
Ground Work Kawaguchi	1998	Trial experiences of rice fields and creation of home for fireflies for citizens	347
Minuma Farm 21	1999	Trial experiences of rice fields for citizens	196
Minuma rice field care farm promotion council	1999	Advance friendship among persons with disabilities and the local area through experiences of agriculture by persons with disabilities	81
Nanbu-ryotsuji volunteer rice field supporters' association	2000	Trial experiences of rice fields for citizens	29
Regional people network	2005	Trial experiences of cultivation of rape blossoms	25

Source: Saitama prefecture, 2010, "Minuma Rice Field Public ownership promotion project purchase register"

Table 3-1. Destinations of distributed flyers of hands-on farming experiences

	Distribution list of the leaflet	Number of distributed leaflets
Institutions where the leaflets were placed	Agricultural Policy Division, Financial Office, Bureau of Economic Affairs, Saitama City	50
	Division for Children's Day -care, Department of Early Childhood Care, Bureau of Child Development	50
	Saitama City Minuma Ward Office	50
	Minuma Green Center	50
	Higashi-omiya Community Center	50
	Saitama Agricultural Cooperative	50
Educational institutions where the leaflets were distributed	Owada Kindergarten	150
	Shirayuri Kindergarten	120
	Uetake Kindergarten	400
	Fukuju Kindergarten	150
	Shirakaba Kindergarten	315
	Osato Nursery school	100
	Owada Nursery school	85
	Juno Nursery school	110
	Minuma Akane Nursery school	70
	Kodomonoshiro Nursery school	20

Source: Interview survey of Department of Agriculture and Forestry of Saitama Prefecture and Saitama Agriculture & Forestry Corporation (2/11/2011 & 14/5/2012, Saitama Prefectural Office, Officers of Department of Agriculture and Forestry of Saitama Prefecture and Saitama Agriculture & Forestry Corporation)

Table 3-2. Outline of harvesting experience of potatoes and growing experience of sweet potatoes at public farmland in Minuma rice fields (2010)

Month	Day	Detail	Place	Participants (number of people)
3	12	Potato planting experience	156, Miura, Midori-ku, Saitama city	245
6	12	Sweet potato growing experience		56
		Potato harvesting experience		382
8	12	Sweet potato growing experience		26
10	12	Sweet potato harvesting experience		201

Source: Interview survey of Department of Agriculture and Forestry of Saitama Prefecture and Saitama Agriculture & Forestry Corporation (2/11/2011 & 14/5/2012, Saitama Prefectural Office, Officers of Department of Agriculture and Forestry of Saitama Prefecture and Saitama Agriculture & Forestry Corporation)

Table 3-3. Outline of Communion (Fureai) farm for residents of the prefecture implemented at public farmland in Minuma rice fields (2010)

Name	Place	Number of lots	Area of the lot (㎡)	Charge for use (yen./year)	Eligible people	Outline
Katayanagi	2-280, Katayanagi, Minuma-ku	42	52	13,000 yen	Only the people who live in/ work in/ go to school in the prefecture, and who can daily keep the farm in good condition	The size of the lot is small, and suitable for individuals or beginners
Katayanagi No.2	1-626-1, Katayanagi, Minuma-ku	17	54	14,000 yen		The size of the lot is small, and suitable for individuals or beginners
Minuma No.1	395-1, Minuma, Midori-ku	12	57	15,000 yen		The size of the lot is small, and suitable for individuals or beginners
Minuma No.2	92, Minuma, Midori-ku	20	52	16,000 yen		The size of the lot is small, and suitable for individuals or beginners
100 tsubo	97, 129, Minuma, Midori-ku	8	250-300-340	25,000 yen/ 30,000 yen/30,000 yen		The size of the lot is large, and suitable for groups or seniors

Source: List of available lots of 2010 Saitama communion farm for residents of the prefecture (2010)

(2/11/2011 & 14/5/2012, Saitama Prefectural Office, Officers of Department of Agriculture and Forestry of Saitama Prefecture and Saitama Agriculture & Forestry Corporation)

