

# Corporate Land Tenure in Nineteenth-Century Japan: A GIS Assessment

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A variety of historical GIS projects are now under way in Japan.<sup>1</sup> Perhaps the oldest undertaken by an American is Loren Seibert's project on the Tokyo area. Yano Keiji and his colleagues at Ritsumeikan University and other Kyoto institutions are currently at work on a virtual Kyoto GIS project. Other projects are attempting to reconstruct the boundaries of large administrative divisions. Further, Murayama Yuji, Tsukuba University, and his colleagues at several research institutes are developing boundary data bases for formal administrative units.<sup>2</sup>

Yet projects on Japan to date have reached something of an impasse when it comes to mapping locations for lower-level administrative units of the late-nineteenth century and earlier, the villages in existence at the start of the period, 1868. This is a function of the history of modern cartography in Japan. The first modern surveys focused on the major metropolitan areas around Tokyo and Kobe-Osaka-Kyoto in the 1880s. More than a decade later Japan undertook a modern, nationwide 1:50,000 topographic survey extending the use of modern cartographic techniques to less densely populated regions.

By this time, many areas had witnessed substantial administrative reorganization. That process began with the 1870s abolition of old semi-feudal *daimyō* (baronial) domains and the creation of prefectures that frequently ignored the old administrative boundaries. In addition, cities, towns, and villages were reformed through amalgamation, with many cities and towns growing in size. In this process the new government literally expunged large numbers of villages from the map.

For the study of twentieth-century Japan, the preceding limitation is not a problem, but for understanding the earliest years of Japan's modern era, and for understanding mid-nineteenth-century Japan, this situation presents a considerable barrier. Unlike pre-1911 Imperial China, for which key official data was often assembled at the county level, Japanese social, economic, demographic, and similar data was compiled at the level of the village, whether that be the small villages that existed up to the amalgam-

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ation of villages in the middle of the long Meiji era (1868-1911) or the newly formed villages of mid-Meiji and later. In the early modern era (which Japanese historians typically treat as the period from ca. 1580-1867), villages, towns, and even a number of cities operated with considerable autonomy in managing local affairs and were the only consistent base for gathering statistical data.

In creating a historical GIS project to analyze many problems associated with Japan's transition to modernity, two general issues arise that compel attention to locations of the lowest levels of the administrative order and encourage identification of either a geographic center point or areal boundaries of these units. One involves treatment of statistical series. While social and economic activities routinely transcended the boundaries of administrative units such as villages, these units represent the lowest level at which statistical, and sometimes qualitative, data were collected by both the early modern rulers and their early Meiji counterparts. For serial statistical data, or even for comparison of selected points in time over several years or decades, researchers must account for boundary changes or commit a statistical ecological error, such as comparing data from different years for a village with the same name but consisting of different territories and therefore different populations and resources. Recognizing this, scholars have simply treated the data collected in the early modern era as a distinct series from that collected in mid-Meiji and beyond. In effect, this has resulted in the transitional period being largely skipped, which compromises our ability to analyze Japanese society's transition to its modern forms.

In addition, any research situation that explores the interrelationship between a community and its natural surroundings faces a need to clearly identify location—either center point or boundary. For example, village locations relative to a drainage system, relative to mountain resources needed for daily life like green manure and kindling, or exposure to sunlight and shade during the growing season help us to understand the distinctive character of social and economic development of different regions of Japan. For some purposes, boundaries help us determine the resources a village controlled directly.

The research discussed here requires a combination of physical geographical data and local socioeconomic data in order to study an unusual but significant aspect of early modern Japan's land-tenure system. As much as one-third of Japan employed systems of corporate village control over arable land during the early modern era and into the Meiji period. To understand why that system appeared in some parts of Japan but not others requires, in part, an assessment of the natural conditions in which villages were set. This necessitates rather accurate identification of many village locations, and, to the degree research also entails an assessment of the resources to which a village has access, location of village boundaries.

These concerns have led the author to explore methods for efficiently identifying location data for mid-nineteenth-century Japanese villages. While village boundaries certainly changed during the seventeenth to mid-nineteenth centuries, most such changes involved the breaking off of part of a village to form a new one, not amalgamation of villages, as has been the case since 1868. As a result, the villages present in the mid-nineteenth century and the first years of the Meiji era represent the largest number of villages to have existed in Japan's history. Identifying the location of these villages immensely facilitates reconstruction of earlier village locations.

The following discussion presents one approach to efficiently identifying a center point latitude and longitude of many communities that disappeared before the advent of modern mapping in the late-nineteenth century. In addition, resolution of boundary locations will be addressed very briefly. Finally, we present a preliminary discussion of how such data can be helpful in testing a historical explanation, specifically why corporate forms of landholding appear in some parts of Japan in the seventeenth-to-nineteenth centuries, but not in other regions. This is an exploratory effort only. Nonetheless, this approach offers promise for enhancing historical geographic research on nineteenth-century Japan.

### Boundary Change, Modern Mapping, and the Challenge of Locating Mid-Nineteenth-Century Villages

During the two-and-a-half centuries prior to the Meiji Restoration of 1868, Japan was divided into some sixty-odd provinces that had no administrative significance. Counties (called *gun* or *kōri* depending on the era), towns, wards, and villages were more typical administrative building blocks, with wards and villages the most basic units of baronial domains (called *han*) ruled by *daimyō*. In addition, these identical units marked the lowest level of administration in the early Meiji era. While there was change over time in village and ward boundaries, and less commonly in the boundaries of higher administrative units, the pace of change was typically gradual before the Meiji Restoration. This is especially evident in comparison with the high pace of change in the 1870s and 1880s.

