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Current Status and Challenges for Forest Commons (*Iriai* Forest) Management in Japan: A Focus on Forest Producers' Cooperatives and Authorized Neighborhood Associations

Masahiko Ota

Graduate School of Fisheries and Environmental Sciences, Nagasaki University, 1–14 Bunkyo-machi, Nagasaki 852-8521, Japan; masahikoota@nagasaki-u.ac.jp

Abstract: *Iriai* forests are an example of communal forest management in Japan. Local institutions have never been static in governing *iriai* forests and the external environments of *iriai* forests have changed significantly over time. This study examines the management challenges of forest producers' cooperatives (FPCs) and authorized neighborhood associations (ANAs) as the two most important contemporary forms of *iriai* forest management. Data from nine FPCs and three ANAs in the Fukuoka and Saga prefectures of Kyushu Island are used. Surveyed topics included basic information about FPCs and ANAs, recent management activities, financial conditions, and member perceptions of forest management. Some FPCs suffered from disadvantageous forestry circumstances, including low timber prices, decreased number of members, and tax burdens; at the same time, some FPCs greatly profited from non-forestry income or assets, e.g., by leasing or selling forestland. In most cases, basic forest management operations had been conducted by both FPCs and ANAs, and members had maintained attachment to and responsibility for *iriai* forests and a sense of public contribution. Policy recommendations include making legal settings and administrative supports more compatible with contemporary realities, providing greater financial support for management activities, and pursuing multi-level governance to open the commons to wider society.

Keywords: *seisan shinrin kumiai*; *ninka chien dantai*; common property resource; developed countries; external policy influence; forest management activities

Citation: Ota, M. Current Status and Challenges for Forest Commons (*Iriai* Forest) Management in Japan: A Focus on Forest Producers' Cooperatives and Authorized Neighborhood Associations. *Forests* **2023**, *14*, 572. https://doi.org/10.3390/f14030572

Academic Editor: Andrej Ficko

Received: 22 January 2023
Revised: 10 March 2023
Accepted: 11 March 2023
Published: 13 March 2023

1. Introduction

Common property resource (CPR) researchers have argued that local communities can successfully manage natural resources, such as the commons [1,2]. These scholars have criticized the assumption that the commons are open-access contexts that inevitably lead to resource depletion. Within certain conditions, such as existing local institutions, local communities can appropriately manage resources. This claim also undermines the assumption that privatization is the sole method of successful resource management [3].

Recently, CPRs in developed industrialized countries have gained a focus [4,5]. Unlike designing institutions that govern natural resources in overuse contexts in developing countries, research on CPR management in developed countries after industrialization and urbanization should address underuse conditions. Appropriate human interventions concerning CPRs are disappearing, due to the declining population or aging of farmers, forest owners, and fishermen,—i.e., producers and bearers of ecosystem services—as well as changing institutional and market conditions around CPRs. Mitsumata [6] categorized external impacts on the commons—as non-settlement trends, commodification of commons, private corporation-led development, public works projects, legal system development and revisions, administration/policies, and court decisions—and presented typical positive and negative influences of each impact. Of these, non-settlement trends and commodification of the commons are important in the context of developed countries. With regard to non-settlement trends, an exodus may have the positive effect of the improvement of

resource conditions in places where overexploitation has been evident, while it may have the negative effect of underuse of resources, resulting in the absence of proper management inputs. The commodification of the commons may have the positive effect of providing opportunities to sustain and strengthen the commons, while it may have the negative effect of monoculture, resulting in resource underuse and neglect once market value is lost.

Traditional common (*iriai*) forests in Japan are a well known example of successful CPR management [7,8]. These forest management systems emerged in the 17th century. *Iriai* forests are forests and semi-natural grasslands that can be collectively accessed by residents in a specific area with specific rights. The resources procured typically include timber, forage, and firewood. Right-holders develop local rules and regulations to sustainably utilize limited resources, including methods, periods, and quantities of harvest.

Local institutions governing *iriai* forests have never been static and external environments surrounding *iriai* forests have changed over time. In particular, *iriai* forests cannot be explored in isolation from national policy developments [9–16]. Since the start of the modern Meiji period in 1868, successive governments have been averse to the existence of the common sphere, including *iriai* forests, because principles of long-standing CPR management are not likely to fit into the top-down control of state agencies nor into the pursuit of efficiency and maximization of monetary profits by private entities. Thus, since the late 19th century, *iriai* forests have been subject to various institutional changes that abrogate *iriai* forests and replace them with other forms of management.

Several studies have emphasized the changes in *iriai* forests as a result of external conditions. Shimada [14] pointed out that local communities can adapt *iriai* institutions to external influences, such as social and demographic conditions. However, communities have been unable to effectively cope with low timber prices, which have been manifested all over Japan since the 1980s; Shimada mentions this has been an influence that works outside the control of local communities. Saito [10] analyzed how municipality mergers in the 2000s in Japan affected forest management by property wards (*zaisanku*). Property wards play a role that enables local community members to hold and maintain rights to *iriai* resources; this institution has been in place since the late 19th century. Saito reported that new municipalities may not fully understand local historical contexts, and thus the autonomy of property wards could be threatened.