Table 3-4. Annual schedule of the agricultural prep school (2011)

Month	Detail of training	Participants	Place
1	Opening ceremony of the school		Space Theater
2	Basic techniques		Space Theater
3	Planting potatoes and spring onions		Miura training field
4	Planting fruits and vegetables, management of potatoes, sowing Japanese mustard spinach, spinach and turnips		Miura training field
5	Management of fruits and vegetables, potatoes, Japanese mustard spinach, spinach, turnips, Planting taros, prevention of pests		Miura training field
6	Harvesting fruits and vegetables, potatoes, Japanese mustard spinach, spinach and turnips, management of taros	47 people from Saitama prefecture	Miura training field
7	Management of fruits and vegetables and taros		Miura training field
8	Keeping soil in good condition for autumn vegetables	4 people from Tokyo	Miura training field
9	Planting greens, sowing Japanese radishes, management of taros, prevention of pests Cultivation under nets against insects sowing spinach, turnips, garland chrysanthemums, onions and spring onions, management of Japanese radishes	Metropolis	Miura training field
10	Management of greens and Japanese radishes, cultivation by late sowing under nets		Miura training field
11	Harvesting greens and taros		Miura training field
12	Making compost of fallen leaves		Miura training field

Source: Saitama Agriculture & Forestry Corporation (2011) Minuma rice fields agricultural prep school training plan for 2011 course
(for new students)

Table 3-5. Annual schedule of School children's farm of Saitama municipal Omaki elementary school (2010)

Month	1	2	3	4	5	6	7	8	9	10	11	12			
Week															
Event	Spring holidays	Entrance ceremony	Homa visit	The opening of a swimming pool for the season	Harvesting potatoes	Harvesting eggplants	Harvesting eggplants	School excursion trip	Athletic meet	School concert	Private interview	Opening ceremony	Winter holidays	Closing ceremony	Graduation ceremony
1st grade															
2nd grade															
3rd grade															
4th grade															
5th grade															
6th grade															
Others															
1st grade															
2nd grade															
3rd grade															
4th grade															
5th grade															
6th grade															
Others															

Source: Saitama prefecture outside of school education association (2011)

Trial experiences of agriculture using the Saitama 700 thousand children experience activity, Green School Farm pp.2-5

Table 3-6. Annual schedule of activities of Saitama Agriculture & Forestry Corporation in public farmland acquired by Minuma rice field public ownership promotion project (2012)

Detail of activity	Detail	3 (Month)												Remarks
		4	5	6	7	8	9	10	11	12	1	2	3	
Mowing (4.9ha) Landscape-forming crops (7.1ha)	Mowing by machines	← (Implemented as necessary. About 3 times a year) →												Implemented from April to January when necessary according to the growth of weeds
	Mowing by croppers	← (Implemented as necessary. About 3 times a year) →												
	Rape blossoms	◎									※△	△		
	Sunflowers										※△	△		
Hands-on experiences of agriculture (2,000m ²)	Clovers												◎	
	Cosmoses												◎	
	Potatoes	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	
School children's farm (5,400m ²)	Sweet potatoes													
	Potatoes													
	Sweet potatoes													
Communion (Fureai) farm for residents of the prefecture (98lots, 9,149m ²)	Potatoes													
	Sweet potatoes													
	Vegetables													
Training farm of the agricultural prep school (2.1ha)	Katayanagi No.2 Minuma No.1													
	Minuma No.2 100 taubo													
	Mowing by croppers	← (Implemented as necessary. About twice a year) →												Implemented as necessary according to the growth of weeds

Source: Annual schedule of Minuma center for agriculture of fiscal 2012 (2012)

Table 3-7. Detail of activities at the farmland, functions of the farmland, and the state of participation by the entities which manage the public farmland that was taken into public ownership by the Minuma rice field public ownership project by Agriculture & Forestry Corporation

