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External impacts on traditional commons and present-day changes: a case study of *iriai* forests in Yamaguni district, Kyoto, Japan

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Abstract: Japanese *iriai* forests have been regarded as a model of institutions for collection action in the sustainable use of resources in studies on commons, as pointed out by Ostrom (1990) and McKean (1992). However, present-day *iriai* forests that have survived decades of legal and even greater economic and social challenges have undergone significant alteration. While we know that external conditions such as foreign competition from low-cost timber have depressed the Japanese forestry industry and thus reduced the health of Japanese forests as a whole, we do not know about the current state of the *iriai* forests in particular. Adaptation to external impacts is crucial for the survival of the commons in a modern industrialized society. This study examines external impacts on traditional commons and the resultant institutional changes in current Japan. We cannot easily track the changes in traditional commons without deep understanding of many cases, because the factors affecting their functioning are complex and diverse. Therefore, we opted to use the case study method to improve the empirical foundations for analyzing these complex phenomena. Our goal was to examine the institutional changes resulting from one source of pressure found in many commons near urbanizing areas in postwar Japan – an increase in newcomers – as well as from the pressure of foreign competition in forest products. We chose eleven villages in the Yamaguni district in Kyoto city that manage their own common forests and studied the documented rules in these communities. We used participant observation and also conducted interviews with villagers to obtain their sense of change over time, the impact of globalization, and the current status of the commons. This paper derived the following conclusions. First, the village community can adapt its institutions to external influences by supporting continuous institutional change. Second, although village communities can overcome most external impacts themselves, there is one impact, low-priced

competition due to free trade in forest products which they cannot cope with independently. Third, regenerating local Japanese commons requires multi-level governance based on the principle of subsidiarity.

Keywords: External impact, free trade, institutional change, *iriai*, principle of subsidiarity

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1. Introduction

Japanese *iriai* forests and semi-natural grasslands are popularly known for their models of collective institutions that promote the sustainable use of common lands, as pointed out by Ostrom (1990) and McKean (1996). In *iriai* forests and semi-natural grasslands, residents of a specific area with specific rights collectively access certain forests and grasslands where they can procure timber, forage, firewood and so on. Villagers establish detailed rules on the methods, period and quantities of harvest for the forest products that each household may take from an *iriai* forest for their livelihoods (McKean 1992). Ostrom (1990) identifies Japanese *iriai* as a robust institution and appropriate model to devise the principles and uses it as one of several cases from which she builds design principles for maintaining long-enduring common-pool resources (CPR) institutions that support sustainable production. However, the circumstances of *iriai* forests have changed drastically after the World War II. These changes have differed in each local area of Japan,[1] so we will limit our discussion of changes over time to the range of cases included in this study.

[1] One of the important institutional changes widespread in the postwar period was a shift from collective management to individualized management, promoted by the Japanese government's controversial program to "modernize" *iriai* forests in 1966, based on the view that collective

Iriai institutions were established largely during the Edo Era (1603–1867) (Furushima 1956). At that early stage of *iriai*, non-timber forest products such as firewood, forage and grass, utilised for household purposes, were the main products of *iriai* lands (Funakoshi 1981). Local institutions served to protect *iriai* resources from overexploitation because these resources were crucial for the subsistence of local people (Tsutsui 1973). Ostrom, McKean and others describe these traditional *iriai* arrangements in the literature from this early stage of commons development.

However, with the growth of the economy, demand for firewood, forage and grass significantly decreased due to the substitution of imported fossil fuel, feed grain, and chemical fertilizer.[2] Non-timber products became less crucial for people's livelihoods while demand for timber increased. Some *iriai*-holding communities converted their forests to timber-producing coniferous plantations, encouraged both by potential profits from timber production and by government policy (Funakoshi 1981). They waited eagerly for their plantations of high-value cedar and cypress to mature, but as Japan and the rest of the world began to import inexpensive tropical timber from developing countries around the world, demand for Japan's domestic supply of timber did not expand as they had hoped.

Over the past few decades, people lost interest in *iriai* forests – and also in individually owned forests – even after having invested in them. The failure to tend these forests reduced their quality, and made them more susceptible to disease, damaging their economic value even further. As a result, people abandoned many of their tree plantations (Mitsui 1998). During these two processes of enthusiasm and then disappointment with *iriai* as timber-producing forests, both *iriai* institutions and the health of the forests themselves have become endangered (Mitsui 1998). But the commoners continue to hold their rights to the forest and to the *iriai* land. Many wonder how the commons can survive within modern industrialized society (Ueta 1996), but recent research (Mitsumata et al. 2008) emphasizes the importance of *iriai* commons that can manage local resources and environment in a sustainable way, suggesting that the commons can provide a structured mechanism offering sustainability within industrial society. This study examines how villagers have managed their *iriai* forests during these two phases of enthusiastic afforestation and disappointed neglect. Because we have good reason to suspect that *iriai* forests are no longer isolated from external influences, and indeed that external pressures of various sorts have contributed to the problems these forests have today, this paper focuses on two of the most important exogenous impacts on traditional commons – the arrival of newcomers

management was archaic and inefficient. Kijima et al. (2000) analzed the efficiency of timber forests in *iriai* forests under individual versus collective management, and concluded that individual management may encourage more investment and labor, but collective management seems to be more efficient at monitoring functions designed to protect the resource base.

[2] The timing of this switch to imported substitutes varies by resource and region, but the shift in firewood occurred in the late 1950s (Murota 1985).

to the community and commercial pressure in the form of competing products at lower prices – and the changes that have followed. We will be looking at how these two forces have affected local *iriai* institutions.

2. Methods

Researchers have commented that *iriai* forest and *iriai* institutions are very complex and diverse, reflecting local history, culture and nature (Nakao 2003; Murota and Mitsumata 2004). In Japan, national laws governing *iriai* under articles 263 and 294 of the Civil Code and article 238 of the Local Autonomy Law state that *iriai* shall be governed by local custom. The decision to honor local custom probably did not signify any great respect in government or law for local custom at all, but simply acknowledged the fact that because *iriai* practice varied so much after centuries of independent evolution, it would be difficult to arrive at uniform rules for regulating *iriai.* Thus *iriai* institutions vary greatly, and studying external impacts on them greatly multiplies the variations that we must try to track.

Therefore, in this effort to gather primary empirical data in conjunction with so much variety, I opted to study a manageably small number of villages within the same geographic region and forest ecosystem. To capture external pressures in the form of population movement and trade liberalization in timber, I chose a heavily forested area near the metropolis of Kyoto where several villages within the same forested area each manage their own *iriai* forest, and where residents keep excellent documentation that we can use to track increase in population and trade in forest products as well as internal rule-making. Section 3 examines this region's use of common lands in comparison with the rest of Japan. Although it is near a metropolitan area, allowing us to examine the pressures of urbanization and economic change, it is also quite similar to forested commons throughout Japan. Sections 4 and 5 below describe how the 11 villages in this district (Oshio, Hatsukawa, Motoido, Terayama, Ohno, Higae, Nakae, Tsuji, Tō, Torii and Shimo – see Figures 1 and 2) have each responded to increase in the number of new residents and competition from trade in forest products.

In fact, because of the central government's interest in amalgamating municipalities, these once separate 11 villages, called *mura* or *ku*, have been merged into the Yamaguni *mura*, an administrative body since 1889. In 1955 the government underwent an additional amalgamation combining Yamaguni with other neighboring areas into Keihoku Town. Finally, in 2005 Keihoku Town was absorbed into the City of Kyoto, even though it remains well outside of the developed area of the city and is heavily forested.