Matsushita [11] overviewed the management problems faced by forest producers' cooperatives (*seisan shinrin kumiai*: hereafter FPC). FPCs are cooperatives established to manage *iriai* forests, generally replacing broad-leaved forests with coniferous forests for more intensive forestry production. The Japanese government strongly promoted the establishment of FPCs for forests managed by *iriai* institutions after the late 1960s. The problems among FPCs identified by Matsushita include a lack of sufficient income due to uneven distribution of tree age structure and low timber prices, aging of FPC members as a labor force, and a lack of forestry experts among FPC members. He also denoted the burden of taxes; FPCs are cooperatives and hence, are subject to paying several taxes, including corporate tax, corporate inhabitant tax, and fixed asset tax. As a result, it is difficult for members to find a clear reason to continue their FPCs and so, the number of dissolutions of FPCs is increasing. At the same time, he presented several FPC cases where innovative activities had been taken.

Yamashita et al. [9] compared institutional characteristics of conventional *iriai* organizations, FPCs, and authorized neighborhood organizations (*ninka chien dantai*: hereafter ANA) against the backdrop of an increasing number of FPCs that had been dissolving themselves and changing their status to ANAs. ANAs are local neighborhood associations (such as wards) that have obtained the status of legal entity and can officially register fixed assets, such as *iriai* forests. ANAs have been a significant alternative after the dissolution of FPCs. Specifically with regard to the status change from FPCs to ANAs, the researchers pointed out that the reduction of transaction costs and the exemption from corporate taxes were the primary reasons motivating the change.

The present study aims to examine the management situations of FPCs and ANAs as contemporary forms of *iriai* forest management. There is little doubt that FPCs and ANAs are the two most important forms of contemporary *iriai* forest management. However, except for a few studies [9,11], FPCs and ANAs rarely appear in English literature, despite their importance; thus, more information and insights are needed. In particular, few studies provide detailed case information on kinds of forest management operations, forestry and non-forestry income sources, and locals' perceptions regarding the future of their *iriai* forests; the present study tries to fill this information gap.

An examination of FPCs facing management difficulties and ANAs as an alternative will facilitate understanding of how external legal, market, and social environments affect CPR management in developed industrialized countries. The cases of FPCs and ANAs can also highlight the pitfalls that policies related to administration and forestry in Japan have run into, along with the will of local communities to go along with their forest commons despite difficulties.

In terms of Japanese studies on FPCs and ANAs, Yamashita [17] presented a comprehensive review of the progress and current status of FPCs, drawing on official statistics. Handa [18] indicated that even though the policy intention of FPCs was the aim of more efficient timber production, most FPCs had continued with conventional *iriai*-type management. Several studies [19,20] reported problems and difficulties faced by FPCs, similar to those that Yamashita et al. [9] and Matsushita [11] presented. Although studies on FPCs are likely to be critical of the present situation, a couple of studies indicated the potential of FPCs, because the forest areas that FPCs own are likely to be greater than individual private forests; hence, they may hold advantages in making management plans and obtaining forest certificates [21,22].

2. Materials and Methods

First, the author consulted secondary literature and official statistics to determine the historical policy developments affecting *iriai* forests and the institutional arrangements of FPCs and ANAs.

Second, the author collected firsthand data from surveys through face-to-face interviews in the Fukuoka and Saga prefectures on Kyushu Island. For the Fukuoka prefecture, the author mailed a letter to all 55 FPCs registered in a database requesting an interview. The author received responses from 11 cases, which included 2 ANAs. For the Saga prefecture, the author purposefully selected 1 ANA; this was a case where former FPC members and residents were not the same and the number of residents in the neighborhood was far greater than the number of former FPC members. The author sought to observe what kinds of problems exist in such a situation. In total, the author obtained 9 FPC cases and 3 ANA cases; they are called FPCs A to I and ANAs A to C to preserve anonymity. The 3 ANAs included no cases of status change from the 9 FPCs—in other words, they were separate from each other. Topics surveyed included FPCs' or ANAs' basic information, recent management activities, and financial conditions. Data were collected in October 2018, February to May 2019, October 2020, and May 2021.

It should be noted that the present study is not based on random sampling methods. Regarding the Fukuoka prefecture, the author was able to obtain information from FPCs to which letters from the author were successfully delivered and who were willing to take interview surveys. The addresses of many FPCs provided in the database were wrong; consequently, these FPCs did not receive the letters from the author. It is probable that FPCs with little substantive activity were not included. Regarding the Saga prefecture, the author only focused on 1 ANA. Thus, the present study should be understood as case studies aimed at naturalistic generalization, a process through which readers gain insight by reflecting on the details and descriptions presented in case studies [23].

Part of the data has been published in Ota [24] and Ota [25]. The present study reorganizes the already-published information in terms of its purpose and adds qualitative information that Ota [24] and Ota [25] did not present.

3. Results

3.1. Historical Developments and Recent Institutions Concerning Iriai Forests

3.1.1. Typical *Iriai* Institutions

Iriai institutions were developed during the Edo period (1603–1867). At that time, resources that could be obtained from forests were crucial for subsistence purposes. In addition to firewood and timber, grass was an important source of fertilizer for rice fields. Particularly after the middle of the Edo period, population growth was evident due to the expansion of rice fields. As a result, overexploitation of forests and consequent forest degradation proliferated. Natural disasters occurred frequently. The Tokugawa Shogunate and domain lords ruling at the time developed several theories and measures to address the overexploitation of mountain forest resources, including advice for utilizing trees or planting trees after harvest [26]. In addition to such government measures, local rules and regulations concerning forest resources were developed to collectively avoid conflict among households or hamlets and to prevent overexploitation [7]. Such sets of rules and regulations governing *iriai* forests can be called *iriai* institutions.