1998	2010	Function				Managing entities					
		Production	Protection	Play	Education	Public corporation	Saitama Prefecture	Residents	Citizens	Corporations	Educational institutions
Mowing	Mowing	△	×	×	×	◎	●	×	×	×	×
	Landscape amenity crops	○	○	×	×	◎	●	×	×	×	×
-	Hands-on farming experiences (experiences of harvesting and cultivation)	○	○	○	○	◎	●	○	○	×	○
	Communion (Fureai) farm for residents of the prefecture	○	○	○	○	◎	●	○	○	×	×
	Agricultural prep school	○	○	○	○	◎	●	○	○	○	×
	School children's farm (part of hands-on farming experiences)	○	○	○	○	◎	●	○	○	○	○

Source: Interview survey of Department of Agriculture and Forestry of Saitama Prefecture and Forestry of Saitama Prefecture and Saitama Agriculture & Forestry Corporation

Note: In the column of Function, ○ indicates that the function is exerted, △ indicates that the function is not adequately exerted, and × indicates that there is not such a function

In the column of Managing entities, ◎ indicates the management entity, ● indicates the entity owns the land, ○ indicates participation as user entities, and × indicates absence

Table 4-1. Detail of activities independently conducted by Ground Work Kawaguchi Executive Committee and public farmland (2000)

		2000							
Month	Day	Name of activity	Place of activity	Purpose of activity					
				Improvement of natural environment	Nature observation	Hands-on farming experiences	Crafts making	Fireflies habitat preservation	Exploration of food culture
4	30	Preparation of rice fields	Minuma nature school (rice field)			○			
3	18	Mowing in the reed bed	Minuma nature school (reed bed)	○					

Source: Interview survey of Ground Work Kawaguchi and Saitama Prefecture (5/2/2011, Minuma nature school, & 18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

Table 4-2. Detail of activities hosted by Ground Work Kawaguchi Executive Committee and public farmland (2000)

Month	Day	Name of activity	Place of activity	Purpose of activity					
				Improvement of natural environment	Nature observation	Hands-on farming experiences	Crafts making	Fireflies habitat protection	Exploration of food culture
4	30	Fireflies habitat preservation, cleaning	Minuma nature school (all area)	○				○	
5	7	Crafts making using natural materials, making a flute	Minuma nature school (vacant lot)				○		
5	14	Rice planting	Minuma nature school (rice field)			○			
7	2	Crafts making using natural materials, balance toys	Minuma nature school (vacant lot)				○		
9	15	Rice harvesting	Minuma nature school (rice field)			○			
10	15	Fireflies habitat preservation, investigation and observation of birds, insects and plants	Minuma nature school (all area)		○			○	
11	12	Harvest festival	Minuma nature school (rice fields, vacant lot)			○			○
12	17	Crafts making using natural materials, making sacred straw festoons	Minuma nature school (vacant lot)				○		
2	4	Crafts making using natural material, making reed screens	Minuma nature school (vacant lot)				○		

Source: Interview survey of Ground Work Kawaguchi and Saitama Prefecture (5/2/2011, Minuma nature school, & 18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

Table 4-3. Detail of activities conducted independently by Ground Work Kawaguchi and public farmland (2010)