The Meiji Restoration brought a rapid transformation of the administrative landscape as the new government sought to create a modern centralized nation-state. The old Tokugawa regime's 250-odd domains were combined into some forty prefectures with actual administrative responsibilities (*ken*), as well as specially designated districts of generally similar size, the *dō* (Hokkaido), the *fu* (Osaka and Kyoto), and the *to* (Tokyo). Although there was some overlap between the new prefectures and the old, but administratively meaningless, province boundaries, the new leadership in Tokyo subverted the time-honored customary divisions, creat-

ing prefectures by combining provinces or splitting old provinces between two or more new prefectures. The early modern administrative associations of counties, towns, and villages with a common ruling authority were often torn asunder and recast.<sup>3</sup> With this change came significant alterations in the size of territories collecting basic statistical data as well as changes in the scale of resources available for financing local government functions, including funding for relief and prevention of natural calamities.

Far more dramatic than the formation of prefectures was the new government's abolition of the pre-modern village as a part of its effort to break up potentially fractious local alliances, to lower the costs of administration, and to place the government on a more stable financial footing. While some of the old villages survived as enlarged administrative villages, the overwhelming majority were absorbed into a larger village (the same Chinese character was used as for the pre-Meiji villages, read either *son* or *mura*, depending on locale and era). The administrative functions of these Tokugawa villages were absorbed by the larger, Meiji villages. Even if a village survived in name, its officers now oversaw a much larger territory and became correspondingly more bureaucratic, with local administrative officials even coming from outside the territory that comprised the new unit.<sup>4</sup>

All of this began well before the development and broad implementation of modern land-survey and cartographic techniques. Such techniques had not been sufficiently diffused throughout Japan to be employed during the land-tax reform of the early 1870s or even later, in the late 1880s, when resurveys were undertaken as part of the final adjustments in creating a newly defined land tax base for the new Meiji government.<sup>5</sup> Experimentation with modern cartographic and survey approaches initially focused most intensely on the metropolitan districts of Tokyo, Kyoto, and Osaka; the first modern comprehensive national survey was only implemented in 1892 after several years of planning. Even these measurements later required a correction in longitude by 1918, adding 10.4 seconds.<sup>6</sup>

By the time the national 1:50,000 maps were drawn in the late-nineteenth century, many mid-nineteenth century villages had disappeared, never making it onto a modern map. Even when later 1:25,000 maps were generated nationally, the situation was not rectified.<sup>7</sup> In other words, historians and historical geographers are faced with loss of thousands of mid-nineteenth century Japanese villages.

From the standpoint of connecting a variety of socioeconomic data from the Meiji villages with that of their early nineteenth-century predecessors, or for examining mid-nineteenth century local administrative transformations, recovery of these lost village locations would be immensely valuable. For some purposes, simply locating some reasonable center point—the center of a village's residential cluster—would be adequate. (Pre-modern Japanese villages generally clustered houses together, with

fields distributed around this core. This pattern continued to prevail in rural areas well into the twentieth century.) For other purposes, identification of village boundaries and changes in them are important to a scholar. This is especially the case in assessing the extent of community control over natural resources.

For a small study region, one can determine village location fairly simply through site visits, interviews with local informants and archival research, but there are growing limitations to this approach. One problem is the mortality of informants familiar with old neighborhoods. Increased urbanization and suburban development compound the problem. In some cases, these processes have quite dramatically transformed the land and destroyed physical boundaries. For example, one can now travel around many parts of modern Niigata City in a car where in 1960, travel on similar routes would have required a boat. Some parts of the city were structured very differently prior to bombing during World War II. In other places, construction of modern riparian works such as dikes have destroyed the small areas that once comprised a mid-nineteenth-century village.

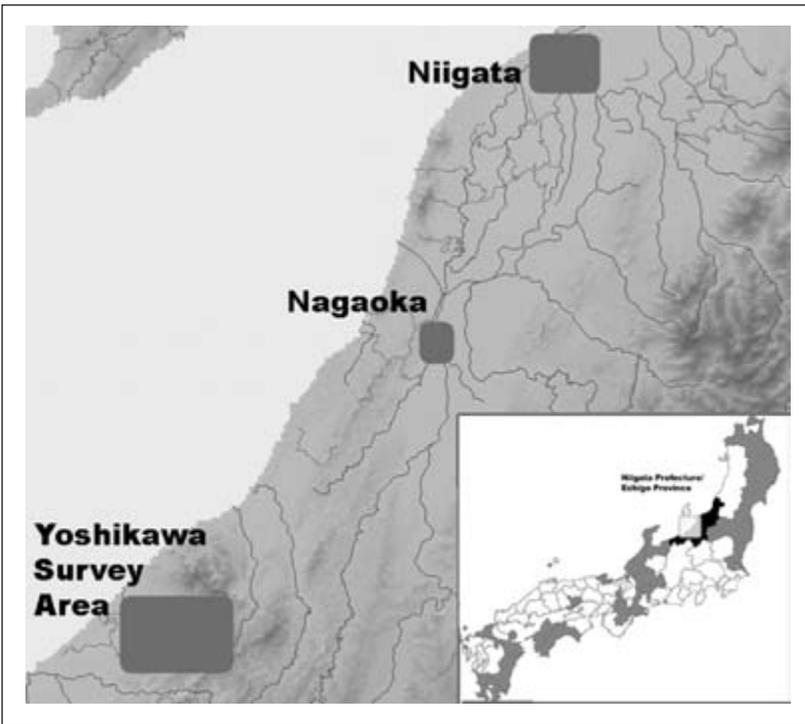
Further, when a study requires data across a broad region or regions, the use of local informants is impractical. The time and effort required for site visits, research, and interviews would be substantial. Such an obstacle is sufficiently large to discourage research on large numbers of villages in order to make regional comparisons such as that needed to explore the relationship between natural conditions and land-tenure forms taken up later.

