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Japanese Irrigation Cooperatives

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Introduction

Niiike is a small rice-growing settlement in the western half of Honshu, Japan's Principal island. One hundred thirty people live in its twenty-four houses clustered at the base of a pine-covered hill. We are interested in these one hundred thirty persons not as so many individual Japanese but as members of a community. Niiike is a clearly defined, natural sociocultural unit, large enough to be the setting for most situations and events that are the basic stuff of a way of life, yet small enough to let us see this way of life at close quarters. As members of communities ourselves, we will recognize familiar conditions and problems among those that confront the people of Niiike. Certain other situations are peculiar to Japan or to this particular locality. But the solutions, even of those problems with which we are familiar, are often not what we would expect. Niiike's style of dealing with life's situations is what makes it distinctively Japanese rather than some other nationality, rural rather than urban, Niiike rather than some other settlement. Yet much of Niiike's way of life is also customary and normal in a great many other Japanese communities. Our study concentrates on the life of people in a rural community called a "buraku." In non-technical terms, the buraku is a small rural settlement, a social entity consisting of households grouped into a community. We retain untranslated throughout this study the Japanese word "buraku," because it has no appropriate counterpart in our experience and in

From *Village Japan*.

order to avoid confusion with two other Japanese terms, "ōaza" and "mura," which refer to successively larger divisions of the rural countryside. From a purely geographical point of view these terms are generally so related that several buraku lie within each ōaza and several ōaza lie within each mura. But these terms connote more than a difference in geographic size. Outside the cities and towns, all of Japan is divided into mura: units of territory fitting border to border to furnish a blanket of government over the entire country, including hills and open fields as well as settlements. The mura has a full apparatus of government; it is the smallest legal administrative unit of Japan and may be considered the administrative village. The ōaza beneath it is also a territorial unit with a vestige of administration inherited from the period of Japanese history prior to 1872. Neither the mura nor the ōaza, however, is a community all of whose inhabitants have constant and face-to-face social interaction. The buraku is just such an entity; its government is largely unofficial, and the borders of its land are only hazily defined; but it is a clearly defined social community. Its inhabitants have a strong sense of group identity. For this reason, it is a useful and convenient unit of study.

To call this community by its Japanese title, Niiike buraku, unfortunately does not relieve us of all terminological difficulties. The same sort of community in some other parts of Japan is called an *aza,* while "ōaza" may be used to refer to only the principal community among a group of *aza,* all of them together composing a mura, or administrative village. Moreover, almost all over Japan, there is popular use of the term buraku in speaking of segregated settlements of the onetime classless people, the outcast Eta. Even in the vicinity of Niiike, this pejorative connotation may color the word in conversational use. But the usual meaning of "buraku" is the perfectly honorable one of "small rural settlement."

But we still must ask how appropriate Niiike is as an example of a buraku. It lies on the coastal plain of Okayama Prefecture in one of Japan's more prosperous farming areas. Among Japanese country folk, the farmers of this plain are regarded as generally up to date and forward looking. Niiike is run of the mill within the area. It is neither particularly old-fashioned nor progressive, rich nor poor, specialized nor diversified. It is a representative community of the Okayama coastal plain. But no one community can be fully representative of more than a limited area; its historical background, its present degree of prosperity, its size, its topographic and climatic setting, and its products, to name only a few features, differ slightly or grossly from those of other communities. Therefore, we have on occasion drawn comparisons, to show the variety of alternatives and necessities from which the people of Niiike and the Okayama coastal plain have shaped their living. These comparisons also make us aware of the diversity of rural Japan and of the importance of a region's history to the character of its communities.