For this study, I conducted cross-section analysis on all 11 villages in Yamaguni district (in Section 4.1) and additional time series analysis for Tō village (in Section 4.2). I have made 21 site visits for field research to all 11 villages since 2004, during which I interviewed the chair, vice-chair, and other committee members of the common forest management organizations in all

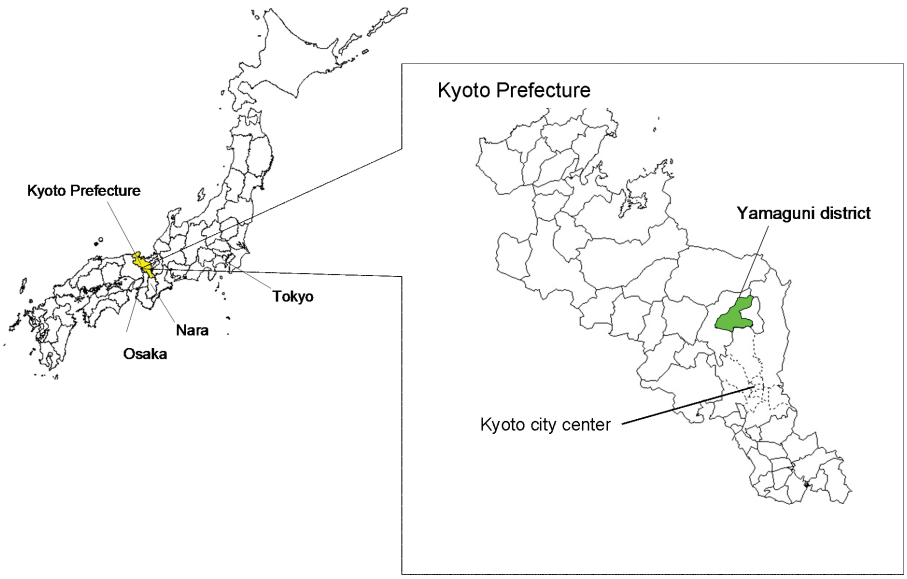

Figure 1: Map of Kyoto Prefecture and Location of Yamaguni district.
Note: Made by Daisaku Shimada by using the blank map software Kenmap8.3 and Mapmap6.

11 villages. I also interviewed six persons who had been members of earlier committee members from 1982 on in Tō village, as well as four new residents of Tō village. I collected documentation of rules and changes in rules to analyse the institutional changes owing to the increasing number of newcomers. For the purpose of the time series analysis, I evaluated all rules of 1972, 1987 and 2004 in Tō village as well as the current rules in nine villages. I examined the account books of the Tō residents association, common forest management committee and common forest management organizations from 1960 to 2006, along with additional documents providing information on management of common forests, in order to analyse the impact of competition from free trade in forest products. Finally, I did participant observation of cooperative work in forest management in the common forest in Tō, with the committee chair as guide.

3. Outline of the Yamaguni district

Yamaguni district, in the northern part of Kyoto City (see Figure 1), is well known as having a long history in the forest industry. In 2006, there were 11 villages, 523 households and 1724 people in Yamaguni, which covers 47.35 km^2 in all with forests covering 45.63 km^2 (Keihoku town 2004). According to Motoyoshi (1983) and Totman (1989), the Emperor Kanmu (737–806) declared Yamaguni to be an Imperial forest when he transferred the capital from Nagaoka to Kyoto in 794.

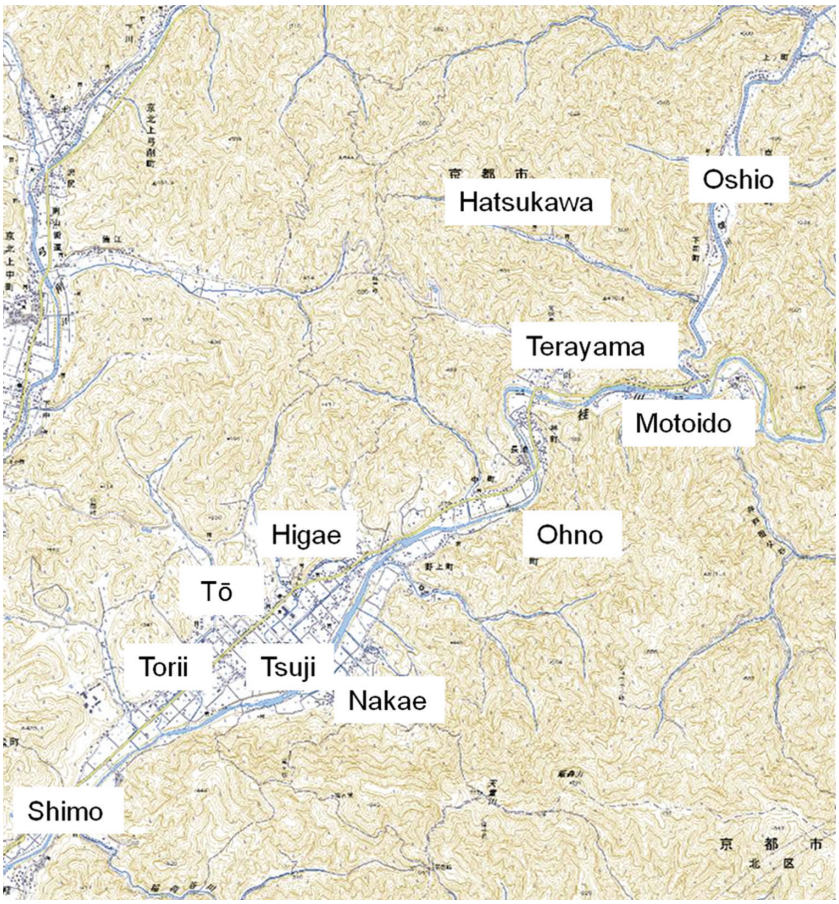

Figure 2: Eleven villages in Yamaguni district.
Note: Made by Daisaku Shimada by using the map of Geographical Survey Institute.

Thus this area began supplying timber from the late 8th century onward for the new capital of Kyoto, when exploitation forestry began. This activity expanded further in the medieval period, especially after the Katsura River was developed to improve the physical transport of timber to Japan's major medieval metropolitan areas of Kyoto and Osaka. After peace and major city-building began with the Pax Tokugawa (1600–1867), causing Japan's first significant crisis of deforestation in the 17th century (Totman 1989), regenerative forestry (intentional replanting after harvest) began in the Yamaguni area. After the Meiji Era (1868–1912), commercial forestry in Yamaguni, now famous for its forest, continued to develop to meet the ever-increasing demand for timber.

However, if we fast-forward to the most recent two decades, we find that forestry in Yamaguni has gone through the same collapse and crisis that Japan

has experienced nationwide. As Yamaguni's forestry industry reached critical condition, forestry workers as a percentage of the entire working population decreased in Keihoku Town[3] from 1955 to 2000: 17.3% in 1955, 10.1% in 1975, 6.5% in 1995 and 6.3% in 2000 (Keihoku town 2004). During the postwar era, urbanization proceeded very rapidly in Japan, and primary industry workers decreased while tertiary sector workers increased in this area.

In Yamaguni district, customary common property forests managed by villages account today for 12.03% of the total forest area (Table 1). In addition, 5.00% of forests are managed by the Yamaguni district's property ward[4] and 2.05% belong to the shrine or temple. These latter forms of ownership derive from customary commons as well. Each of the 11 villages in Yamaguni district (Figure 2) has its own unique institutions for managing its customary common property forests. I focus in this paper on these various customary common property forests.

According to the forest census in 1990, customary common property constitutes only 4.56% of Japan's total forest area (Ministry of Agriculture, Forestry and Fisheries of Japan 1991). In Yamaguni district, this proportion is 12.03% (and for the Kinki[5] area as a whole it is is 12.45%). Thus customary commons in Yamaguni is on par with the proportion for the wider Kinki region, and a good deal higher than Japan's nationwide standard.

Community-based forests in Yamaguni are comparable in size to those in the Kinki region as a whole. In 1990, 59,209 community-based organizations each possessing at least 0.1 hectares (ha) managed Japan's customary common property forests in Japan (Ministry of Agriculture, Forestry and Fisheries of Japan 1991). Of these, 22,636 organizations possessed a forest area from 0.1 to 1 hectare, and 16,452 organizations possessed forest area from 1 to 5 hectares in size, comprising 66.02% of the total number of organizations. In addition to this majority of groups managing forests under 5 hectares in size, another 26.44% of the community-based forest management groups managed larger forests ranging from 5 to 50 hectares in size, and 7.54% organizations had forests larger than 50 hectares. The communities of Yamaguni manage relatively large forests: all of them are at least 5 hectares in size, and five Yamaguni *iriai* organizations manage forests larger than 50 hectares (see Table 7 in Section 5). In the Kinki region as a whole, where customary common forests tend to be larger than average, 56.97% of the organizations have forests smaller than 5 hectares, but 12.56% of them have

[3] I used the data of Keihoku town, which includes Kuroda district, Yuge district, Syuuzan district, Hosono district and Utsu district. This data excludes Yamaguni district because data on Yamaguni district did not exist.