### An Exploratory Approach to Center-Point Identification

Understanding the patterns of land tenure in Japan and their significance requires exploration of the relationship between the geographical and climatological circumstances and land-tenure data for villages in a large inter-regional comparison. Consequently, development of some efficient means of recovering early Meiji village location is essential. For this purpose, one possibility is to use data from modern sources that does not appear on maps. The national Ministry of Land, Infrastructure, and Transport (formerly the National Land Agency, NLA) has, in the past decade, made increasing amounts of such data available at a reasonable cost. Among this data are the locations for features on its 1:25,000 surveys. This includes many customary names for what people today might call a neighborhood (now often referred to as an *aza*, *koaza*, or *ōaza*) but which appear to represent old villages. Might these names provide a starting point for identifying latitude and longitude for early Meiji and mid-nineteenth-century villages, one that can reduce or eliminate the need for less time/cost efficient methods such as conducting interviews with local informants?

To make a preliminary assessment of the reliability of Japanese government data by comparing it to information from a local informant, GPS was employed to identify latitude and longitude of old residential

clusters in one rural part of Niigata prefecture. The choice of region for this experiment was based on a convergence of beneficial circumstances. The region was familiar from previous research in local archives and work with local historians over several years. These experiences made it clear that there were a number of reliable local contacts who were familiar with changes in the area because of a combination of research conducted in the writing of a multi-volume local history, personal lifetime experience living in the area, and discussions with elderly residents who had lived their entire lives in this part of Japan.<sup>8</sup> The area chosen is near modern Yoshikawa-machi (Figure 1). As a preliminary test, rural areas such as this represent something of a best-case scenario. Rural areas are least likely to have experienced the deforming destruction of fires and natural disasters or the construction of metropolitan complexes and their associated suburbs. More densely populated regions will present greater challenges. Nonetheless, since much of Japan remains rural, the results of this test promise to be broadly applicable.



**Figure 1.** Study Area. Location of Yoshikawa-machi area in modern Niigata Prefecture (formerly known as the province of Echigo). The distance from the southwestern coast to Niigata City is approximately 130 kilometers.

Some discussion of the circumstances under which the GPS readings were taken is in order. First, the environment in which residential clusters are found posed something of a measurement challenge for a hand-held GPS unit. Hamlets<sup>9</sup> are often tightly clustered within copses of trees that block satellite signals. Further, roads are narrow, usually only wide enough for one car, so stopping a vehicle in a location that will not bother traffic or the neighborhood can be a problem. One might consider this simply an inconvenience—one can park, walk to an appropriate location, and then take a bearing—however, practically speaking, social conventions in Japan complicated measurement in several instances. An observer, especially a foreigner toting strange equipment, attracts considerable attention from a neighborhood, even in the company of a local informant. This made the informant very uncomfortable, limiting the degree to which measurements were taken directly at the center of a residential cluster.

Time also was short. In a matter of three hours, bearings were taken for some four dozen hamlets that, in the seventeenth to early nineteenth centuries, comprised one local, sub-county district (*kumi*). Within the limits just noted, bearings taken were as close to residential hamlet centers as possible.

In Figure 2 the government data is represented by triangles and the GPS observation data is represented by circles. Note that in the overwhelming majority of cases the triangles overshadow the circles completely. The greatest divergence is evident in the cases of Chūjo (which has no identically named counterpart) and Akasawa, both located in the upper-central part of Figure 2, and Ozawa, located somewhat below and to the right of Chūjo and Akasawa in the center of the map.<sup>10</sup>

Despite the rapid and less than ideal process employed to take bearings for the hamlets, Figure 2 reveals a high correlation between GPS observations and Japanese government location data for rural communities, suggesting that published government data makes a reasonable starting point for identifying the center-point latitude and longitude of mid-nineteenth-century villages.

The remaining problem is how to identify boundary locations for mid-nineteenth-century villages, information useful in identifying the natural resources controlled by a village to aid and supplement agricultural endeavors. This issue is considerably more complex than identifying hamlet center-point locations. During the pre-Meiji Restoration era boundaries sometimes changed quite significantly. Boundary identification is further complicated by the fact that several villages might share access to particular areas of common land (*iriaichi*). Any given pre-modern map might identify that territory specifically as belonging to just one village or as the jointly managed territory of several villages depending on the purpose underlying creation of the map. In other words, what appear to be village boundaries on pre-modern maps do not reflect the same degree of fixity that modern map users associate with boundaries.<sup>11</sup> During the early



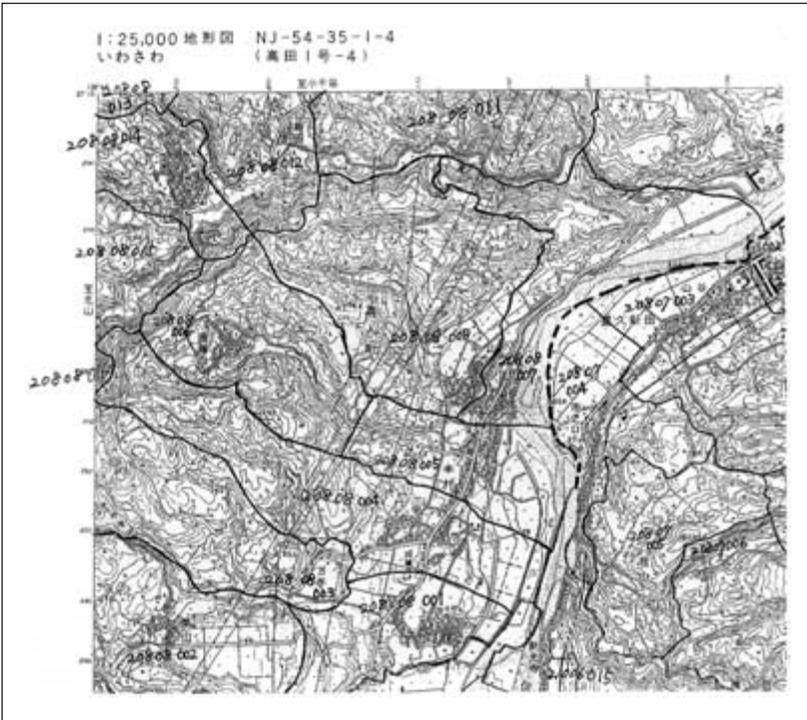
Meiji era, however, the new government took steps to define clearly the boundaries for each village as part of its efforts to change to modern land-holding and administrative practices. Following European practice, land was to be defined as either privately held or held by a government entity, with land that could not be documented as clearly private or managed by a local government reverting to the Emperor. Despite the fluidity of pre-modern boundaries, early Meiji village boundaries are a reasonable approximation of village boundaries as they existed in the late Tokugawa period. Determination of boundaries would provide a foundation from which it would be easier to work back in time using contemporary maps and other sources to map change in pre-modern villages.