The unit of *iriai* institutions was traditional Japanese hamlets (*mura*). In general, the principles of membership were strict: only people who resided in the hamlet had a right to access the resources of *iriai* forests. Although great variety was seen in rules applied among hamlets, or even in one hamlet across seasons or species, practices that carefully utilized limited forest resources were common. Typically, there were limits on the amount and time of harvest and particular techniques in exploiting resources. Contribution of labor to manage the forest areas—such as annual burning of grassland, cutting specific timber or thatch, and planting or enriching particular species—was an important obligation under *iriai* institutions. Enforcement of rules was substantial, with high degrees of compliance. *Iriai* institutions were largely in line with the design principles of CPRs presented by Ostrom [1].

3.1.2. Policy Changes over Time

Institutional change has occurred in three directions: conversion to national property, conversion to municipal property, and conversion to private property [10]. The conversion to national property was established by the Public/Private Ownership Separation Policy, which began in 1873. Under this policy, forests for which evidence of private ownership was not confirmed were incorporated into national forests. Many *iriai* forests were regarded as forests without private ownership, due to their form of collective use; consequently, they fell under national forests.

The first wave of conversion to municipal property occurred with the Municipal Government Act in 1889. This act consolidated traditional hamlets (*mura*) from the Edo period into modernized municipal units of cities, towns, and villages. Processes of consolidation were expected to involve taking over resources under *iriai*-related institutions, such as forests, grasslands, or ponds, and making them the property (assets) of the new municipalities. Most of the peasants at the time strongly opposed this policy, to prevent their resources for subsistence from being taken away. Their protests made it difficult to implement the policy. As a compromise, the government created a new scheme of property wards (*zaisanku*). Under this scheme, right-holders of *iriai* resources can substantively maintain their rights to use, manage, and dispose of resources under the supervision of the municipalities. Property wards are one of the most common forms of *iriai* forest management, together with FPCs; in 2011, there were 3710 property wards in total, not only for forests, but also for ponds, hot springs, and graveyards [27].

The second wave of conversion to municipal property was the Village-owned Forests Integration Policy, which began in 1910. This aimed to incorporate into municipal property the *iriai* forests that had remained owned by former hamlet-like units (registered under the names of former hamlets such as *ku*, *aza*, or *kumi*). However, failing to deliver the expected achievements, this policy ended in 1939.

In the late 19th century, when the first wave of conversion to municipal property was taking place, Japanese law scholars learned about the laws and legal systems in Western Europe, and the Japanese Civil Code was enacted in 1896. In the Civil Code, rights of common (*iriai ken*) are specified in Articles 263 and 294. Rights of common ensure local community members' use of local forests or other natural resources based on local customs maintained since the pre-modern era. At the time that the Civil Code was enacted, more than 80% of the population lived in rural areas and were dependent on basic natural resources, such as firewood, fodder, grass, water for irrigation, and fishery; thus, ensuring the livelihood security of these people was essential.

According to the court rulings to date, rights of common are a private right. This feature is extremely important; as a private right, rights of common have been very strong [28]. If these rights had been public rights, the actualities of the rights of common might have been changed or manipulated at the discretion of the government. As a result of this definition of the rights of common in the Civil Code, on the one hand, the government tried to bring *iriai* forests into the public sphere through policy instruments, but on the other hand, it ensured that local community members hold collective access to *iriai* forests, with the rights of common held as a private right.

However, confusing issues have arisen related to the rights of common. On the one hand, rights of common can exist irrespective of land ownership status; court rulings have established that rights of common exist on national lands. On the other hand, rights of common cannot be registered; a group of people holding rights of common for an *iriai* forest cannot register the land of their forest as holders of rights of common. Consequently, holders of rights of common have been likely to register their forests in the name of former hamlets (such as *ku*, *aza*, or *kumi*) or in the individual names of all right-holders.

Until the 1950s, forests had been primarily used for subsistence purposes in Japan. Forest areas, including those of *iriai* forests, mainly consisted of broad-leaved trees such as oak, used for fuel and agricultural uses, and grassland, used for foraging. Such conditions were consistent with the livelihoods and lifestyles of local farmers in those times. However, circumstances drastically changed after the 1960s. Modernization of lifestyles, such as the increasing use of fossil fuels, resulted in the decreased importance of forest resources for the subsistence economy. Grass and small branches were replaced with chemical fertilizers, thatched roofs were replaced with iron roofs, and firewood was replaced with petroleum and natural gas.

At the same time, the national policy for forestry also changed. In 1964, the Forestry Basic Act was enacted, which states that the objectives of forestry are to increase timber production and productivity and to enhance the income of forestry workers. The government strongly promoted the planting of coniferous trees, such as Japanese cedar (*Cryptomeria japonica*) and Japanese cypress (*Chamaecyparis obtusa*), for intensive forestry. Existing broad-leaved forests were often replaced with coniferous trees.

In this context, the government tried to promote intensive forestry practices in *iriai* forests. The Act on Advancement of Modernization of Rights in Relation to Forests Subject to Rights of Common of 1966 has been the base of this policy shift [11]. This act was created to establish modern types of property rights related to forests by extinguishing pre-modern rights of common, developed on the assumption that communal types of management and decision-making rooted in rights of common are likely to hinder advanced and efficient utilization of forest resources. Under this act, which provides due processes, rights of common are to be extinguished, and forests under *iriai* institutions are to be converted to private property, owned either by cooperatives or individuals.

By 2014, approximately 580,700 ha of *iriai* forests had been subject to this modernization process (i.e., the extinguishment of rights of common). As of 2011, of the modernized *iriai* forests, 52.4% had come under the management of FPCs, 41.0% had been individualized by being equally divided among right-holders of *iriai* forests, 5.5% had become jointly owned private forests, and 1.0% had come to be managed by agricultural producers' cooperatives [11].