[4] A "property ward" is a special local public entity that is a part of the local government. It can manage its property such as forests, hot springs, irrigational ponds, community halls and so on. In Yamaguni district, Yamaguni Property Ward mainly managed forests. In 2005, the Yamaguni Property Ward disbanded and the the Yamaguni Authorized Neighbourhood Associations were established in its place.

[5] The Kinki area consists of Kyoto, Osaka, Hyogo, Nara, Wakayama, and Shiga Prefectures.

Table 1: Ownership of forests by management form in Yamaguni district (2003).

	Total forest area	State (Japan)	Prefecture (Kyoto-fu)	City (Kyoto-shi)	Property Ward (zaisanku)	Public Corporation of Forestry and Greenery	Private Corporation	Shrine or Temple	A forestry owners' association	Customary common property (*iriai*)	Private individual
Area (ha)	4562.82	3.02	0.00	2.91	228.24	10.00	99.89	93.65	22.69	549.00	3553.42
Percentage of total forests	100.00	0.07	0.00	0.06	5.00	0.22	2.19	2.05	0.50	12.03	77.88

Source: Forestry statistics of Hokusou in 2003, reprinted from Shimada (2008) by permission of the Forest Economic Research Institute.

forests larger than 50 hectares. Thus Yamaguni is similar in the pattern of forest size to the Kinki region, though there are a greater portion of large community forests in Yamaguni even than in Kinki as a whole.

Similarly, community-based forests in Yamaguni devote approximately the same portion of their forests to timber plantations as do those in the Kinki region as a whole. If we look at the 36,573 commons organizations throughout Japan that each own more than one hectare of common property forests (Ministry of Agriculture, Forestry and Fisheries of Japan 1991), we find that 8678 of these organizations (23.73% of them) did not have plantation forests, but 15,278 of them (41.77%) held more than 80% of their customary commons forest area in plantation. Between 7 and 10% each of the commons user groups held 0–20%, 20–40%, 40–60%, and 60–80% of their land dedicated to plantations. Thus plantation use is the prevalent form of forest management among common property (*iriai*) user organizations. We do not have complete data of this type for Yamaguni district, but in the Kinki region, 25% of commons organizations have no plantation forest, 25% have put more than 80% of their forest into plantations, and another 13.02% have put 20–40% of their lands into plantation forest. Since Tō village has dedicated 36.1% of its common forest areas into plantation (see below in section 4.2 and Table 3), Tō's use of plantation methods reflects the usage in the Kinki region also.

As noted previously, the Yamaguni area is well known for its timber industry. All villages in this area have developed coniferous plantation forestry as a way of managing their forests for a long time. Village assemblies created detailed rules specifying the obligations and rights to common property forests. All villagers had to perform collective work to enhance and maintain the yield of common property forests and subsequently to earn money both from timber and from the extremely valuable *matsutake* mushroom (*Tricholoma matsutake*) that flourish in these forests. The money earned by these means provides the economic foundation for village autonomy.

4. Newcomers and the changing institution of common property forests

A major concern for the stability and social cohesion of a commons user group is dealing with population change, particularly the arrival of newcomers to a community that has *iriai* assets. Table 2 reports results of a survey that targeted organizations owning more than 10 hectares of customary common property in 2000 (Ministry of Agriculture, Forestry, and Fisheries of Japan 2001). Table 2 shows us that almost half of the *iriai* organizations in Japan do not allow newcomers to acquire rights in the commons, and another third of them allow newcomers to acquire rights only if they meet certain community-set conditions for membership. Only a fifth grant *iriai* rights unconditionally to newcomers. In comparison to the rest of Japan, the Kinki region containing Yamaguni (shown in bold) is somewhat more generous about passing out rights to the commons than

Table 2: Do commons user groups allow newcomers to hold rights in the commons?

Regions of Japan	May hold rights in the commons		May hold rights under certain conditions		May not hold rights in the commons		Total
	Number of organizations	%	Number of organizations	%	Number of organizations	%	
Hokkaidō	6	28.6	8	38.1	7	33.3	21
Tōhoku	282	13.0	623	28.8	1261	58.2	2166
Hokuriku	209	22.4	337	36.0	389	41.6	935
Kantō	388	25.1	468	30.2	692	44.7	1548
Tōkai	291	24.0	367	30.3	555	45.8	1213
Kinki	**548**	**23.5**	**993**	**42.5**	**795**	**34.0**	**2336**
Chūgoku	373	21.5	574	33.1	788	45.4	1735
Shikoku	117	31.0	106	28.0	155	41.0	378
Kyūshū, Okinawa	401	23.1	486	27.9	852	49.0	1739
Total for Japan	2615	21.7	3962	32.8	5494	45.5	12,071

Note: In the regionalization used here, the Kantō region includes Nagano and Yamanashi prefectures.
Source: Ministry of Agriculture, Forestry, and Fisheries of Japan (2000).

other regions of Japan, and only a third of the Kinki organizations refuse to grant rights in the commons under any circumstances to newcomers. The table reveals considerable differences among regions. Whereas 58.2% of the *iriai* organizations in Japan's northern Tōhoku region refuse to allow newcomers into the user group, in the Kinki region a total of 66.0% of *iriai* organizations allow newcomers to acquire rights in commons user groups, either outright or subject to conditions.

Yamaguni seems to match the Kinki trend: outsiders can become rights-holders in 3 communities, and can acquire rights if they meet certain conditions in the other 8 communities. None of the Yamaguni villages flatly forbids newcomers to acquire *iriai* rights. We will next examine the process by which Yamaguni communities dealt with newcomers over the course of the last few decades.

4.1 Overview of 11 villages in Yamaguni

The shortest distance by road from the middle of Yamaguni district to the Kyoto city center is approximately 20 kilometers, allowing people to commute into the city for jobs.[6] The 1970s witnessed an increase in the number of newcomers in this area in accordance with motorization and the expansion of suburbs. The increasing number of newcomers changed the institutions of customary common property forest management.

Originally, the residents' associations and common forest management organizations were the same body in all 11 villages, because all residents were entitled to holder *iriai* rights. Before the number of newcomers increased, all

[6] Public transportation in this area consists of buses that go into the city center of Kyoto. No railways serve this highly mountainous area.

households had rights and responsibilities to the common property forests. Duties and benefits were allocated equally to all households. All household representatives were required to participate in cooperative labor for forest management,[7] held three to ten times a year until the 1980s. Thus, all households equally shared the cost of managing common forests. Residents' associations in each village (which we will also refer to as the village community) also earned revenue from the commons, largely from selling standing timber and selling rights to *matsutake* mushroom picking in the forests.[8] They used this revenue from the common forests primarily for community public goods in the village – a community hall, a shrine for the guardian god of the village, or a Buddhist temple whose patrons were the villagers.

New residents increased in the 1970s and 1980s. Most of them came from other areas of the Yamaguni district, some of whom did not want to take up responsibility for common forest management because they considered engaging in cooperative work for common forests to be a heavy physical burden.[9] But at the same time, the public goods provided by the revenue from the common forests benefited all residents to varying degrees. These facts put new residents into the position of free-riders, benefitting from the commons without contributing. Long-term villagers worried about the negative effects of the free-rider problem on the incentive of newcomers, and perhaps of other villagers too, to engage in very necessary cooperative work. Our interviews and analysis of written rules indicate that each of the villages tried to change its institutions in some way to respond to this problem, creating either a newly formulated and enlarged residents' association, an independent common forest management organization separate from the residents' association, or an authorized neighborhood association, a new organizational entity authorized by recent legislation. We explain further below.