These considerations suggest the need for very intensive village-by-village investigation; however, the situation may not be quite so discouraging. There is some promise of a reasonable starting point for efficiently identifying boundaries of mid-nineteenth-century villages. The Japanese government has long maintained data on agricultural hamlets, a card of data for each hamlet. Available from the *Norin Tōkei Kyōkai* (Tokyo), the Agriculture and Forestry Statistics Society, these data include a variety of statistical data related to agricultural conditions, production, and the condition of populations associated with agriculture in modern Japan. The statistical data have been compiled over many years, but public release in digital form is a recent phenomenon, with the first compact disc publication occurring in 1995. The data do not, however, include geographic coordinates for each hamlet.<sup>12</sup>

In the 2000 survey, however, employees also generated hand-drawn maps of hamlet boundaries as part of their on-site data collection. These boundaries were drawn on standard 1:25,000 topographic maps. One example from Niigata Prefecture is presented in Figure 3. This illustration is from the Takada section of what is now Jōetsu City, somewhat to the south of the Yoshikawa area. (In fact, the Yoshikawa area is in the process of being joined to Jōetsu City, one more example of the continuing effort to reshape local administration that will increasingly challenge our ability to identify locations of historical communities.)

These data have been digitized, an expensive step that nevertheless greatly facilitates scholarly use. At least for those hamlets where center-point Japanese government data is reliable, the boundary data should provide a reasonable initial estimate for economically defining multiple hamlet boundaries. These can then be adjusted based on older large-scale maps created during the early twentieth century, as well as careful use of late-nineteenth-century maps based on pre-scientific mapping.

The procedures outlined here will work most effectively in areas that have experienced little change. In practice that means, first and foremost, rural areas. Cities and towns that have experienced extensive damage and rebuilding due to earthquakes, bombing during World War II, or regions that have experienced substantial suburbanization are likely to present



**Figure 3.** Section of “Takada area map section 1, number 4,” (in Niigata Prefecture) with Japan’s Ministry of Agriculture, Forestry and Fisheries delineation of agricultural hamlet (sub-territories of modern villages and towns) boundaries. Each hamlet is identified by its Ministry of Agriculture, Forestry and Fisheries (Nōrinsuisanshō) code number on the map rather than its name.

additional challenges. In each of these cases, local communities have experienced name changes to varying degrees, whether they constituted formal administrative divisions and subdivisions or customary neighborhoods.

Consequently, for some regions identifying locations, both boundary and center point, will require additional, more painstaking research. In these cases, researchers will have to work back through extant modern maps (again, these go back to the early twentieth century for the nation as a whole, earlier for the two major metropolitan areas of the Kanto (the Tokyo region) and the Kinai (the Kobe, Kyoto, Osaka area). Other earlier nineteenth-century maps, created in the process of establishing the foundations of a new system of land taxation and new administrative divisions, while not based on modern cartographic methods, also can be used to further identify center-point and boundary locations. Work by Murayama Yuji, as noted above, goes back to approximately 1890, and this will facilitate these efforts, but they mark the limits of digital recording of modern cartographic data.

While the solution proposed above is not complete, it goes a long way toward simplifying identification of reasonable coordinates for thou-

sands of early Meiji villages prior to amalgamation into larger units during the Meiji administrative reforms.

### Responsiveness of Village Corporate Landholding Structures to Flood Hazards in Early Modern Japan

The value of mid-nineteenth-century village locational data can be illustrated with a preliminary testing of the links between corporate land-redistribution practices under the custom of corporate village landholding in the Niigata Prefecture (formerly Echigo province) region during the early modern era. The cases discussed below come from the Yoshikawa area of Echigo and that just south of the Shinano River where it empties into the Japan Sea in the city of Niigata. The locational data employed are limited to center-point data. Nonetheless, employing this data to test a historical interpretation raises sharp questions about a long-standing interpretation that links a region's susceptibility to flooding to the presence of corporate landholding practices.

Very few Western historians are aware of the presence of corporate systems of landholding in early modern Japan. They are not discussed in survey texts, nor are they mentioned in the best-known studies of early modern villages, Thomas Smith's *Agrarian Origins of Modern Japan* and Herman Ooms's *Tokugawa Village Practice*.<sup>13</sup> Many Japanese scholars are also unaware of these practices. Instead, scholars presume a general set of practices that comes very close to modern private landownership.

Because of the regional variation in administrative practice, practices of corporate village control of arable land cannot be described simply—the determination of corporate landholding systems was sometimes made by domains, sometimes by individual villages, and sometimes by a combination of the two. As a result, there is much variation in specific practices and even nomenclature. Nonetheless, a general classification of basic types of corporate landholding practices is possible.