Month	Day	Name of activity	Place of activity	2010																	
				Improvement of natural environment	Nature observation	Hands-on farming experiences	Crafts making	Fireflies habitat protection	Exploration of food culture	Collecting natural materials	Experiences of volunteers	Charcoal making	Experiences in the workplace								
4	17, 21, 24, 28, 29	Cultivation of rice fields, making ridges between rice fields, making nursery bed	Minuma nature school (rice fields)																		
5	1	Sowing (rice)	Minuma nature school (rice fields)																		
6	7	Sowing (rice)	Minuma nature school (rice fields)																		
6	2, 5, 9, 12	Pudding	Minuma nature school (rice fields)																		
7	16	Uprooting of seedling	Minuma nature school (rice fields)																		
7	20~10/8/2010	Fireflies habitat preservation, Investigation of fireflies	Minuma nature school (all area)																		
8	25	Setting rice field bird nets	Minuma nature school (rice fields)																		
9	5	Setting rice field bird nets	Minuma nature school (rice fields)																		
10	1	Gathering acorns	Minuma nature school (all area)																		
10	2	Drying the harvested rice hanging on racks	Minuma nature school (vacant lot)																		
11	6	Harvesting rice (glutinous rice, black rice)	Minuma nature school (rice fields)																		
11	3	Grain threshing	Minuma nature school (vacant lot)																		
11	6	Harvesting rice (red rice)	Minuma nature school (rice fields)																		
11	10	Harvesting rice (black rice)	Minuma nature school (rice fields)																		
11	13	Drying the harvested rice hanging on racks	Minuma nature school (rice fields)																		
11	20, 27	Hulling rice, rice milling	Minuma nature school (vacant lot)																		
1	15	Hulling rice, rice milling	Minuma nature school (vacant lot)																		
1	22	Pruning trees in grassland	Minuma nature school (grassland)																		
2	19	Making rice-husk charcoal	Minuma nature school (vacant lot)																		
2	19	Pruning trees for rice-hanging racks	Minuma nature school (vacant lot)																		

Source: Interview survey of Ground Work Kawaguchi and on-site investigation (5/2/2011, Minuma nature school, & 18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

Table 4-4. Detail of activities hosted by Ground Work Kawaguchi and public farmland (2010)

Month	Day	Name of activity	Place of activity	2010											
				Improvement of natural environment	Nature observation	Hands-on farming experiences	Crafts making	Fireflies habitat protection	Exploration of food culture	Collecting natural material	Experiences of volunteers	Charcoal making	Experiences in the workplace		
4	3	Making mugwort-flavored rice cake	Minuma nature school (vacant lot)							○					
		Spring wild herbs meal	Minuma nature school (all area)		○					○					
6	19	Rice planting	Minuma nature school (rice fields)			○									
8	4	Fireflies habitat preservation, Night observation	Minuma nature school (all area)		○					○					
10	16	Harvesting rice (glutinous rice, green rice)	Minuma nature school (rice fields)			○									
12	4	Harvest festival	Minuma nature school (rice fields, vacant lot)			○					○				
	11	Making sacred straw festoons	Minuma nature school (vacant lot)								○				
2	26	Fireflies habitat preservation, cleaning	Minuma nature school (all area)	○											

Source: Interview survey of Ground Work Kawaguchi and on-site investigation (5/2/2011, Minuma nature school, & 18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

Table 4-5. Detail of activities requested to Ground Work Kawaguchi by Kawaguchi city and public farmland (2010)

		2010													
Month	Day	Name of activity	Place of activity	Purpose of activity											
				Improvement of natural environment	Nature observation	Hands-on farming experiences	Crafts making	Fireflies habitat protection	Exploration of food culture	Collecting natural material	Experiences of volunteers	Charcoal making	Experiences in the workplace		
7	29~31	Admission to the volunteer school	Minuma nature school (rice fields)	○		○						○			
8	24	Nature observation	Minuma nature school (all area)		○										
		Crafts making	Minuma nature school (vacant lot)										○		

Source: Interview survey of Ground Work Kawaguchi and on-site investigation (5/2/2011, Minuma nature school, & 18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

Table 4-6. Detail of activities implemented upon request from educational institutions to Ground Work Kawaguchi on public farmland(2010)

Month	Day	Name of activity	Place of activity	2010												
				Improvement of natural environment	Nature observation	Hands-on farming experiences	Crafts making	Fireflies habitat protection	Exploration of food culture	Collecting natural material	Experiences of volunteers	Charcoal making	Experiences in the workplace			
5	12	Kamiaoki-minami elementary school, Minuma nature observation	Minuma nature school (all area)		○											
7	5	Kizoro elementary school, Visiting Minuma	Minuma nature school (all area)		○											
9	3, 7	Mitsuwa kindergarten, Nature observation	Minuma nature school (all area)		○											
10	29	Kita junior high school, Experiences in the workplace	Minuma nature school (rice fields)			○										○
11	19	Zaike elementary school, Nature observation	Minuma nature school (all area)		○											
1	20	Nakacho, Tozuka junior high schools, Experiences in the workplace	Minuma nature school (rice fields)			○										○