3.2. Institutions of FPCs and ANAs

The institutions of FPCs are rooted in the 1951 Forest Act. In 1978, the Forestry Cooperative Act was enacted and it is the legal foundation of FPCs. In Japan, cooperatives in the forestry sector generally refer to forest owners' cooperatives (*shinrin kumiai*: hereafter FOC), which differ from FPCs. Members of FOCs and FPCs are both forest owners, but FOCs jointly undertake forestry operations for forests owned by members and other entities. FOCs target ordinally individual private forests, and have nothing to do with *iriai* institutions.

An FPC is based on the principle of "consistency of ownership, management, and labor". Cooperative members make monetary or in-kind investments and own forests, and in principle, they manage the forests through their labor contributions [17] By law, an FPC is established for joint forest management for more than five people residing in a particular community, under the approval of the prefectural governor. After approval, members invest in the FPC and register the corporation. An *iriai* forest is jointly owned and managed by an FPC—i.e., the cooperative's members.

Only people who reside in the community or make in-kind contributions to the forests can be cooperative members. More than half of the cooperative members should regularly engage in FPC activities and more than one-third of the people who regularly engage in these activities should be FPC members. When an FPC gains profits, dividends are allocated to members according to the number of days that they work for the FPC. Activities that FPCs can undertake include forest management, cultivation of trees and edible mushrooms, agriculture utilizing forest areas, operations for or management of entrusted forests, and other related activities. Members can engage in not only forestry activities but also the cultivation of mushrooms, fruit, or animal husbandry.

Similarities exist between conventional *iriai* organizations and FPCs. Right-holders of *iriai* forests and FPC members overlap in many cases, and despite the change in legal status, FPC members are likely to have a sense of their forest as the commons rather than a sense of intensive commercial forestry [18]. There are also differences between conventional *iriai* organizations and FPCs in that legally, rights of common no longer exist for forests owned by FPCs. Furthermore, FPCs are likely to receive subsidies from municipalities. FPCs have to engage in various kinds of desk work, such as bookkeeping and organizing an annual general assembly, and they are subject to corporate and corporate inhabitant taxes due to their cooperative status [9].

The number of FPCs drastically increased after 1966, when modernization processes began, exploding from 586 in 1966 to 1494 in 1976, with a peak at 3482 in 1996. Since then, the number has decreased (Figure 1); as of 2020, 2693 FPCs could be found in Japan.

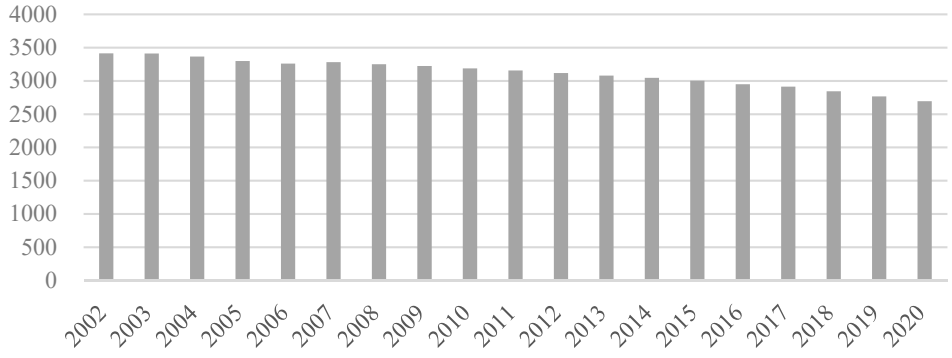

Figure 1. Recent changes in the number of FPCs (created from [29]).

The decreasing number of FPCs in recent years is mostly due to dissolution or status change. Although no official statistics are provided on dissolved FPCs, Table 1 indicates that 30–50 FPCs have been dissolved annually in the last decade. Approximately 72% of the dissolved FPCs have changed their status to ANAs [17].

Table 1. Basic information for the FPCs surveyed.

Pseudonym	A	B	C	D	E	F	G	H	I
Year established	1965	1969	1978	1974	1975	1954	1975	1982	1984
Area owned (ha)	164	36	7	51	61	131	49	93	20
Number of members (at the time of the survey)	72	90	50	32	56	23	60	26	32

(adopted from [24]).

ANAs are defined in the 1991 revised Local Autonomy Law in Japan. Under certain conditions, a local neighborhood association (such as a ward) can obtain the status of legal entity and register fixed assets, such as *iriai* forests, under the name of the neighborhood association. Although the ANA institution was not originally meant to address issues concerning *iriai* forests, it can be used for the sake of such forests. Before 2017, the document procedures were complex and difficult: cooperative members first had to dissolve the FPC through due process—including the liquidation of assets (forests), which may cost around several hundred thousand Japanese yen—and then had to register themselves as an ANA. However, the 2017 revised Forest Act has enabled FPCs to directly change their status to ANAs without dissolution; in this case, members do not have to bear the costs related to liquidation procedures.

One of the most important reasons for becoming an ANA is that ANAs are exempted from corporate tax and corporate inhabitant tax, which FPCs must pay. Given that many FPCs feel the burden of tax payments, tax exemption is a significant advantage [9].

Another distinct point between FPCs and ANAs is that after an ANA is established, its stakeholders are not limited to the former cooperative members. The *iriai* forest becomes an asset of the neighborhood, and so, all residents of the neighborhood become right-holders within the ANA. Decision-making and forest management practices can be affected in cases where the number of residents is greater than the number of former FPC members. This involves a change from a strict membership regime to a much softer and broader community management regime.