At the most general level, village corporate landholding practices mean that there is no direct link between a cultivating family and any specific plot of farmland. The land farmed within a village at any given time by a family could be changed based on practices established by either the village or the *daimyō* (baronial) domain. Sometimes the process followed a regular sequence of rotation, but more often it involved a tiered system of drawing lots that prevented any family from amassing only high-quality land. All managed each category (paddy or dry) and grade of land (good, poor, etc.) in proportion to its presence in the village.<sup>14</sup> Although there are exceptions, the primary function of reallocation was not redistribution or equalization of wealth. Unequal holdings often developed in the regions that practiced corporate landownership. In this sense, the best modern parallel is that of different shareholders in a joint stock company such as IBM. Shares could often be bought, sold, inherited, or pledged as

**Table 1. A Typology of Corporate Landholding Practices.**

Attribute	Mode of Redistribution		
	Type I: Equal Redistribution per Family	Type II: Wealth Redistribution (based on family composition)	Type III: Proportional Redistribution
Locus of control	Village	Domain or village	Domain or village
Amount redistributed	Some land	All	All
Primary purposes	Investment sharing; minimal food supply; public revenue (e.g., shrine support)	Secure basic food supply; communal/domain labor guarantee	Sharing risk and cost of natural disasters
Secondary purposes		Intra-village equalization of tax rates	Intra-village equalization of tax rates; labor retention
Comment	Least common form		Most common form of redistribution practice nationally

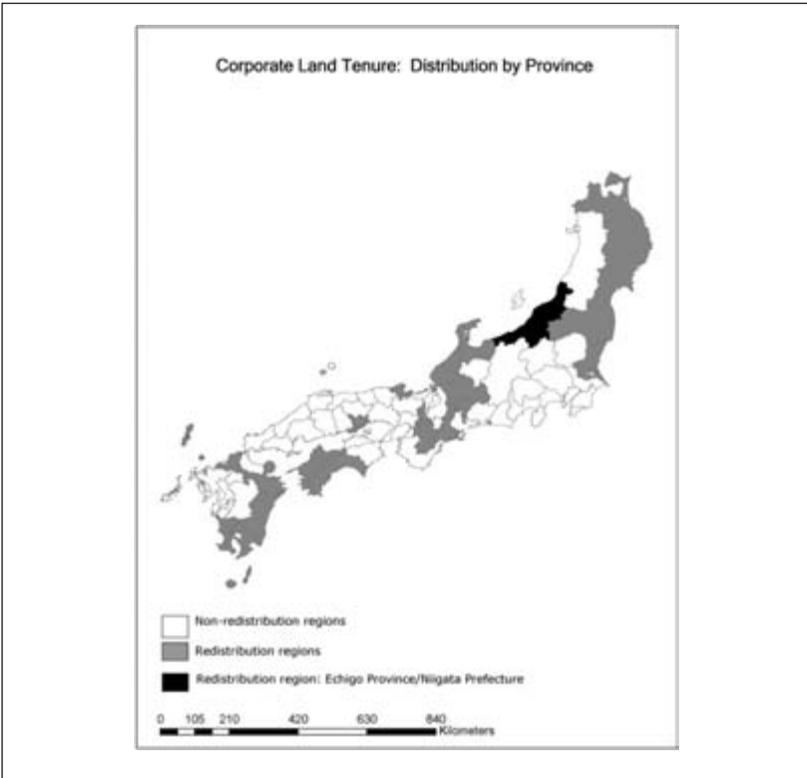
security on a loan, accumulated or lost, but shares were not associated with a specific tangible asset.

A general classification of these systems of corporate landholding is presented in Table 1. Since the examples in the following discussion all are encompassed by the proportional redistribution type (Type III in Table 1), the most common form of corporate control, this typology is presented only as a means of stressing the variation of corporate landholding practices and to contextualize discussion of proportional redistribution under corporate landholding. Note that the primary purpose identified for proportional redistribution forms is the sharing of the risk and cost of natural disasters. This holds true whether the regulatory initiative lay in the hands of *daimyō* domain, village councils, or a combination of the two. This function lies at the heart of our concern in employing village locational data. It suggests that climate and geographic circumstances were central to the origin and purpose of redistributing arable land. Without specific locations, this claim cannot be assessed.

Despite the lack of widespread recognition that land-tenure practices varied considerably throughout Japan, a significant minority of the country employed corporate practices during the early modern era.<sup>15</sup> Getting a bead on the proportion is complicated by the fact that Japan did not have a national administrative structure during the early modern centuries. The shogun functioned as *primus inter pares* (first among equals), especially in regard to local/regional administrative practice. He did not head a bureaucratic structure that could implement policies uniformly throughout the land. For any given area of administration—tax assessment, land-tenure systems, and so forth—there was substantial regional variation.

Consequently, while estimates of the extent of corporate landholding practices are suggestive, they are not entirely straightforward. Determining which provinces include examples of corporate landholding provides a rough measure of the spatial distribution of the practice, but provinces did not coincide with administrative units (baronial *daimyō* domains), which were typically smaller and created substantial diversity of practice even within a province. A calculation of the value of *daimyō* domains that regulated corporate landholding practice is less likely to overstate the distribution of the practice, but is harder to map, and this estimate understates the proportion of Japan subject to corporate landholding because it misses instances in which individual villages adopted corporate control on their own initiative, independent of domain action. Nonetheless, as the white regions in Figure 4 suggest, about one-third of Japanese provinces (twenty-five of the sixty-six traditional provinces) provide examples of corporate landholding practice.<sup>16</sup> This estimate is reinforced by a calculation of the proportion of Japan's assessed value (*kokudaka* or putative yield) represented by *daimyō* domains that issued ordinances compelling the use of corporate land-holding. Those domains accounted for 5,256,100 *koku* or about 29.2 percent of Japan's total assessed value. To compensate for the omission of village-based corporate landholding practice we can add the putative value for Echigo Province, where villages acting on their own initiative widely resorted to corporate landholding. This provides a fairly conservative estimate of 6,313,100 *koku* or 33 percent of Japan's total putative yield.<sup>17</sup> As a ballpark estimate, it seems reasonable to conclude that about one-third of Japanese land devoted to agriculture was subject to corporate forms of landholding during the Tokugawa era.