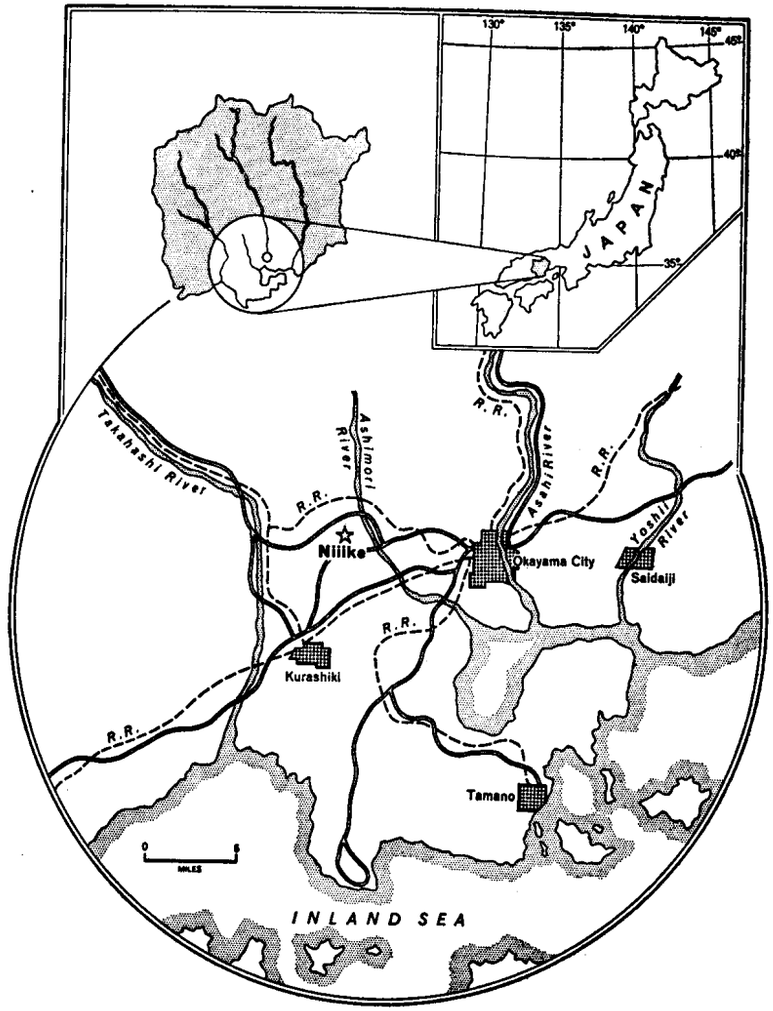

Figure 6.1. The location of Niiike in Okayama Prefecture, Japan.

Land and Water

The serried paddy fields lying beneath the pine-garbed hills of the Okayama Plain give an impression of changeless antiquity. Even the unhurried, deliberate movements of the farmers as they work among their crops or in their drying yards contribute to the aura of timelessness which lies over the landscape. There are evidences of the past all about. Yet the scene itself has been constantly changing. This landscape contains few of the natural features as they were a thousand years ago. They have been modified over the centuries

and are still being reshaped by man. Over the centuries men have effaced the sluggish, estuarine streams that once drained these valleys. They have diked the Ashimori River to curtail its floods and have dug ditches to drain the swamps. Men have made ponds to hold irrigation water and later have erased them to set fields in their place. Men have cut down the ancient forests, terraced the hillsides for crops, and then once more covered the hills with trees. At a pace measured in generations, from the time of first settlement through the medieval projects of drainage, clearing, and canal-building to the modern period when revision of the ditch system transformed and rationalized the entire pattern of rice fields, the farmers of this valley have transformed the landscape. These many generations of planning and reconstruction were unified by the consistent effort to feed an increasing population. Flood control, new varieties of crops, alteration of soil conditions, and the adoption of new agricultural techniques all contributed to this effort. The wasteful prehistoric chieftains, it is true, placed their great tombs in the middle of the fields, but every other move affecting the appearance of the valley floor and hills, or even the distribution of houses, can be interpreted in terms of more efficient planting and management of fields.