Source: Interview survey of Ground Work Kawaguchi and on-site investigation (5/2/2011, Minuma nature school, & 18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

Table 4-7. Functions of farmland with related to the detail of activities independently conducted by Ground Work Kawaguchi Executive Committee in the public farmland in Minuma rice fields and state of participation of managing entities (2000)

Month	Day	Detail of activity	2000												
			Function of farmland				Managing entity								
			Production	Protection	Leisure	Education	Ground Work Kawaguchi Executive Committee	Kawaguchi city	Other civic groups	Corporations	Educational institutions	Citizens	Residents		
4	30	Preparation of rice fields	○	○	○	○	◎	×	×	×	×	×	×	×	×
3	18	Mowing in the reed bed	×	○	○	○	◎	×	×	×	×	×	×	×	×

Source: Interview survey of Ground Work Kawaguchi and on-site investigation (5/2/2011, Minuma nature school, & 18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

Note: In the column of Function, ○ indicates that the function is exerted, and × indicates that there is not such a function
 In the column of Managing entities, ◎ indicates the management entity, ○ indicates participation as user entities, and × indicates absence

Table 4-8. Functions of farmland with related to the detail of activities hosted by Ground Work Kawaguchi Executive Committee in the public farmland in Minuma rice fields and the state of participation of managing entities (2000)

Month	Day	Detail of activity	2000 Function of farmland				Managing entity						
			Production	Protection	Leisure	Education	Ground Work Kawaguchi Executive Committee	Kawaguchi city	Other civic groups	Corporations	Educational institutions	Citizens	Residents
4	30	Fireflies habitat preservation cleaning	×	○	○	○	◎	○	×	○	○	○	○
5	7	Crafts making using natural materials Making a flute	×	×	○	○	◎	○	×	○	○	○	○
5	14	Rice planting	○	○	○	○	◎	○	○	○	○	○	○
7	2	Crafts making using natural materials Balance toy	×	×	○	○	◎	○	×	○	○	○	○
9	15	Rice harvesting	○	○	○	○	◎	○	○	○	○	○	○
10	15	Fireflies habitat preservation, Investigation and observation of birds, insects and plants	×	○	○	○	◎	○	×	○	○	○	○
11	12	Harvest festival	○	○	○	○	◎	○	○	○	×	○	○
12	17	Crafts making using natural materials, Making sacred straw festoons	×	×	○	○	◎	○	×	○	○	○	○
2	4	Crafts making using natural material, Making reed screens	×	×	○	○	◎	○	×	○	○	○	○

Source: Interview survey of Ground Work Kawaguchi (5/2/2011, Minuma nature school, & 18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

Note: In the column of Function, ○ indicates that the function is exerted, and × indicates that the function is not exerted
In the column of Managing entities, ◎ indicates the management entity, ○ indicates participation as user entities, and × indicates absence

Table 4-9. Independent activities of Ground Work Kawaguchi in the public farmland in Minuma rice fields and the state of participation of the managing entities (2010)