In studies of the proportional forms of corporate landholding systems, scholars have stressed their role in allocating the effects of natural disasters among villagers from the seventeenth to the nineteenth centuries. They argue that this system made it possible for residents to continue farming rather than to be wiped out completely by a flood or landslide. (Note again that parcels one cultivated under proportional allocation gave each shareholder the same proportion of each kind of land in the village, a fully diversified portfolio of lands to farm, so no one family could accumulate rights only in the best locations in the village regardless of the total



**Figure 4.** Distribution of Corporate Land Tenure by Provinces.

acreage one managed.)<sup>18</sup> This interpretation has developed largely through small-scale local studies that exploited a limited range of materials and made no systematic comparison of the influence of topography across regions. This is true even for Aono Shunsui's prodigious and very significant work in surveying a large number of cases.<sup>19</sup> A well-structured delineation of local geographic conditions is lacking. The effort at examining topographic conditions below cannot be comprehensive or conclusive, but it shows both the value of having locational data for villages and the importance of specifying geographic conditions more clearly.

Other stimuli besides floods and landslides have been identified as important reasons for the establishment of proportional redistribution systems, but they do not clearly distinguish regions practicing proportional redistribution from those that followed more individualized forms of land ownership. Japanese scholars have argued that redistribution functioned as a means to distribute taxes within a village in an equitable manner. Since all holders possessed the same proportion of each land grade and type in the village, a flat land tax allocation could be made based on the assessed value of each family's total holdings (*its mochidaka*). Unlike

modern societies where taxation is commonly assessed on an individual, early modern Japanese overlords taxed villages as a corporate unit. The responsibility of dividing up taxes among villagers lay with the leadership of the village. Proportional redistribution techniques certainly achieved that end, but many other mechanisms were available, such as applying different tax rates to each grade and type of land a family held or basing taxes on the acreage held. Current discussions do not provide insight into why one form of tax allocation and land redistribution would appear in one part of Japan, but not another. An alternate form of this explanation stresses the motivation of domain administrators in implementing proportional corporate landholding to assure equitable allocation of land taxes and thereby to assure that maximum possible labor was available to produce the foodstuffs that comprised the great majority of taxes that villages paid. Yet the same question arises as with individual villages that adopted corporate landholding: What makes this alternative appealing to some domains but not to others?

Nakada Kaoru, Uchida Ginzō, and others have proposed that corporate landholding provided a means to equitably allocate the benefits of collaborative land reclamation.<sup>20</sup> While certainly feasible, such an explanation does not explain why this practice continued long after the reclamation project was completed and agricultural conditions on the newly developed fields had stabilized. The continuation of such a time-consuming practice (evaluation of the land, grading, measuring, and conducting the allocation could easily take four-to-six weeks) only makes sense if there were some clear benefit for the community. In the case of reclaimed land, it is worth noting that most land available for reclamation after the late-sixteenth century was in very marginal and unstable locations: swamps; islands of land created by deposition in the middle of rivers and streams; poorly watered, steep hillsides; or otherwise unstable land. In such circumstances, the potential value of reallocation to accommodate losses in arable land would make a more reasonable explanation than just sharing the proceeds of a common investment, but this explanation brings us back to propensity for natural disaster as a stimulus.

In other words, the reasons scholars adduce for the adoption of corporate village landholding all either resolve back to the impact of natural calamities or offer no factor that differentiates regions that employ corporate tenures from those that do not. GIS can assist in testing the claim that the frequency or severity of natural disasters played a significant role in creating corporate forms of land tenure. The discussion that follows represents a preliminary examination using GIS.

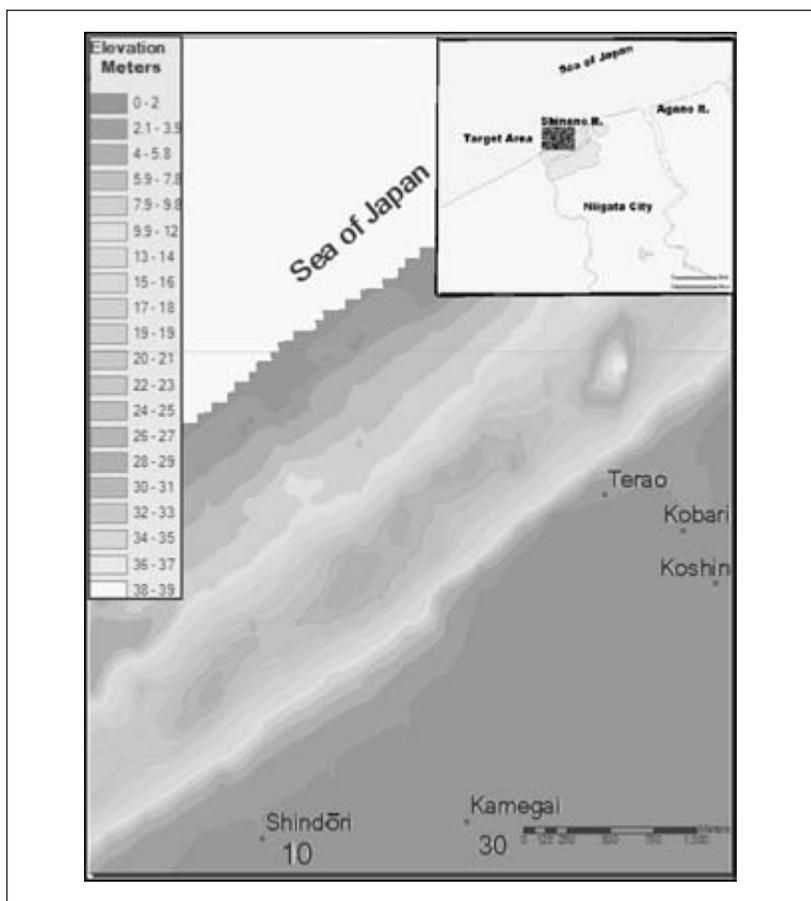
For the balance of this discussion we shall focus on the question of flooding, since that issue can be explored with more limited data than that required for landslides. To begin, note that under proportional allocation of land, redistributions of holdings were conducted at different times by different villages when these villages operated free of domain

regulation (the case in the region we will examine below). In some villages, reallocations took place only after a flood or landslide that affected five percent of the arable land in a village. Other villages reallocated on a periodic basis, such as once every one, three, five, seven, ten, fifteen, twenty, or thirty years. If some problem developed in the interim, tax accounting adjustments would be employed in the absence of a redistribution. A logical assumption would be that villages that adopted shorter intervals between redistributions were responding to greater frequency of flooding. Where we have redistribution interval data as well as locational and other geographic data for villages, we have material to test this hypothesis.