Rice cultivation has been the central theme in the development of Okayama agriculture. From the dawn of agriculture in Japan, irrigated rice has been the overwhelming important crop. Dry fields have been used largely for supplemental purposes; even the dwindling forests and meadows have been used to support rice growing, providing green cuttings to fertilize the paddy fields. Today 56 percent of all Japan's cultivated land is in paddy. In Niiike this figure is 85 percent. Wet rice cultivation has been a potent force shaping communities such as Niiike. Its implications must be understood before we can adequately comprehend the problems of land and water faced by the people.

Even at a simple level of technology, rice grown with ample water provides a maximum yield per unit of cultivation. Water acts as a retardant to weeds and certain insects and in other ways aids the cultivator. In particular, nitrogenous bacteria that flourish in the still water covering the fields constantly replenish the soil and make possible its repeated use. Thus, apart from the high yield, wet growing conditions minimize the need for crop rotation. These natural qualities provide a secure and constant base for an agricultural population, contrasting in important respects with the technique of dry farming familiar in Europe. Europe's traditional agricultural technology centers around grains that grow well under dry soil conditions: wheat, barley, rye, and oats. It puts a premium on diversity of land use and rotation of crops. It has fostered close integration between animal husbandry and agriculture, since the constant need for fertilizer has made the Western farmer depend on manure from his animals.

Thus, starting with cereal crops that grow well under different conditions, two distinct agricultural technologies have grown up on opposite sides of the Eurasian continent. Farmers of the Orient increasingly have emphasized intensive cultivation of land, perfecting irrigation systems and organizing their communities to manage them. They have become able to grow two or more crops annually in the same field. As units of cultivation have grown small, maximum production per unit has been achieved by lavish expenditure of human energy. In contrast, most occidental farming has more land available, so its techniques are prodigal of land, e.g., fallowing and the grazing of large animals. As acreage expands, these techniques permit less manpower per acre and lower unit costs; so the system encourages extending the acreage of each farm. Substitution of machines for man and animal power fits the logic of this *extensive* farming, which is probably most highly developed today in the American Middle West. Instead of more crops per man-hour, however, *intensive* farming develops the logic of more crops per acre; it reaches a peak in Japan's small, double-cropped farms. In their version of the equation, MANPOWER UNITS + LAND UNITS = CROP UNITS. Land units are necessarily tiny, so they boost manpower in order to produce peak crops.

Intensive cultivation of rice tends to impose certain conditions on the society it supports. Its high yield stimulates dense population; its heavy requirements of manpower in turn depend on dense population. Paddy technology is complex and demanding. Preparation of paddy fields and the planting and transplanting of rice are laborious operations little amenable to types of mechanization devised to date. Rural Japan thus has long used its heavy concentration of population as a work force. Problems arise from the fact that this population is usefully employed only through a limited season; but the workers live the year around on the farm, so they often face long periods of underemployment or, as it is called in Japan today, "concealed unemployment." This lack of year-round work, however, does not contradict the reciprocal relation between rice and population; as population rises to take care of cultivation, the methods of cultivation must be intensified to produce food for the increased number of months.

Paddy culture is self-perpetuating in yet another way. The amount of labor and capital put into the creation of paddy land provides a continuing incentive to maintain the system. The construction of paddy fields is laborious and costly, hard for those familiar only with "natural" agriculture to comprehend. The fields must be constructed to hold water an exact inch or two deep over the entire surface. In preparing them the farmer must frequently start several feet below the surface and build up with carefully graded soils. Moreover, each paddy plot must be linked to an irrigation system, which in itself is often a major undertaking. The same irrigation system must also provide proper drainage of rain and ground water during the seasons when the fields are

dried. This complex system of terraced fields and interlacing irrigation and drainage ditches is not easily assembled, nor is it easily modified. It becomes the cherished heritage of an entire community generation after generation.