3.3. Activities and Management Conditions of the FPCs Surveyed

3.3.1. Overview

Table 1 presents basic information on the surveyed FPCs. With the exception of two cases, the FPCs were established after the Modernization Act in 1966. The average area owned was approximately 68 ha. In terms of forest type, most of the lands that the FPCs owned were planted forests of Japanese cedar. Each FPC's number of members was less than 100 and all FPCs had experienced a decline in membership. A large part of the forests managed by FPCs D, F, and G had been designated as forest reserves, which are important to local environmental conservation and water cultivation.

3.3.2. Tending Activities

Table 2 shows that eight of the nine FPC cases had conducted some activity to tend to planted forests in the few years before the surveys were conducted. Of these eight, six FPCs (A, B, D, E, F, and H) had operations using their own labor. Most of the thinning operations had been entrusted to other forest management bodies, such as FOCs; only FPC A had their own work crews to conduct thinning operations. Four FPCs (B, D, F, and G) received subsidies from the prefecture or cities for their tending operations.

Table 2. Forest management activities among the FPCs surveyed.

Pseudonym	A	B	C	D	E	F	G	H	I
Tending activities	Thinning Improving Cutting Weeding	Thinning Weeding	–	Vine-cutting Weeding	Thinning	Thinning Weeding Maintenance of mountain trails	Thinning	Thinning Weeding	–
Timber production	–	–	–	–	–	Timber from thinning	–	Final harvest Timber from thinning	–
Non-timber forest product production	–	–	–	–	–	–	–	–	–
Non-forestry activities	Land lease	–	Land lease	Land lease	Land lease	–	–	Land lease	–

(adopted from [24]).

3.3.3. Forestry and Non-Forestry Activities

Only FPC H conducted a final harvest of timber; it also sold timber generated from thinning activities. FPC F also conducted thinning and sold timber. No FPC was producing non-timber forest products, such as mushrooms.

Five FPCs (A, C, D, E, and H) engaged in non-forestry activities, all of which involved leasing land to other businesses, such as quarries. As explained in the following section, these FPCs enjoyed large annual incomes. In addition to present incomes, some FPCs held monetary assets that were obtained by selling forestland in the past. Although FPCs B and I had no income, they managed to pay taxes using the assets that they had obtained in the past. FPC D had a large amount of assets due to land selling to a development project.

3.3.4. Case Study Information

This section provides detailed case study information for each FPC, including members' perspectives.

[FPC A]

FPC A was the most active among the surveyed FPCs. It had finished planting Japanese cedar trees by 1995 and conducted tending operations, such as weeding, improving cutting, and thinning. It had working crews for forestry operations, which is rare for an FPC. As of 2019, 18 people worked at the FPC: eight were in their 60s, and six were in their 70s. In addition to the tending operations conducted by work crews, provision of labor, such as the weeding of coastal pine forests, was mandatory for ordinary members.

FPC A held substantial assets, including their own office, because it received annual income from a land lease contract with a company for a quarry, amounting to several million Japanese yen. Thus, FPC A enjoyed stable and substantial money from non-forestry activities, and members could afford to pay the taxes related to the FPC.

In addition to the above-mentioned activities, the members were working on disaster recovery. A landslide occurred in part of their forest in 2018; consequently, they had to remove tree debris to get the roads back to normal conditions.

Even in FPC A, the number of members has decreased from 150 people in 1965 to 91 people in 2009 to 72 people in 2018. The members foresaw that this trend would continue, due to depopulation and population aging.

The president of the FPC told the author that the members were proud of maintaining appropriate forest management, thanks to good income from non-forestry activities, and that they would like to keep the status quo. With increasing societal attention to the role of forests in environmental conservation, they would like to contribute to the public as a forest

owner and manager. The president said that in the future, they might want to conduct basic forestry operations for other private (individually owned) forests through contracts.

[FPC B]

FPC B had a history of developing planted forests of Japanese cedar and cypress through a benefit-sharing contract with the city where it is located. Planting started in 1962, before the establishment of the FPC, and the area within its purview is approximately 6 ha. One custodian was hired from the community to supervise this area. The contract with the city emphasizes the importance of the afforestation of mountains and the enrichment of water sources; it is implied that these public functions were of great importance when the FPC was established.

In addition to the planted forests as per the city contract, FPC B had also planted approximately 3 ha of Japanese cedar and cypress. The members conducted tending operations of weeding and thinning, although they had not been able to target all the planted forests that needed tending.

The members received a subsidy from the prefecture for thinning operations, which they entrusted to an FOC. Simple operations, such as weeding, were managed by executive members, which consisted of 15 people in rotation every three years. They intentionally rotated executive members to expose younger members to their *iriai* forest.

FPC B gained no income from forestry and had no constant non-forestry income. In the past, it had sold part of the forestland to the prefecture to construct a check dam; it used the money from this land sale to pay corporate taxes.

The number of cooperative members had decreased from 164 people in 1962 to 90 people in 2018, most of whom were more than 60 years old.

Nevertheless, FPC members had no intention of dissolution or status change. They had managed *iriai* forests in the present form, and so, they would probably continue to in this way. The president told the author that all citizens should bear the management of forests because forests and mountains have public functions, and more support from subsidies was needed because there are limitations to what one cooperative can do.

[FPC C]

The forest area of FPC C is small: 7 ha. Forest accessibility was not bad and the planted Japanese cedar trees were mature. However, the FPC had no immediate plan to fell and sell them, and tending operations were not necessarily required. As a result, FPC C's activities were mostly absent. According to its members' perceptions, the FPC is "on leave" from its activities and operations as a cooperative. At the same time, the members did not want to dissolve or change their status to an ANA. FPC C had a constant income source from leasing land for the placement of telephone poles. It had also sold part of its forests to the city to make roads, through which they received a large amount of money. In this way, the members could afford to pay taxes.