Month	Day	Name of activity	2010 Function of farmland				Managing entity							
			Production	Protection	Play	Education	Ground Work Kawaguchi	Kawaguchi city	Other civic groups	Corporations	Educational institutions	Citizens	Residents	
4	17, 21, 24, 28, 29	Cultivation of rice fields, Making ridges between rice fields, Making nursery bed	○	○	○	○	◎	×	×	×	×	×	×	×
	1	Sowing (rice)	○	○	○	○	◎	×	×	×	×	×	×	×
	7	Sowing (rice)	○	○	○	○	◎	×	×	×	×	×	×	×
6	2, 5, 9, 12	Puddling	○	○	○	○	◎	×	×	×	×	×	×	×
	16	Uprooting of seedling	○	○	○	○	◎	×	×	×	×	×	×	×
7	20~10/8/2010	Fireflies habitat protection Investigation of fireflies	×	×	○	○	◎	×	×	×	×	×	×	×
8	25	Setting rice field bird nets	○	×	○	○	◎	×	×	×	×	×	×	×
9	5	Setting rice field bird nets	○	×	○	○	◎	×	×	×	×	×	×	×
	1	Gathering acorns	○	×	○	○	◎	×	×	×	×	×	×	×
	2	Drying the harvested rice hanging on racks	○	×	○	○	◎	×	×	×	×	×	×	×
10	6	Harvesting rice (glutinous rice, black rice)	○	○	○	○	◎	×	×	×	×	×	×	×
	3	Grain threshing	○	×	○	○	◎	×	×	×	×	×	×	×
	6	Harvesting rice (red rice)	○	○	○	○	◎	×	×	×	×	×	×	×
11	10	Harvesting rice (black rice), Drying the harvested rice hanging on racks	○	○	○	○	◎	×	×	×	×	×	×	×
	13	Hulling rice, rice milling	○	×	○	○	◎	×	×	×	×	×	×	×
	20, 27	Hulling rice, rice milling	○	×	○	○	◎	×	×	×	×	×	×	×
1	15	Pruning trees in grassland	×	○	○	○	◎	×	×	×	×	×	×	×
	22	Making rice-husk charcoal	×	×	○	○	◎	×	×	×	×	×	×	×
2	19	Pruning trees for rice-hanging racks	×	×	○	○	◎	×	×	×	×	×	×	×

Source: Interview survey of Ground Work Kawaguchi (5/2/2011, Minuma nature school, & 18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

Note: In the column of Function, ○ indicates that the function is exerted, and × indicates that there is not such a function
 In the column of Managing entities, ◎ indicates the management entity, ○ indicates participation as user entities, and × indicates absence

Table 4-10. Activities hosted by Ground Work Kawaguchi in the public farmland in Minuma rice fields and the state of participation of the managing entities (2010)

		2010														
Month	Day	Name of activity	Function of farmland				Managing entity									
			Production	Protection	Play	Education	Ground Work Kawaguchi	Kawaguchi city	Other civic groups	Corporations	Educational institutions	Citizens	Residents			
4	3	Making mugwort-flavored rice cake	○	×	○	○	◎	○	○	○	○	○	○	○	○	○
		Spring wild herbs meal	×	×	○	○	◎	○	○	○	○	○	○	○	○	○
6	19	Rice planting	○	○	○	○	◎	○	○	○	○	○	○	○	○	○
8	4	Fireflies habitat protection, Night observation	×	×	○	○	◎	○	○	○	○	○	○	○	○	○
10	16	Harvesting rice (glutinous rice, green rice)	○	○	○	○	◎	○	○	○	○	○	○	○	○	○
		Harvest festival	○	○	○	○	◎	○	○	○	○	○	○	○	○	○
12	11	Crafts making using natural materials	×	×	○	○	◎	○	○	○	○	○	○	○	○	○
		Making a sacred straw festoon	×	×	○	○	◎	○	○	○	○	○	○	○	○	○
2	26	Fireflies habitat protection Minuma clean & clean (cleaning)	×	○	○	○	◎	○	○	○	○	○	○	○	○	○

Source: Interview survey of Ground Work Kawaguchi (5/2/2011, Minuma nature school, & 18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

Note: In the column of Function, ○ indicates that the function is exerted, and × indicates that there is not such a function
 In the column of Managing entities, ◎ indicates the management entity, ○ indicates participation as user entities, and × indicates absence

Table 4-11. Activities implemented by Ground Work Kawaguchi upon request from Kawaguchi city in the public farmland in Minuma rice fields and the state of participation of the managing entities (2010)