The Shinano River is Japan's longest and has the country's largest drainage basin. It begins high in the mountains of Nagano Prefecture and curves through steep valleys until it begins to enter the Echigo Plain. The effect of the drainage can be illustrated dramatically. If the weather is clear in central Niigata Prefecture at the modern city of Tokamachi, but it is raining in Nagano, the residents of Tokamachi understand that there is risk of a flood in their neck of the woods within eight hours. Further downstream, passing the city of Nagaoka, the river enters its lower reaches, an area long considered the classic location for corporate village landholding. This region continues all the way to the city of Niigata where the Shinano empties into the sea. Figure 5 shows an area just to the south of the mouth of the Shinano. The river is less than one kilometer below and to the right of this map.

The map contour interval in Figure 5 is just under two meters. The white area at the upper right of the ridge is about thirty-eight meters above sea level. The two villages with numerals under them at the bottom of the map, Shindōri and Kamegai, are located in territory that is no more than two meters above sea level. The distance between these two villages can be walked in five minutes. Soil conditions are identical, being a combination of sandy dune and river diluvium. Climatic circumstances, too, are identical. For all practical purposes, the physical geographic conditions in these two villages are identical.

Despite their proximity and similarity of geographic circumstance, these two villages had remarkably dissimilar fixed intervals for reallocation of land: every ten years at Shindōri, every thirty at Kamegai. What is more remarkable is that the village closest to the Shinano had the longer interval, a phenomenon that is counter-intuitive. We would anticipate that the village closer to the river would be at higher risk and therefore have a shorter interval between redistributions. This situation is further complicated by the redistribution interval of a village that can not be shown on this map, the village of Sekiya. Sekiya is located right on the banks of the Shinano, less than a kilometer away. Its redistribution interval, like Shindōri, is just ten years.



**Figure 5.** Elevation Map of several villages at the mouth of the Shinano River, Niigata City. The two villages with numbers under them are Shindōri (left) and Kamegai (right). (Created from 50-meter mesh DEM data from the Ministry of Agriculture, Forestry and Fisheries of the Government of Japan.)

## Conclusion

The results of this small handful of cases is certainly not conclusive. Nonetheless, it is sufficient to suggest that with proper identification of village or hamlet location, in combination with data on redistribution intervals under corporate landholding and other topographic data (including that from historical maps), one can test historical interpretations regarding corporate landholding in early modern Japan and test a variety of derivative hypotheses. Although urban and suburban regions that have undergone substantial change will require more intensive investigation to confirm locations, the use of Ministry of Agriculture, Forestry, and Fisheries hamlet center-point data provides a useful and reasonably efficient

means for establishing early modern village locations for those in stable rural areas.

This solution is not perfect, and from a purely methodological standpoint, continued investigation into efficient methods for identifying early Meiji village center-point and boundary locations is essential. For example, the consonance of Japanese government data and compilations based on mid-nineteenth-century and earlier documents for historical place-name references such as the *Kadokawa Nihon chimei dai jiten* (*Kadokawa Greater Dictionary of Japanese Place-Names*) or the *Heibonsha Nihon rekishi chimei jiten* (*Heibonsha Dictionary of Japanese Historical Place-Names*) is by no means perfect. In comparing lists of modern place-names to lists of mid-nineteenth-century place names there will be a number of names that have no earlier counterpart. The reverse also is true. Nonetheless, where there is agreement between such lists, the preceding investigation suggests that for many rural areas the modern data will have considerable utility.

In addition to its value for the broader project on land-tenure systems of which this work is a part, successful determination of location can set the stage for linking early modern/early Meiji statistical and map data to mid-Meiji and later data that will permit longitudinal examination of demographic trends, response to natural and human disasters, the spread of disease, the patterns of economic change, and other issues of broad interest. Toward that end, I am working with several colleagues in the United States and Japan to extend the research reported here and to create a nationwide, freely available database of this fundamental locational data.

## Notes

1. There is multi-disciplinary interest in Asia more broadly, too, as evidenced by a number of presentations at the 2003 Pacific Neighborhood Consortium in Bangkok. Scholars from Australia, China, Japan, Thailand, Vietnam, the United States, Europe, and elsewhere presented an exciting array of projects representing the current state of historical preservation and historical GIS work on Asia. Much of this work employed GIS to present images associated with specific historical materials (e.g., manuscripts) or a very specific kind of artifact, e.g., temple or statue locations in rather limited regional contexts, rather than for analytical purposes. It focused on understanding spatial relationships at a specific point in time. Nonetheless, a fascinating motion-picture-like presentation on the political evolution of the Khmer Empire by Roland Fletcher, University of Sydney (Australia) suggests the potential for long-term historical analyses using GIS. The conference website, through which the program can be accessed, is at <http://203.144.221.112/PNC/>. Follow the "Day by Day" link. Fletcher's paper, "Timemap of the Khmer Empire," is available at this site under the November 8<sup>th</sup> schedule.
2. Siebert, Loren, "Using GIS to Document, Visualize, and Interpret Tokyo's Spatial History," *Social Science History* 24:3 (Fall 2000): 537-74; Yano Keiji, et al., "Toshi 3 jigen GIS/VR ni yoru Kyoto baachyaru ji/kukan no?kochiku" (<http://www.ritsumei.ac.jp/~yano/cvim.pdf>); Murayama Yuji, et al., "Rekishi tokei intaanetto GIS" (<http://land.geo.tsukuba.ac.jp/teacher/murayama/history/index.html>).
3. Kaga domain, for example, was comprised of three traditional provinces, Kaga, Noto, and Etchu. When the shape of the new prefectures was finally settled, these territories became two prefectures, Ishikawa (comprised of Kaga and Noto) and Toyama (comprised of Etchu). For another example in detail, see Kären Wigen, "Constructing Shinano: The Invention of a Neo-Traditional Region," in Stephen Vlastos, ed., *Mirror of Modernity: Invented Traditions of Modern Japan* (Berkeley: University of California Press, 1998): 229-42, as well as Wigen, *The Mak-*