[FPC D]

FPC D was the richest of the surveyed FPCs. It had sold part of its forestland around 40 years ago for a natural park development project, receiving a huge amount of money (more than 100 million Japanese yen). Part of this money had been used for community development, such as renovating a shrine and the community hall. In addition, the FPC had an annual income from leasing land for the placement of sign boards. Consequently, FPC D had no problem paying taxes. They even used their income to enjoy tours to other FPC cases to study management or advanced forestry activities.

The community where FPC D worked had some newcomers. While the FPC had 32 (meaning 32 households) members in 2019, there were more than 140 households in the community. This meant that younger generations lived in the community and participated in tending operations, such as weeding. Even though the number of cooperative members was decreasing, they were optimistic about maintaining this FPC through younger generations, substantive assets, and constant non-forestry income sources.

Part of the forest of FPC D had been designated as a forest reserve for water cultivation. The forests were regarded as important to local environmental conservation.

[FPC E]

FPC E was also a wealthy FPC; it had contracted with a private mining company and leased part of their forestland as a quarry. The FPC received a large annual income from this land leasing—approximately 9.5 million Japanese yen. In addition to corporate taxes, its income tax was massive; however, the FPC had no problem paying it. FPC E also provided dividends to its members.

The number of members was decreasing; however, the rate of decrease was not very severe. The decrease was due to the decline in the population residing in the community. Few FPC members withdrew from membership and the members mostly enjoyed the benefits of cooperative activities.

Exceptionally, in FPC E, members had conducted thinning operations by themselves, with daily allowances; in principle, this was mandatory. According to the president, annual operations fostered a sense of responsibility among members.

[FPC F]

A large part of FPC F's forest had been designated as a forest reserve for water source cultivation. The members had maintained a high level of frequency of tending operations: they conducted weeding and monitoring of forest-area boundaries every year by themselves, and they entrusted thinning to an FOC using a subsidy. The maintenance of trails of the nearby mountain was entrusted to FPC F by the city with a subsidy for this work.

A year before the author's survey, FPC F received forestry income from timber generated from thinning. However, this was exceptional; in the previous decade, there was mostly no other timber income. In the 1960s and 1970s, it enjoyed a huge profit from timber, sometimes as much as 100 million Japanese yen, thanks to increasing demand for utility poles. In the past, the FPC had provided timber for constructing a former community hall to contribute to the community.

The FPC charged 5000 Japanese yen every year as a membership fee. Even with this money, it had a deficit balance due to heavy corporate and fixed asset taxes. The members were spending down the savings that they had earned in the past.

The number of FPC members had decreased from 92 members in 1965 to 23 in 2018. The president told the author that the reason for this was unclear. At the same time, the number of residents in FPC F's community had increased from 120 households several decades ago to more than 600 households recently. This was due to its good accessibility, as people could commute from the community to big cities.

The president said the FPC's management situation was worsening, but the members had no good ideas for breakthroughs. They perceived that having profit-earning activities, either forestry or non-forestry in nature, would be important.

[FPC G]

A large part of the forest of FPC G had been designated as a forest reserve for water cultivation. Its location was near an important source of water for the city.

The number of members had decreased from 92 people in 1975 to 60 in 2018. The president told the author that this decrease may not be due to aging alone: because FPC G had no forestry or non-forestry income, members were charged 10,000 Japanese yen as an annual fee every year, and members who were not willing to pay the fee had withdrawn from the FPC. The money from these fees was used for taxes and administrative costs.

FPC G conducted tending operations, including thinning. It had received subsidies from the prefecture and all operations were entrusted to an FOC using money from the subsidies to pay for it. It also cleaned the walking roads of a nearby natural park, entrusted by the prefecture with a subsidy.

[FPC H]

FPC H was engaged in various management activities. It was the only surveyed FPC to have undertaken a final harvest of timber in recent years, with operations entrusted to an FOC; the profit earned from this operation was several thousand Japanese yen. After the final harvest, the members had wanted to replant cedar and cypress trees; they had

little idea of working on broad-leaved forests, such as oak species. The president told the author that if they had been engaged in shiitake mushroom production, which requires oak logs, they might have wanted to replace conifer trees with oak trees. In addition, they had undertaken weeding and thinning operations by themselves. FPC H also received an income from leasing forestland for roads (approximately 750,000 Japanese yen annually).

The number of members had not significantly decreased from 29 people at its inception in 1982 to 26 people in 2018. This was due to its good accessibility to a big city, offering a reasonable distance for commuting. FPC H had no problem paying taxes and continuing its forest management.

[FPC I]

Even though the total area of FPC I's forest was small, it was in coastal areas, thus serving as windbreaks.

FPC I regularly monitored forest-area boundaries, but other than that, it had no tending operations; according to the president, operations were not needed at this phase. There was no income-earning activity: the FPC had sold part of its forest in the past and it drew on the savings earned from these sales to pay taxes. It also charged an annual membership fee of approximately 60,000 Japanese yen; this amount was also used to pay taxes.

Although FPC I's members were attached to their *iriai* forests, they had begun to discuss the possibilities of dissolving the FPC. However, they faced an issue: the number of FPC members (households) was 32, while the number of households in the community was 110. If they dissolved the FPC and became an ANA, all residents in the community would become members of the new ANA. The president told the author that such a change could impose the problems faced by the FPC on other residents; as a result, the members were hesitant to change.