Month	Day	Name of activity	2010																				
			Function of farmland				Managing entity																
			Production	Protection	Play	Education	Ground Work Kawaguchi	Kawaguchi city	Other civic groups	Corporations	Educational institutions	Citizens	Residents										
7	29~31	Accepting to the volunteer school	○	○	○	○	◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○		
8	24	Nature observation	○	○	○	○	◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
		Crafts making	○	○	○	○	◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Source: Interview survey of Ground Work Kawaguchi (5/2/2011, Minuma nature school, & 18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

Note: In the column of Function, ○ indicates that the function is exerted, and × indicates that there is not such a function
 In the column of Managing entities, ◎ indicates the management entity, ○ indicates participation as user entities, and × indicates absence

Table 4-12. Activities implemented by Ground Work Kawaguchi upon request from educational institutions in the public farmland in Minuma rice fields and the state of participation of the managing entities (2010)

		2010														
Month	Day	Name of activity	Function of farmland				Managing entity									
			Production	Protection	Play	Education	Ground Work Kawaguchi	Kawaguchi city	Other civic groups	Corporations	Educational institutions	Citizens	Residents			
5	12	Kamiaoki-minami elementary school, Minuma nature observation	x	x	o	o	o	o	x	x	x	x	x	x	x	x
7	5	Kizoro elementary school, Visiting Minuma	x	x	o	o	o	o	x	x	x	x	x	x	x	x
9	3, 7	Mitsuwa kindergarten, Nature observation	x	x	o	o	o	o	x	x	x	x	x	x	x	x
10	29	Kita junior high school, Experiences in the workplace	o	o	o	o	o	o	o	x	x	x	x	x	x	x
11	19	Zaika elementary school, Nature observation	x	x	o	o	o	o	x	x	x	x	x	x	x	x
1	20	Nakacho, Tozuka junior high schools, Experiences in the workplace	o	o	o	o	o	o	o	x	x	x	x	o	x	x

Source: Interview survey of Ground Work Kawaguchi (5/2/2011, Minuma nature school, & 18/2/2011, Kawaguchi Support station, the director of Ground Work Kawaguchi)

Note: In the column of Function, o indicates that the function is exerted, and x indicates that there is not such a function
 In the column of Managing entities, o indicates the management entity, o indicates participation as user entities, and x indicates absence

Table 5-1. Comparison of sustainable systems of public farmland of Agriculture & Forestry Corporation & Forestry Corporation and civic groups

		Agriculture & Forestry Corporation	Civic group
Managing entity	Land owner entity	Public group	Public group
	Management entity	Public group	Private group
	User entities	Private group	Private group
Purpose of activity		Single → Multiple	Multiple → Multiple
Activity unit of public farmland		Single	Multiple
Exerted functions of farmland	Production	△ → ⊙ Public → Public & Private	○ → ○ Private & Public → Private & Public
	Protection	x → ⊙ x → Public & Private	○ → ○ Private & Public → Private & Public
	Play	x → ⊙ x → Public & Private	⊙ → ⊙ Private & Public → Private & Public
	Education	x → ⊙ x → Public & Private	⊙ → ⊙ Private & Public → Private & Public

Source: Created by the author

Note: The symbols indicate the level of exertion of a function of farmland. ⊙ indicates enough, ○ indicates exerted,

△ indicates insufficient, × indicates not exerted.

Public indicates that public interest is exerted, Private indicates that private interest is exerted

→ indicates the change from the early state to the later stage

Table 5-2. Difference between sustainable systems of public farmland and private farmland

	Public farmland	Private farmland
Managing entity	Unspecified number of people	Farmers, their families and employees
Activity	Diversified in order to respond to the needs of managing entities	The land is used as a means of livelihood, and it is not diversified
Activity unit in farmland	Single (long-term activity) Multiple (short-term activity)	Single (long-term activity)
Increase in the range of functions of farmland	The number of functions of farmland increases as the number of managing entities and the number of activities increase	The functions of production and protection are mainly exerted

Source: Created by the author based on the results described in chapters three and four of this research and Bryant and Johnston (1992)