As explained in Section 3 above, these village communities were smaller than municipalities they merged into, and they generally developed a collaborative relationship with the municipalities that now contained them. However, the village communities no longer had corporate status after amalgamation, so they could not be registered holders of land. Instead, the usual arrangement that villages adopted to meet this challenge was either to register the common land in the names of all householders, or else to elect one to three people who represented the village to become the registered owners of common forests. Very often, in these cases,

[7] According to the interview with the village community's leader, people do planting, weeding, vine cutting, cleaning cutting and thinning young forests themselves, as cooperative labor required on the commons. But for more technically demanding work like thinning and pruning, they hire forestry workers in the communities. See Table 7 for information about the number of days communities require for cooperative labor.

[8] For further information regarding revenues, see Figure 7 in Section 5.

[9] According to results of a survey done by a research group I belong to, the physical labor required was one of the main reasons people cited in explaining their reluctance to take responsibility for common forest management (Mitsumata et al. 2008).

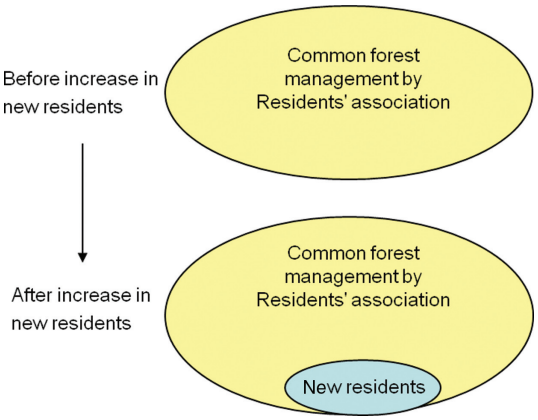

Figure 3: Common forest management by enlarged residents' association.

the handful of representative persons who held and registered formal title would make a contract, actually a notarized deed with considerable legal strength, with other villagers assuring them that all, not just the representatives, really owned the commons. This notarized deed would be filed with the registration of land to guarantee rights of ownership to all of the owners.

In two of the Yamaguni communities, Oshio and Ohno villages, new residents basically became members of the residents' association and assumed rights and responsibilities related to the common forests. Figure 3 illustrates this change.

Why did they maintain the traditional organization rather than choosing a new form? Interviews provided two different reasons. In the case of Ohno village, the number of newcomers was small,[10] indicating that both their political influence and their ability to damage the commons through free-riding were relatively small. In Oshio village, where 23 newcomer households arrived after World War II (most around 1975) and eventually constituted 50% of the population, leaders said that villagers wanted to avoid creating division in the community between newcomers and original villagers in the management of common forests. These newcomers were engaged in forestry, blended well with the village community, and played a central role in community activities. So other village residents felt that unity with the newcomers was important and valuable. Moreover, one leader in Oshio pointed out that the scale of common-pool assets in the village was small, so an argument over the commons was not worthwhile. The very different

[10] The village community leader explained that 7 of the 73 households were newcomers, and 3 of the 7 newcomer households were willing to carry rights and responsibilities for common forest management. Thus only 4 households were potential free-riders, and villagers felt that this potential problem was manageably small.

circumstances of these two villages led them to make the same institutional choice to absorb newcomers into their existing organization.

Seven other Yamaguni villages – Motoido, Terayama, Higae, Nakae, Tō, Torii and Shimo villages – also managed common forests through traditional residents' associations, but as the number of new residents increased and the free-rider problem grew, they responded to the arrival of newcomers by shifting management of their common forests to independent common forest management organizations, separate from the pre-existing residents' associations.[11] After this shift, new residents arriving in these communities could become members of residents' associations (because they were indeed residents), but the new residents did not automatically become members of common forest management organizations. Newcomers could choose whether to join the new common forest management organizations, and some did, but most did not.

In most of these villages, new residents had to find one or two sponsors who already held *iriai* rights in the common forests in order to join the common forests management organization. Moreover, new members of these organizations would not receive 100% of the rights to start with, and their *iriai* rights grew by a percentage increment each year. In Tō, new residents needed 40 years to elapse before they could obtain the 100% of *iriai* rights. It is because people had to invest effort in the forests for a long time before they could receive much revenue from their own forest plantations.

Figure 4 illustrates an independent common forest management organization, the most frequently adopted option in Yamaguni. Legally, these independent common forest management organizations were voluntary organizations without corporate status. Therefore, these organizations also could not be registered holders of land, so creating them did not solve the problem of registering ownership.

Rather, the main reason they established a new organization for the management of the commons was to clarify the rights and obligations of commoners to the common forests. These communities required holders of *iriai* forest rights who benefit from the forests to perform collective work to enhance and maintain their yield in common forests, at most four times a year (see Table 7). The communities fined any member who missed the cooperative labor. These fines (see Table 7) varied from 8000 to 12,000 yen in Motoido per day, so they had substantial impact and prevented the free-rider problem from emerging. As described in Section 4.2, villagers continuously improved their institutions to address new needs.

There were also other reasons to establish independent organizations. The leader of Nakae village pointed out that residents' associations and common forest management associations could take on different roles and activities, and this spared both organizations, as well as the leadership, from carrying concentrated burdens. Motoido and Terayama had an additional reason dating from their merger

[11] All seven of these villages created independent organizations for managing their common forests, so we are treating them as a single type, but in fact the organizations they created were not identical, instead reflecting the variety in their circumstances.

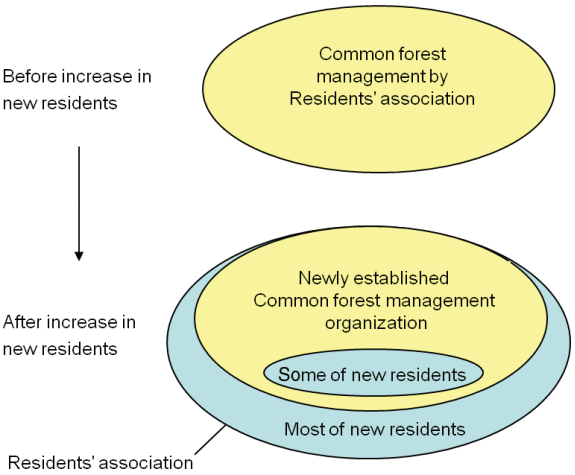

Figure 4: Establishment of common forest management organization independent of residents' association.

into a single village much earlier, when they decided to manage their common forests through a new unit or organization separate from the amalgamated village.

The two remaining villages in Yamaguni – Hatsukawa and Tsuji – also managed their common forest through a residents' association and allowed newcomers to join it at first. But later they opted to take advantage of a new 1991 amendment to the Local Autonomy Law that allowed village communities to obtain corporate status as legally recognized entities, known as authorized neighborhood associations, which can then register their ownership of commons (see Figure 5). According to Yamashita et al. (2009), when the government created the system for authorized neighborhood associations, it did not expect to see communities that managed *iriai* forests adopt this form to manage their commons. However, authorized neighborhood associations established under the 1991 revised Local Autonomy Law had a significant impact on common forest ownership (Yamashita et al. 2009). Hatsukawa and Tsuji were the two Yamaguni villages that applied the new governmental law to managing their common forests.

One reason that village communities chose this form was to reduce the cost of registering and titling land. Village communities own much of the common lands in Japan, though as explained earlier, they do not hold title themselves but instead register the land under the names of all householders or a few representatives. However, given the fact that people move in and out of the community, this conventional registration system could become cumbersome and expensive, since residents would have to re-register their commons every time someone moved out or a new resident became entitled to share in the commons. It is much easier for a single entity to own the commons continuously, and for the entity to change its composition freely without going through registration of title again.