In the final analysis this type of technology leaves a strong imprint on the community which engages in it. Each household, as a unit of production as well as ownership, needs internal cohesion and cooperation to keep and make the most of its landholdings. The household, in turn, must look to the local community, both as a source of cooperative labor at crucial times and as the management unit for irrigation. Close association among households exist in most areas of Japan today, even though the forms of association vary sharply according to local conditions.

Beyond the level of the family the social implications of paddy culture merge with many other molding forces, yet the effects of this technology are clearly visible. Intensive cultivation under these conditions tends to limit returns to a subsistence level. The great supply of labor tends to limit the mechanization of agriculture. In so far as the workers must be fed from their limited land, food crops cannot readily be supplanted by ones that have high market value or shifted to meet variable market demands. Farmers with low income on scarce and high-priced land tend to lose their independence and, in any case, lack income for improvement. Agricultural improvement frequently depends upon government or the wealthy and powerful. Land reclamation and water management tend to lie beyond control by the individual farmer and rest with the community, the landlord, or the feudal lord. In Japan, as in other Asian countries with similar economic features, political power has been closely related to the control of land and water.

Important though land is to contemporary Niiike, it is no longer the sole reliance for every household or for the community as a whole. Recent measures have pushed back the threat of landlordism, and the circle that leads from rising population to more intensive cultivation and back to newly increasing population has been broken by outside economic factors as well as ones internal to the community.

Land Types and Their Use

Every square rod of land in the Okayama Plain is precious. The average Niiike household owns somewhat less than three acres of productive land, which must provide not only food for the household but the produce sold to the city as well. Because the premium is high on land that can be made to produce heavily and constantly and because rice outproduces every other crop, irrigable rice fields are most prized, particularly if they will produce a second crop. In ordinary conversation people take irrigated land as the measure of a family's holdings. Yet other types of land are listed on the tax records. In the productive category, two other kinds are important: dry field and wood lot. Uncultivated land, of some importance elsewhere for pasture and other purposes, is inconsequential in the vicinity of Niiike. Other private holdings include lots for farmhouses and outbuildings and privately owned ponds or canals.

Communally owned land, although minimal, also exists in Niiike. It comprises the cemetery, the lots upon which the village assembly hall and fire-equipment shed are built, and one patch of wood lot. The last is owned in common by all buraku of upper Shinjō ōaza, which use it only as a source of wood for funeral cremations. Roads, paths, canals, and streams are public property and not taxed, although responsibility for upkeep belongs to the buraku or larger entities, depending upon their location and importance. The space given to these is restricted. Cultivation is the primary goal.

The importance of paddy land can be illustrated in two ways. In 1956 in the Okayama Plain, paddy land was selling at prices ranging between $1,100 and $2,300 per acre. (The figures here approximate the real price rather than the nominal price fixed by government regulation.) At this price, most Niiike farmers have holdings worth $4,000 or more, equal in value to ten or twenty acres of farmland in the American Middle West. This comparison is inadequate, not only because the prices of other things such as housing differ, but also because there are aspects of landholding that defy calculation in monetary terms. Cultivated land is so hard to get that those who possess it often are unwilling to sell at any price, to the vexation of public officials who must then confiscate land required for public or industrial developments. The fact that cultivation can compete in cash profits with other land uses helps to explain why plots of rice may be seen growing well inside the fringes of a city. In non-economic terms, the value of paddy land can also be illustrated by a distinctive system of place names. Peaks and promontories, streams and valleys very often have no standard names. A river or stream may change its name every few hundred yards along its course, and the same mountaintop will be known by different names to the persons who live north and to the persons who live south of it. By contrast, almost every little parcel of paddy land has its distinctive name, which it has carried through generations, sometimes from as far back as the Taika Reform of A.D. 645. Dry fields and wood lots rarely have acquired names in this fashion.