- ing of a Japanese Periphery, 1750-1920, (Berkeley: University of California Press, 1995) for descriptions of one case in which old associations were disrupted.
4. On early Meiji reform of local administration, see James C. Baxter, *The Meiji Unification Through the Lens of Ishikawa Prefecture* (New Haven, Conn.: Council on East Asian Studies, 1994), and Neil Waters, *Japan's Local Pragmatists: The Transition from Bakumatsu to Meiji in the Kawasaki Region* (New Haven, Conn.: Council on East Asian Studies, 1983).
  5. See, e.g., Philip C. Brown, "Feudal Remnants' and Tenant Power: The Case of Niigata, Japan, in the Nineteenth and Early Twentieth Centuries," *Peasant Studies* 15:1 (1987): 1-26.
  6. Kokudo Chiriin, *Gomanbun no ichi chikeizu: sakusei shozo mokuroku* (Tokyo: Kokudo Chiriin, 1997): 10. This source also indicates on page 14 that the first Western-style maps are drawn in 1873, followed by "Meiji-style" maps in 1880, then standardization of 1:20,000 techniques later employed in surveys of the Kanto in 1885.
  7. An example of the labeling in the 1:25,000 map compared to the 1:50,000 map can be viewed at <http://people.cohums.ohio-state.edu/brown113/>, click on the link "1:25k and 1:50k comparison." Although readers may not be able to understand the Japanese characters in the two maps presented in these two maps, one can see that more place names appear on the 1:50,000 map than on the late-twentieth-century 1:25,000 map. While the earlier 1:50,000 map is more complete, the listing of old early Meiji villages is nonetheless far from complete.
  8. Yoshikawa Chōshi Hensan Inkai, ed., *Yoshikawa Chōshi* (Yoshikawa-machi, Niigata-ken: Yoshikawa-chō, 1993-1996, 6 vols.).
  9. The term hamlet is employed when discussing customary settlement locations as portrayed on post-Meiji Restoration maps; the same settlements are referred to as villages when discussed in a pre-Restoration context.
  10. This is not simply a matter of scale. Zooming in shows a divergence of only three to five meters between the sets of data. See the illustration at the following URL: <http://people.cohums.ohio-state.edu/brown113/>. Follow the GPS vs. Japan Gov. Data Comparison close-up link at the bottom of the page.
  11. Domain authorities paid less attention to village boundaries because their primary concern was to identify lands subject to the land tax, which fell only on arable dry field and paddy land. While domains might levy miscellaneous taxes (*komononari*) on non-arable land, measurement of that land and careful demarcation of its extent were not part of the process. The taxes on wild mountain acreage and fields amounted to a very tiny fraction of the land tax assessed on arable lands, so the effort to calculate taxes was not warranted.
  12. See Satō Takanori, et al., "GIS o mochiita nōgyō shūraku kaado deeta no bunseki," [http://user.numazu-ct.ac.jp/%7Etsato/tsato/vcgis\\_98/](http://user.numazu-ct.ac.jp/%7Etsato/tsato/vcgis_98/). Sato and his colleagues made a preliminary test of methods for incorporating location data for the 1995 Miyazaki shūraku data. They did this by plotting the exact geographic center of each of some 900 hamlets as point data.
  13. The most detailed survey texts are George Sansom, *A History of Japan* (Stanford: Stanford University Press, 1963, vol. 3); Conrad Totman, *Early Modern Japan* (Berkeley: University of California Press, 1993) and *A History of Japan* (Malden, Mass.: Blackwell Publishers, 2000). Thomas Smith, *The Agrarian Origins of Modern Japan* (Stanford: Stanford University Press, 1959); Herman Ooms, *Tokugawa Village Practice* (Berkeley: University of California Press, 1996).
  14. For a more complete description of the procedures for tiered allocation, see Philip C. Brown, "Harvests of Chance: Corporate Control of Arable Land in Early Modern Japan," in John F. Richards, ed., *Land, Property and the Environment* (Oakland, Calif.: ICS Press, 2002): 51-2.
  15. Some regions employed the practice for the whole era and into the twentieth century, other regions for only part of the Early Modern period.
  16. Based on the listings included in Furushima Toshio, "Warichi seido ni kansuru bunken," *Nōgyō keizai kenkyū* 16:4 (1940): 134-62; Aono Shunsui, *Nihon kinsei warichi sei shi no kenkyū* (Tokyo: Ozankaku Shuppan, 1982); and Kumayama Chōshi Hensan Inkai, *Kumayama Chōshi Oaza hen* (Kumayama-chō, Okayama-ken: Kumayama-chō, 1993): 267.
  17. The listing of domains is taken from Aono, *Nihon kinsei warichi*. Putative yield figures are taken from Takayanagi Mitsutoshi and Takeuchi Rizō, eds., *Kadokawa Nihon shi jiten* (Tokyo: Kadokawa Shoten, 1976): 1165-93.
  18. The link between natural disasters and land-tenure type is laid out in the work of Aono and Furushima cited in note 16. On the allocation of lands within villages, see Brown, "Harvests."
  19. Aono, *Nihon kinsei warichi*.
  20. Nakada, Kaoru, "Echigo kuni warichi seido" *Kokka gakkai zasshi* 18:205 (1904): 51-76 and 18:206 (1904): 27-63; Uchida Ginzō, *Nihon keizai shi no kenkyū* (Tokyo: Dobunkan, 1921): 256-9.