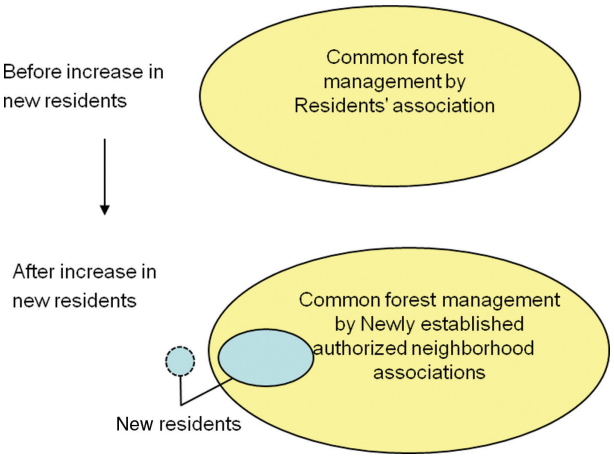

Figure 5: Establishment of authorized neighborhood associations to manage common forests.

When it comes to treatment of newcomers, these two villages differed. In Hatsukawa village, the Hatsukawa Authorized Neighborhood Association consisted of all residents including three newcomers. Residents of Hatsukawa told us that because the numbers of both new and old residents were small (see Table 7), they considered community unity important. In contrast, the Tsuji Authorized Neighborhood Association consisted of both original residents and only those new residents who were willing to join the association, share in its duties, and reap benefits.

In summary, in these three types of collective entities, villagers modified their institutions in different ways in response to an increase in new residents, out of concern for maintaining village unity and cohesion while also solving free-rider problems and reducing other burdens on leadership and costs of land registration. Factors related to these diverse choices were the number of newcomers, total village population, the interests and preferences of newcomers, and the size of common-pool resources to be managed as community assets.

4.2 The case of Tō village

We can already see that even among the 11 villages in Yamaguni, each village has reacted independently to modify its collective institutions, not suddenly but often in gradual steps. To improve our understanding of the role of diverse institutions in commons management, we will look closely at Tō village, which experienced the largest influx of newcomers among the cluster of villages that also adopted an independent forest management association. Tō's institutional changes are well documented because its residents kept careful records that allow us to see step by step changes. Table 3 shows the composition of Tō's forest resources. Plantation forests of *Sugi* (Japanese cedar: *Cryptomeria japonica*) and

Table 3: Forest Resources in Tō's common forests in 2007.

Tree species	Japanese cedar			Japanese cypress		Japanese red pine	Others	Total
	Plantation (*migakimaruta)*	Plantation	Natural growth	Plantation	Natural growth			
Area (hectares)	1.20	11.21	0.10	3.77	5.61	11.17	11.69	44.75
Composition of total (%)	2.68	25.05	0.22	8.42	12.54	24.96	26.12	100.00

Source: Documents held by Tō village.

Hinoki (Japanese cypress: *Chamaecyparis obtusa*) cover 36.2% of Tō's forest commons, and Japanese red pine (*Pinus densiflora*) covers 25.0% of this total area. Tō's organization for *iriai* forests directly manages the forests and receives revenue from them by selling the stumpage. Tō can also charge others for picking the *Matsutake* mushroom, a very popular and expensive mushroom that grows in forests of Japanese red pine. According to interviews with the organization, several leaders who served as heads of organizations separately in 1982, 1986, 1987, 1991, 2001 and 2003, this use of timber and mushrooms for revenue has not changed since 1945.

In Tō, interviews and analysis of village rules show that villagers modified their institutions in response to an increase in the number of new residents, not once but three times, in 1972, 1987 and 2004 (see Table 4). The first institutional change in 1972 was a response to the expectation of an influx of newcomers, though the real increase in newcomers occurred in the 1980s. There were 50 households in 1970, only 47 in 1980, up to 74 in 1990, and then down again to 64 in 2000.[12] This increase could result from both in-migration and branching of existing households. However, community documents and interviews with the president of the common forest management organization indicated that in 2005 only two households originated from independent branching of existing households. In addition, a few households moved out during the same period. Thus we know that the increase in households in the 1980s resulted mostly from newcomers from outside of the community.

Tō's initial response to the arrival of newcomers was to create written rules that clarified the rights to common forests. Up to 1972, villagers felt that the rights and responsibilities for common forests should belong to the village community, and that all households residing in the community therefore had those rights and responsibilities.

According to the new rules drafted in 1972, all rights holders of common forests must reside within village community borders. Thus rights holders who

[12] The number of households in Tō village came from the Agricultural Community Survey in the World Census of Agriculture and Forestry 2000 (Ministry of Agriculture, Forestry and Fisheries of Japan 2000).

Table 4: Institutional changes in Tō (bold vertical lines mark an intentional change in institutions).

	Before 1972	1972–1987	1987–2004	After 2004
Number of Households	50 in 1970	49 in 1972	74 in 1978	64 in 2000 54 in 2005
Number of rights holders	50 in 1970	49 in 1972	47 in 1978	45 in 2005
How residents acquired rights	Residents automatically became rights holders	Residents could choose whether they wanted to be rights holders		
Management Organization	Residents association (all households)		Common forest management committee with separate accounting from residents association	Common forest management organization independent from residents association
Ownership of common land	Residents association (all households)			Common forest management organization
Distribution of costs and duties	Equal in all households	Rules say only rights holders but in fact all households share costs and labor	Rights holders	
Distribution of benefits	Community public goods to all residents	Rules prescribe distribution only to rights holders. In fact, all residents receive public goods	Community public goods and distribution to rights holders (not to all households)	Rules say distribution to rights holders. In fact, few distributions due to decreasing revenue

left the area forfeited their rights completely. From 1972 on, new residents did not automatically become rights holders, but could choose whether to acquire rights to the common forest along with bearing the costs of managing the forests, including undertaking cooperative labor for forestry. Absenteeism from cooperative labor involved payment of a penalty high enough to discourage such offences (10,000 yen per day in 2006). A fine in this range for absence from required duties was standard in Yamaguni *iriai* organizations (see Table 7). All eight of the Yamaguni villages where people had continued to share work had the same system requiring payment of similar fines.

The residents' association of Tō held ownership of the common forests both before and after 1972, but even though ownership did not change in 1972, the costs of managing common forests subtly changed at that time (see Table 4). Before 1972, all households in the village equally shared the costs. In other words, all householders contributed to cooperative work. After 1972, according to the rules, only the rights holders shared such costs. However, in reality, all

households shared costs equally because they had rights to common forests in 1972. In reality, villagers recognized the management of common forests as part of community activity.

Tō changed its rules for distributing benefits subtly in 1972 by adding the option to restrict benefits to right holders. This rule was adopted in anticipation of newcomers who might present free-rider problems, but because in-migration did not occur at the expected level, all Tō villagers continued to be rights holders and opted to continue receiving benefits in the form of public goods after 1972 as well. The village usually added all revenue from the common forests into the village community's account. Analysis of the account book of Tō village from 1965 to 1986 shows that during this period, revenue from selling stumpage and the rights to pick *matsutake* mushrooms constituted 49.5% and 19.7% respectively of the village community's total revenue. If we examine the account books for just the period from 1972 to 1986, after the changes of 1972, the forest and mushroom revenue still contributed 45.5% and 22.0% respectively of all village revenue. Tō used this revenue largely for public goods that provided benefits to all villagers: to build an assembly hall, to repair the temple and shrine, and to hold traditional cultural events such as festivals. In 1986 Tō village stated that "We received the revenue for the village community from common forests and for that purpose we collectively worked at our forestry plantations. Three or four times per year of collective work are precious. We reap great benefits such as building community infrastructure from common forests" (Yamaguni Neighborhood Community Association 1986, 69). This statement and Tō's accounts indicate that the common forest was a very important source of revenue supporting the village's activities and the village leaders were highly aware of this fact.

Thus in 1972, the residents of Tō clarified the rights and obligations of common forests in preparation for future increases in newcomers, based on their concern that some newcomers would not contribute to forest management. However, all newcomers who had come to the village before 1972 actually joined the forest management collective and thus fulfilled their obligations as right holders. For example, a villager interviewed in 2005 arrived in 1952, served as the village's forestry manager for a long time, and then became president of the village community in 1982. Thus Tō's experience with newcomers before 1972 was quite positive, with all villagers fulfilling their obligations. Tō's clarifications and new policies of 1972 were not based on bad experience at all, but were simply precautionary. The precautions were wise, as the number of new residents increased greatly during the 1980s and many of these newcomers chose not to obtain right to common forests. From this point on, the number of persons holding *iriai* rights to the common forests was smaller than the total number of village residents.