3.4. Activities and Management Conditions of the ANAs Surveyed

3.4.1. Overview

All surveyed ANAs underwent a status change from FPCs in recent years for financial reasons—i.e., burdens of taxation and expected budget shortfall. ANA B had forestry incomes before the status change, but the members felt that such income would not be enough to maintain the status of an FPC.

Even after the status changes, these FPCs continued in their basic forest management activities.

ANAs A and B experienced little issues in terms of membership, because the former FPC members and residents of the communities mostly overlapped. However, for ANA C, where the numbers of FPC members and residents in the community were not the same, difficulties were faced when applying a principle of the ANA, i.e., the forests become an asset for all residents of the community.

3.4.2. Case Study Information

This section provides detailed case study information on each ANA, including members' perspectives.

[ANA A]

ANA A (Fukuoka prefecture), which owns 27 ha, was organized in 2016 after the FPC in Community A was dissolved. The former FPC had been established in 1986. The reason for the dissolution and status change to an ANA was that the cooperative's members lost the motivation to continue intensive forest management activities as an FPC, due to lower timber prices, the aging of cooperative members, and a lack of successors. They decided to choose a less intensive form of management as an ANA.

Even after becoming an ANA, the members continued with basic forest management operations, particularly root-cutting and thinning. Root-cutting was conducted, as a rule, one or two times a year by all residents in the community. Thinning was entrusted to an FOC, paid for by a subsidy from the prefecture.

The former FPC members and the residents of the community mostly overlapped. Therefore, their management situation did not drastically change, other than a positive consequence of being free from corporate taxes.

[ANA B]

ANA B (Fukuoka prefecture), which owns 72 ha, was organized in 2020 after the FPC in the community changed its status. The former FPC was established in 1983. During the time of the FPC, members were engaged in the weeding and cleaning of strip roads. This community experienced severe damage from flooding in 2017 and the members had to remove dirt from their forest area. They had undertaken a final harvest of timber, which they entrusted to an FOC. Before the status change, the FPC had a reasonable annual forestry income of approximately 700,000 Japanese yen.

The members decided on the status change at the 2019 annual meeting of the FPC. The primary reason was that the FPC would otherwise face bankruptcy. The number of FPC members and residents in the community was declining, due to their remote location. Here, when a person's membership ends due to his or her death, and when none of his or her children live in the community, the FPC has to return the amount that the FPC member invested to establish the FPC, i.e., 350,000 Japanese yen. This meant that the more members who died, the more money the FPC had to disburse from their savings. The members were sure that their savings would run out in the near future, despite a certain amount of forestry income. Therefore, they decided to change their organizational status to an ANA. The status was changed in 2020, at which point, an agreement was reached among the former FPC members that they would not claim a refund of the invested amount.

The secondary reason for the status change was the burden of taxation; even though the FPC had forestry income, corporate and corporate inhabitant taxes were a burden.

The FPC members felt little concern about changing the organizational status. In this community, residents and FPC members mostly overlapped, and so, issues of membership was not a problem. The president told the authors that they would continue the same level of forestry operations after the status change.

[ANA C]

ANA C (Saga prefecture), owning 23 ha, was organized in 2021 after the FPC in the community changed its status. The former FPC was established in 1990. A large part of the forest had been designated as a forest reserve for water source cultivation. A few years before the status change, the cooperative's members had conducted weeding, using a subsidy from the city. There were no forestry nor non-forestry incomes. The FPC charged annual fees in order to pay taxes.

The members started discussing a status change to an ANA in 2017, due to the burden of taxation. The president told the author that they had a sense of responsibility to manage the *iriai* forest, particularly with regard to disaster prevention and water source cultivation. However, it was unrealistic to continue the FPC situation for future decades.

In the process of deliberation, the FPC faced a problem in that the FPC members and the residents in the community were not the same. As of 2020, the number of FPC members (households) was 26, but the number of households in the community was 80. After an FPC becomes an ANA, the forest becomes an asset for all residents of the community. The FPC members were uncomfortable with this situation, as they had contributed labor and in-kind and monetary investments. Thus, they tried to determine a method by which they could continuously engage in managing the *iriai* forests.

Consequently, the regulations of the newly formed ANA prescribed that a forest division was to be set up consisting of former PFC members. In doing so, the former FPC members tried to maintain responsibility for managing the forests. It was unclear how the benefits from timber production or any other income sources, if any, would be shared in the ANA—in other words, whether benefits would be shared among the former FPC members alone or among all community residents. This issue had remained a gray area.

This arrangement somewhat deviates from the concept and principle of ANAs, which is an organization open to all community residents. At the same time, this arrangement

could be regarded as a technique to reconcile the existing legal prescriptions of the ANA setup with local realities.

The former FPC president told the author that the members of the former cooperative were willing to maintain their existing forest management operations, primarily based on the forest division in the ANA. However, they were not sure what other, non-FPC community residents would be involved in or invited to in terms of forest management. At the time of the author's survey, few concrete ideas on collaboration in the community had been developed.

4. Discussion

An examination of the historical developments of external policy influence over *iriai* forests confirmed that FPCs were promoted by the government when timber prices were high in the 1960s. Conventional *iriai* communities, based on rights of common, were considered a hindrance to promoting intensive and efficient forestry. As a result, rights of common were subject to extinguishment through due processes. However, conditions favorable to forestry have disappeared, particularly since the 1980s, given low timber prices and declining FPC membership. The status of a cooperative is generally no longer advantageous; instead, FPCs have the disadvantage of paying corporate taxes even though they have no income. As Shimada [14] indicates, these external factors have worked outside the control of *iriai* communities.