The free-rider problem began to appear because the village communities used revenues from common forests to provide public goods that benefitted all residents in the village, including those who did not hold *iriai* rights and did not contribute labor on the commons. This situation led to a second change in institutions, in

1987 (see Table 4) when Tō created common forest management committees. With separate account books, independent from the residents' association, the villagers of Tō now found it easier to document the contributions of labor and to control the flow of benefits from the forest commons. From 1987, Tō's forest management committee continued to put some revenue toward projects and public goods projects that still benefitted the entire community, including non-contributors, but put other revenues toward benefits distributed only to rights holders. The difference between the number of rights-holding households and the number of households residing in the village grew, and by 2004, 44 households held *iriai* rights out of the total of 64 households residing in the village. This substantial difference allowed room for a serious free-rider problem.

In 2004, Tō made additional changes in its collective institutions in order to define rights and responsibilities more clearly. Tō went beyond the 1987 creation of committees to manage the common forest and this time established a full-fledged common forest management organization. Tō also transferred ownership of the common forests from the entire village community to the common forests management association. In 2004, changed rules specified that benefits could go to each contributing (member) household or used to support public goods for the entire community, essentially giving the forest management association the right to restrict benefits to contributors whenever it deemed necessary.

As noted above, the villagers clarified the rights and responsibilities of common forests management in response to more newcomers. In Tō, this institutional change did not occur suddenly, but gradually over time as villagers began to foresee new challenges, thus preventing severe free-rider problems. Flexibility and autonomy for making such repeated institutional changes are important for communities facing strong external influences. We can also see from Table 5, which shows which community organizations each household joined, that all households residing in Tō joined multiple community groups, and that some non-resident households also contributed to activities in Tō. Tō's institutional changes allowed the community to develop a scheme that encouraged this diversity of people to contribute to the community each in their own way.

To summarize the discussion on section 4 from the theoretical viewpoint, we can say as follows. Theories of collective action dilemma explain some of our observations, but not all. Ostrom (1990) stresses the importance of clearly defined boundaries, a well-known design principle: "individuals or households who have rights to withdraw units from the CPR must be clearly defined (Ostrom 1990, 90)." This is the essential first step in organizing collective action. Ostrom's second design principle was the "Proportional Equivalence between benefits and costs" (Ostrom 2005, 259) which she explains as congruence among appropriation, provision rules, and local conditions. A common property regime whose members are becoming increasingly mobile and diverse could make boundaries unclear and decrease fairness. The response of Tō villagers on the issue of membership – distinguishing between all residents and those who contribute to the maintenance of common forests, distributing at least some benefits not to the entire community

Table 5: Community organizations in Tō and their composition by household.

Households (by code name)	Residents' association	Supporting member	Shinto shrine	Yamaguni	TV coops	Common forests	Temple	Farmland consolidation	Farmers' association
1c	o		o	o	o	o	o	o	o
1d	o		o	o	o	o	o	o	o
1e	o		o	o	o	o	o	o	o
1f	o		o	o	o	o	o	o	o
1g	o		o	o	o	o	o	o	o
2a	o		o	o	o	o	o	o	o
2b	o		o	o	o	o	o	o	o
2c	o		o	o	o	o	o	o	o
2d	o		o	o	o	o	o	o	o
2e	o		o	o	o	o	o	o	o
3a	o		o	o	o	o	o	o	o
3b	o		o	o	o	o	o	o	o
3c	o		o	o	o	o	o	o	o
3d	o		o	o	o	o	o	o	o
3e	o		o	o	o	o	o	o	o
3f	o		o	o	o	o	o	o	o
3g	o		o	o	o	o	o	o	o
3h	o		o	o	o	o	o	o	o
3i	o		o	o	o	o	o	o	o
4a	o		o	o	o	o	o	o	o
4b	o		o	o	o	o	o	o	o
4c	o		o	o	o	o	o	o	o
4d	o		o	o	o	o	o	o	o
4e	o		o	o	o	o	o	o	o
4f	o		o	o	o	o	o	o	o
4g	o		o	o	o	o	o	o	o
4h	o		o	o	o	o	o	o	o
5a	o		o	o	o	o	o	o	o
5b	o		o	o	o	o	o	o	o
5d	o		o	o	o	o	o	o	o
6a	o		o	o	o	o	o	o	o
6c	o		o	o	o	o	o	o	o
6d	o		o	o	o	o	o	o	o
6e	o		o	o	o	o	o	o	o
6f	o		o	o	o	o	o	o	o
6h	o		o	o	o	o	o	o	o
5e	o		o	o	o	o	o	o	
1a	o		o	o	o	o	o		
2f	o		o	o	o	o	o		
5f	o		o	o	o	o	o		
5g	o		o	o	o	o	o		
1b	o		o	o	o	o			
5c	o		o	o	o	o		o	o
6b	o		o	o	o	o		o	
6g	o		o	o	o	o			
1i	o		o	o	o				
2g	o		o	o	o		o		
4i	o		o	o	o				
6i	o		o	o					
1h	o		o	o					
1j	o		o	o					
2h	o		o	o					
5h	o		o	o					
2i	o		o						
2j		o	o		o		o		
6j		o			o		o	o	o
2n		o			o				
5i		o			o				
5j		o			o				
5k		o							
1k		o							
1l		o							
1m		o							
1n		o							
2k		o							
2l		o							
2m		o							
2o		o							
2p		o							
2q		o							
6k		o							
6l		o							
6m		o							
TOTAL	**54**	**19**	**55**	**53**	**53**	**45**	**44**	**40**	**39**

Source: Documents submitted to the annual meeting of the Tō Residents Association in 2007.
Note 1: Each cell containing "o" indicates that this household was a member of this organization.
Note 2: "Supporting members" of the Tō Residents' Association usually did not live in Tō, but did business there. "Shrine" members of the parishioners' (*ujiko*) organization affiliated with Tenmangu Shrine, the Shinto patron of Tō. "Yamaguni" refers to Yamaguni Neighborhood Community Association. "TV coops" refers to membership in cooperatives that have master television antennas for community reception. "Common forests" refers to the common forests management organization Tō. "Temple" refers to membership in the patrons' (*danka*) organization of Sanmyōin, a Buddist temple Tō.

Table 6: Expenditures of Tō common forests management committee (1987–2004).

	Management of common forest	Tranfser to Tō residents' association	Transfer to Tō farmers' cooperative (nōkyō)	Transfer to temple and Shinto shrine in Tō	Cost of maintaining community center	Dividend payment to rights-holders	Other	Total
Amount of money (in yen)	37,294,172	17,988,000	2,000,000	11,742,000	3,317,000	46,436,000	13,960,014	132,737,496
Composition of total (%)	28.10	13.55	1.51	8.85	2.50	34.98	10.52	100.0

Source: Account books of Tō common forests management committee (1987–2004).

but only to the contributors who offer their labor to the commons certainly – matches collective action theory and the Ostrom design principles.

On the other hand, the individual material economic goals of members were not the only driving force of common forest management. Therefore, even though the common forests management organization was independent from village communities, it did not monopolize all the revenue for its own members; instead, it used a substantial part of the revenue for the village community as a whole, including non-members of the forest management association. Even though Tō village separated the organization and accounts for the common forest management association from the residents' association in 1987, the common forests continued to provide revenue to the residents' association until 2004 (see Table 6 and Figure 6).

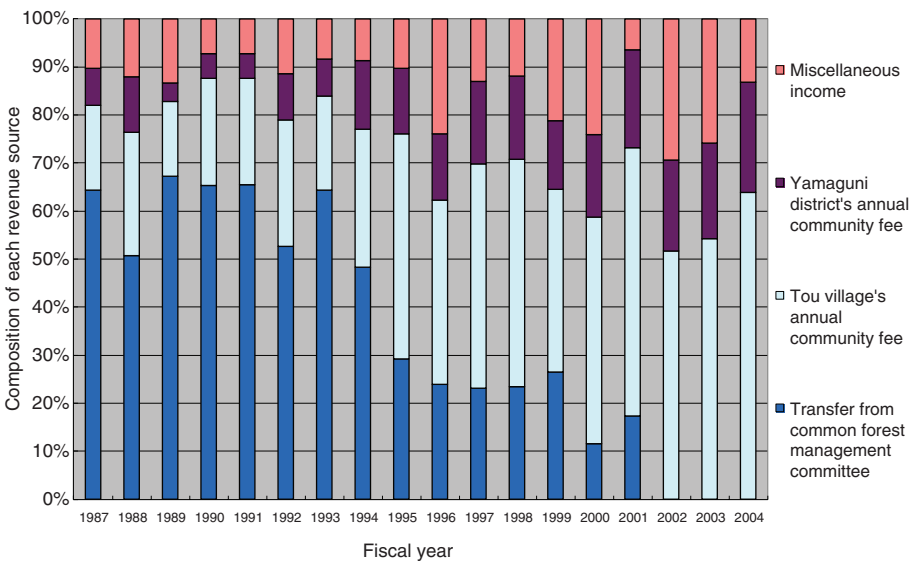

Figure 6: Composition of Revenues of the Tō Residents' Association, 1987–2004. Source: Account books of Tō Residents' Association (1987–2004).

As mentioned above, the revenue from common forests was used to build and repair an assembly hall, temple, and shrine and to hold traditional cultural events such as festivals.[13] In addition, according to interviews and participant observation in cooperative work in forest management, shared labor provides an important opportunity for people to communicate. Doing hard work together in the forest brings a sense of unity. Tō also used a part of its common forest for a tree-planting event by elementary school students. The community arranged this in order to give students a chance to learn about sustainable relationships between people and forest that the village has developed through its use of common resources.

But other Yamaguni villages in which the numbers of newcomers were small did not divide common forest management organizations from community organizations, because they wanted to maintain community unity. Thus we see that institutional evolution is determined by a mix of material concerns about income, worries about free-riders, the demographic realities posed by newcomers, and dissipation of revenue, as well as normative concerns about community unity and even environmental education, as well as additional values like village autonomy, local patriotism, local history and local culture.

5. Changes in common forests affected by liberaliation of trade in timber and forest products

Earning revenues from products of the commons requires selling those products, so obviously market conditions will influence how much revenue these sales can generate. Communities with common forests in timber plantations intended for sale – as well as private firms and individuals who have forested lands and timber to sell – are obviously at the mercy of the market price for timber when they choose to harvest this timber. Japan was badly deforested during and immediately after World War II. The forests created in the postwar reforestation campaigns were not slated to be ready for harvest very quickly. As a result, the huge appetite for wood created by Japan's postwar economic growth could not be met by Japan's own forests. Therefore Japan has completely liberalized timber trade since 1964. Timber imports increased radically. Whereas in 1955 Japan's self-sufficiency in timber was 94.5%, it had dropped to 50% by 1969 and has hovered at 20% since 1995 (Forestry Agency 2011). These trends were compounded by the fact that huge forests around the world were opened up for exploitation by coalitions of rent-seizing governments and rent-seeking timber concessionaires in developing countries (Dauvergne 1997; Ross 2001). This section will examine the impact of free trade in timber on Japan's common forests.

Figure 7 shows Tō village's revenue from common forests and the average stumpage price for Japanese cedar (*sugi*). After shifting towards free trade in

[13] As I will describe later, villagers have grown the plants used at traditional local ceremonies in the common forest since 2005.

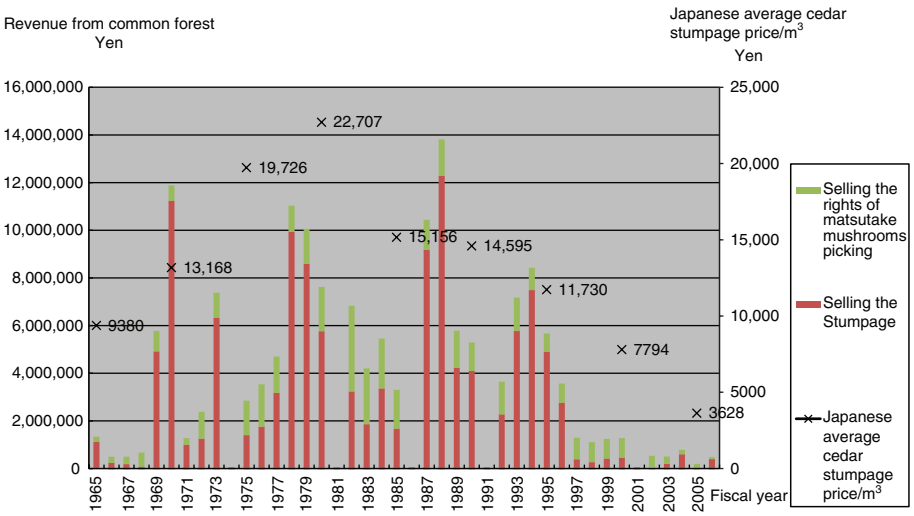

Figure 7: Revenues from common forests in Tō.
Source: Account books of Tō Residents' Association and common forests management organization (1965–2006) and Forest Agency (2011).
Note: Figures for 1974, 1981, 1986, 1991 and 2001 are missing data.

timber in 1960s, timber prices in Japan continued to rise even though low priced foreign timber was available. Rapid economic growth drastically increased timber demand and foreign timber supply could not catch up with this escalating demand. As a result, prices of domestic timber in Japan continued to rise until 1980. However, after they peaked in 1980, timber prices in Japan began to decline gradually. By the mid-1990s, management of coniferous plantations in Japan had reached a critical situation.

Falling timber prices could be attributed not only to liberalizing trade in timber, but also to the appreciation of the yen. Japan shifted from fixed exchange rates for yen to a floating exchange rate system in 1973 that allowed the yen to rise against the dollar – floating rates were another aspect of trade liberalization. In addition, the substitution of wood for metal, petrochemicals and fossil fuels drove demand even lower. Such substitution was supported by the import expansion of mineral resources in response to trade liberalization.

Revenues from common forests reflected the national trends in timber prices in Japan. In 1988 the village of Tō earned its highest revenues from common forests, 13.8 million yen, and thereafter income from the common forests decreased, especially during the late 1990s (see Figure 7). Revenues from selling stumpage have hovered at a low level (from 22,000 to 597,000 yen) since 2002. Tō had one marketing advantage because it could sell branded timber as *Kitayama-migaki-maruta*. Tō began to sell such branded timber in the mid-1980s, which helped

to ease slightly the shock of falling prices. However, local efforts to combat trade liberalization through strategies such as branding could not overcome the huge impact of low-priced foreign imports. As with other natural resources in Japan, under-use and abandonment were dangerous threats to the management of coniferous plantations (Forestry agency 2011).

Almost all villages held small celebrations after cooperative labor in recognition of the services that contributors provided. Interviews with committee members of each organization and with residents who joined cooperative labor and attended celebrations afterward indicate that they continued their activities managing the forest due to a sense of commitment stemming from communities wanting to protect their ancestral legacy, service their community, and conserve the environment. Cooperative labor and these parties enriched the social capital in the villages (Shimada et al. 2006).

Plantation forests need active management to produce the environmental services and public goods that we associate with forests. Although we have much more to learn about the relationship between water and forests because of their complexity, recent studies have clarified that forests have positive externalities such as erosion control, water flow levelling and flood control (Kuraji 2010). However, in unmanaged plantation forests, tree canopy cover becomes overly dense, thus, preventing the development of understory vegetation. Without understory vegetation, rainwater flows on the surface of bare forest floors and sends suspended sediment to downstream river beds (Onda 2007). In addition, Onda (2008) points out that abandoned coniferous plantation forests do not contribute to controlling floods. For the reasons mentioned above, coniferous plantation forests need management, such as tree thinning, to enable forests to contribute to the production of desired positive externalities and public goods. In Yamaguni, these multiple functions benefit not only each village in the Yamaguni district but a much wider area, including big cities downstream below the Katsura River.