We can observe how policies related to administration and forestry can have negative effects on forest commons. Overall, changes in *iriai* forests after the 1960s have typically been the negative effects of commodification and non-settlement trends [6]. On the one hand, this could be understood as simply a failure of certain policies; on the other hand, this could represent a broader indication that such a policy failure is a consequence of modernization and its simplification of the relations between nature, space, and people [30]. The value of maximizing monetary profits by private entities, which prevailed after the 1960s, should be reconsidered, and revitalizing meaningful human–forest relations in the contemporary context is important.

Through its surveys of FPCs and ANAs, the present study has confirmed several important points. First, some FPCs have suffered from disadvantageous circumstances in forestry, including low timber prices, fewer FPC members, and the burden of corporate taxes. Few FPCs had engaged in forestry production in the few years before the surveys were conducted. These were general trends of FPCs that had been indicated in the previous literature [9,11]. At the same time, some FPCs have enjoyed a large amount of non-forestry incomes or assets, e.g., the leasing or selling of forestland. This point has been less emphasized by previous studies, except for Yamashita [17]. It is noteworthy that there are some wealthy FPCs and that not all FPCs are suffering financially. Therefore, it is necessary that future policy options for FPCs consider their diversity and build on the concrete situations of each FPC. However, the fact that all the confirmed non-forestry activities were forestland leasing or selling indicates that whether or not FPCs have an opportunity to engage in such activities depends on their geographical location (whether the FPC's forest is part of an upcoming project site), regardless of FPCs' management efforts. Thus, it is unrealistic to propose attracting forest development projects in order to lease forestland as a solution to the disadvantageous management circumstances of FPCs.

Second, as previous studies have indicated, becoming an ANA is a reasonable option. As seen in the present results, forest management activities are not likely to drastically change after the status change, as the former FPC members generally have high degrees of attachment to and responsibility for their *iriai* forests. However, as shown in the case of ANA C, difficulties will arise when FPC members and community residents do not overlap.

Third, in most cases of both FPCs and ANAs, basic forest management operations were conducted, at least to some extent. Several received subsidies from the prefecture or city to conduct tending operations and the importance of subsidies was confirmed. However, as mentioned in the Materials and Methods section, the present study did not apply random

sampling methods, and thus, the author cannot generalize this in quantitative terms. The qualitative interview results indicate that both FPC and ANA members were likely to feel attached to and responsible for their *iriai* forests. The importance of forests in environmental conservation, water source cultivation, disaster prevention, and climate change mitigation was often emphasized. As the owners and managers of *iriai* forests, they perceived that they had contributed to this public good. It is implied that this sense of pride is one of the important factors maintaining management activities of *iriai* forests in the contemporary context.

It Is noteworthy that local communities are likely to want to persist with forest commons, even when it is difficult. Changing the entity's status to ANA is a creative application of an available institution that originally had nothing to do with forest commons. As can be seen, the existing local will and initiatives should not be overlooked or underestimated. Institutional changes should be encouraged to promote or ease local initiatives that can maintain or revitalize commons management; this lesson can be applied to countries other than Japan.

5. Conclusions

The present study has provided an overview of contemporary *iriai* forest management in Japan, focusing on FPCs and ANAs. It has also presented case studies of several FPCs and ANAs, highlighting the difficulties and struggles that they face as forest commons managers. A simple generalization of the history of Japanese *iriai* forests to the global context is difficult. At the very least, given that forest commons which can entail meaningful human–nature relations have undergone a re-evaluation in the contemporary developed world [6,31], a globally shared question might be how to provide an institutional framework, financial mechanisms, and social understandings that can maintain and revitalize commons.

The author provides three policy recommendations for the Japanese context. First, the legal settings of FPCs and ANAs should be made more compatible with contemporary realities. This has been partially realized through the 2017 revised Forest Act, which enabled easier status change to ANA. However, there is room for further policy modifications in the taxation arrangements of FPCs. In addition, administrative support and consultation opportunities are advisable for FPCs considering a status change to ANA in places where such support has been absent.

Second, greater financial support for management activities is beneficial, particularly for FPCs. Since 2019, the Forest Environment Transfer Tax has been in force in Japan, as a form of payment for ecosystem services [32]. Funds from this tax could be allocated to managers of *iriai* forests. As FPC members feel that they are contributing to the public through forest management, provision of funds from this tax can be seen as reasonable and thereby justified. In the context of global climate change, the ecosystem services provided by managers of *iriai* forests will gain importance.

Third, perusing multi-level governance to open the commons to broader sections of society is key. After becoming ANAs, *iriai* forests become assets of all residents in the community. Given this opportunity, enhanced engagement with people other than former FPC members—e.g., schoolchildren in and outside the community, and environmental volunteers from urban areas—could be considered. Mitsumata and Saito [31] reports cases where new values were created and forest uses were revitalized, as a result of the collaboration of multiple stakeholders. In such a process, the forest composition of *iriai* forests could also be reconsidered; existing planted forests of Japanese cedar and cypress could be gradually turned into mixed forests of conifer and broad-leaved trees. If former FPC members strongly believe that their *iriai* forests should only serve timber production from cedar and cypress trees, changing their thought processes to consider more flexible and diverse uses of forests would also be beneficial.

Funding: This study was financially supported by JSPS KAKENHI under grant number JP21H03709.

Data Availability Statement: The data are not publicly available due to confidentiality reasons.

Conflicts of Interest: The authors declare no conflict of interest.

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