If both appropriate economic incentives and a concern for community are available, villages find it possible to sustain management of their common forests. However, a sense of commitment alone, without supporting economic incentives, makes it difficult to continue investing in maintaining the forest. As Table 7 shows, in response to dropping timber prices, all of the Yamaguni villages reduced the number of days of cooperative labor they required of their residents. Since 2003, the three villages of Oshio, Terayama, and Torii have discontinued members' cooperative labor altogether and no longer levy fines for failure to contribute to cooperative labor. These three villages continue to manage the forests at a minimum level by employing professional forestry workers. However, because of low timber prices, they refrain from selling timber even when the plantation reached cutting stage. The lower economic incentive resulted in forest maintenance to a minimum level of necessary management.

Tō villagers clearcut one coniferous cedar (*sugi*) plantation and left it barren afterward, which led the forest management committee in 2002 to ask members

Table 7: Current situation of common forests management in 11 villages.

Village	Oshio	Hatsukawa	Motoido	Terayama	Ohno	Higae	Nakae	Tsuji	Tou	Torii	Shimo
Type of organization	Traditional residents' association	Newly established authorized neighbourhood association	Newly established common forest management organization	Newly established common forest management organization	Traditional residents' association	Newly established common forest management organization	Newly established common forest management organization	Newly established authorized neighborhood association	Newly established common forest management organization	Newly established common forest management organization	Newly established common forest management organization
Number of households	46	13	38	22	73	78-79	34	32	70	38-39	75
Number of rightholders	46	12	34	12	68	74	34	26	44	34	54
Area of common land	15 ha.	40.29 ha	50 ha	90 ha	118 ha	73.27 ha	10.38 ha	14.38 ha	54 ha	49.59 ha	17.17 ha
Number of days for cooperative work	0. Stopped in 2003. Management had been continued by professional forestry workers.	1. Four times around 1980, 2 times around 1990, 1time since 2004	1	0. Stopped in 2003. Management had been continued by professional forestry workers.	3	1 or 2. Eight times around 1980	2. Five times around 1975	2	3 or 4.	0. Responsible cooperative work had been stopped since 2003.	0 or 1. One since 1995, 3 before 1995
Fine for absence from work (yen)	Currentry no.	8000	12000	Currentry no. (8000 before 2003)	10,000	10,000	9000	9000	10,000	Currentry no. (8000 before 2003)	8000
Revenue from common forests per year	No revenue in recent year since around 1980	No revenue in recent year since 1985	No revenue from timber. Little (50,000 yen) revenue from matsutake mashrooms.	No revenue from timber. Little (300,000 yen) revenue from matsutake mashrooms.	Around 1 million yen. The revenue came from thinned timber and matsuake mashrooms.	No revenue from timber. Little (250,000 yen) revenue from matsutake mashurooms.	No revenue from timber. little revenue by a fine for nonparticipation.	No revenue	Little revenue from thinned timber and matsuake mashrooms	Around 2 million yen from matsutake mashrooms	No revenue since 2003
Way of using the revenue	Community public goods, economic basis of village autonomy. No distribution to individuals.	Community public goods, economic basis of village autonomy. No distribution to individuals.	Community public goods, economic basis of village autonomy. No distribution to individuals.	Community public goods. No distribution to individuals. Travel expenses of the villagers.	Community public goods such as fire engine, money for village event, etc. Distribute the part of revenue to the members.	Community public goods, economic basis of village autonomy. Distribute the part of revenue to the members.	Community public goods, economic basis of village autonomy. No distribution to individuals.	Community public goods, economic basis of village autonomy. No distribution to individuals.	Community public goods, economic basis of village autonomy. Distribute the part of revenue to the members.	Community public goods, economic basis of village autonomy. No distribution to individuals.	Community public goods, economic basis of village autonomy. No distribution to individuals.
Party after work		Yes	Yes	No (Yes until 2003)	Yes	Yes (sometimes)	Yes		Yes	Yes	Yes (Once stopped but reopened)

Sources: Author conducted interviews with the leaders of common forest management organizations in all villages in Yamaguni district during 2004 to 2006.

for opinions on what to do next with this land. They could not find agreement in all of the opposing views on replanting conifers. Finally in 2005, looking for new options because of the low prices of cedar and cypress, on a small (0.022 hectare) bit of land they planted *shikimi* (Japanese anise-tree; *Illicium anisatum)*, which is used at traditional religious ceremonies.

This survey of Yamaguni district revealed that low-priced competition from foreign imports changed the management of common forests. Originally material incentives and a sense of commitment to community drove villagers to manage their common forest. After competition from foreign imports drove down prices and reduced material incentives to maintain and harvest the forests, concern for community continued to encourage some minimal management effort on the commons. But eventually some communities ceased to invest effort in managing their forests.

6. Discussion

This study examines how villages alter their management of common forest in response to external influences, particularly population change and trade liberalization, in order to identify keys to ensuring the survival of commons in a modern industrialized society. The study's major findings concern successful adaptation with autonomy, the challenge of trade liberalization in timber, and multi-level governance honouring the principle of subsidiary.

First, a village community can adapt its institutions to external influences through repeated institutional changes. We saw that Tō village, where the number of newcomers increased most drastically as a result of motorization and the expansion of suburbs, also altered its institutions repeatedly as circumstances changed. Villages must also have the autonomy and freedom to adopt their own changes and experiments – villages facing generally similar pressures responded in very different ways, and they varied in the relative priorities they placed on free-rider problems, revenues, and village cohesion. We must be wary of "one size fits all" templates so that communities can make the adjustments they prefer to make in response to the challenges they see as most important.

Second, we also saw that communities have great difficulty maintaining regular streams of revenue when the products of the commons are subject to serious price competition. The threat of cheap imports and low-priced substitutes for almost all forest products from the commons as well as most of corporate and individually owned forests was greater than village communities could handle on their own. They cannot adjust to this challenge by themselves, though they can overcome most other external challenges on their own, by altering the way they use their common-pool assets over time.

We saw that each village went through three phases of difficulty as they reduced their efforts to manage common forests: effort driven by economic incentives as well as concern for community, then after imports virtually eliminated economic incentives they continued to work out of commitment to

community cohesion, and finally when that effort became too difficult to sustain some of the villages largely abandoned management. Despite the difficulties that village communities had in overcoming problems, continuing the management of coniferous plantations is important beyond the villages themselves because of the vital positive externalities created: watershed protection, flood control and erosion control. The government is in large part responsible for the aggressive nationwide adoption of coniferous plantations on common and other forests in Japan decades ago, and now it may be necessary to add national policies that can mitigate the negative effects of low-priced competition from imports.

Third, to regenerate local Japanese commons, multi-level governance[14] based on the principle of subsidiarity is essential. The idea of the principal of subsidiarity is to deal with problems at the smallest domain in which they can be solved. Problems should be addressed by institutions located at the same scale as the problem. We should not try to use global solutions for local problems, and we cannot expect to solve global problems with purely local measures (Daly and Farley 2004, 363). It is therefore necessary to classify external influences into two different types. The first type includes problems that can be settled by people in the village, such as coping with the increase in newcomers, which requires that communities have flexibility and institutional autonomy. Therefore, government should not impose a uniform policy that kills self-governance. The second type of problem would be those that cannot be settled by the villagers themselves, including external influences (like foreign trade) that are sometimes too strong for one community to deal with. Resource management often has positive externalities, which is why government policy is necessary[15] but such support should be limited to problems that villagers cannot solve on their own.

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[14] New multi-level governance is sprouting up in various places in Japan. For example, in Aso, where semi-natural grasslands used to be managed by the local community as *iriai*, some communities have abandoned management efforts. Then local communities began to collaborate with the local municipality, national government and NGOs, including urban volunteers for the management of the grassland (Yamauchi and Takahashi 2002). This is similar to the emergence of urban forest volunteers who assist aging forest communities near urban areas in cooperative labor on the forests.

[15] This research does not allow me to specify the content of desirable government policies, but only to indicate the circumstances in which policy support from higher-level authorities is needed.

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