Yet every household, for healthy economic balance, needs to own wood lot and dry field as well as paddy land. The wood lot, at the minimum, supplies kindling for winter warmth. Dry fields provide much of the household's food. Once minimal needs have been met, few households strive to increase their dry-field holdings. These remain nearly constant while either paddy land or forest holdings are built up. New or impoverished households, who must worry first about subsistence rather than cash production, are apt to have a high proportion of dry fields. Some conception of the balance of landholdings in Niiike is given in Table 6.1.

Table 6.1.

	Average Holding		Largest Holding		Smallest Holding	
Type of land	Percentage	Acres	Percentage	Acres	Percentage	Acres
Paddy field	58.0	1.57	33.1	2.88	28.5	0.18
Dry field	10.4	.28	3.9	.34	30.8	0.20
Wood lot	31.6	.86	63.0	5.49	40.7	0.26
Total	100.0	2.71	100.0	8.71	100.0	0.64

Dry-field acreage varies much less from the average than does the area of paddy land or of wood lot, as the acreage figures show. The smallest owner, Iwasa Tamaichi, one of the evacuees who took up life in Niiike on whatever land he could get during the war, is short in all three categories. He has to make up his deficiency even in dry-field produce by money earned from his side trade as a barber. Note, however, that even the largest landowner has not a great deal more dry field, for such land has little value either for current income or as investment. Dry fields are gauged to meet subsistence needs within the household but are not increased beyond this point if paddy land or wood lot can be purchased. Land reform did not touch dry-field holdings, so it has not altered this situation.

The distribution of land types shown in Table 6.1, while valid for the average household today, differs markedly from the balance prevailing in Niiike until a generation ago. The farmers of Niiike have shifted in recent years to an increasing emphasis upon paddy farming for a number of reasons, among them the increased importance of cash-crop farming, the collapse of the market for locally grown cotton, and the improvement of hitherto marshy paddy land. To make clear the reasons for this shift, we must briefly review the recent history of land development in the vicinity of Niiike. Although this is the history of a local change, it typifies changes which have brought about an increase of paddy land throughout Japan.

Niiike is a young settlement compared to its neighboring buraku, most of whose beginnings go much further back than the several centuries Niiike can claim. Niiike's first settlers struggled with drainage problems, for much of their land was backmarsh. To judge from the shapes of fields and their names, drainage problems first were solved nearest the river, probably because river silts deposited there raised the land level. Historical records show that cultivation near the river antedates the Taika Reform which reworked some of these fields into the regular *jōri* pattern. During the following centuries, fields closer to the head of the subsidiary valleys were brought under cultivation, and the land at the head of the side valleys was reclaimed last. Niiike, pocketed at the very head of its little valley, was the last area to be drained and cultivated. Piecemeal attacks on the ever present drainage problem up to 1925 had resulted in meandering ditches that crosscut the fields into tiny, irregular shapes. A large gash was cut across the valley floor by a diked ditch that led

run-off water from the hills on the north across the valley to the prehistoric moat at the base of Tsukuriyama and thence drained into the Ashimori River. Although this ditch was built to protect the acres lying between it and the Ashimori River, floods recurred, and one tract—the Shinjō Depression—although cultivable, remained so swampy that wry jokes were made about outsiders who, blundering through its footpaths, fell in and were never seen again. The dike of the large ditch, moreover, prevented the river water from reaching the land in front of Niiike in dry periods. Irrigation water had to be supplied by a good-sized pond immediately west of the present village. The presence of this pond, according to one local conjecture, accounts for the name Nii-ike, or "new pond." Thus the Niiike settlement grew to much its present size by combining intensive use of the dry fields on the hill behind the settlement with the greatest possible use of the unsatisfactory paddy fields in front.

The worst features of this situation were corrected through a large-scale program of land improvement begun in 1925. At that time the central government, seeking a monumental enterprise to commemorate the reign of the Taishō emperor, made special funds available for irrigation and land improvement loans. All over the nation a wave of projects ensued which resulted in "Taishō ponds," "Taishō canals," and "Taishō dams." The project centering on this valley affected not only Niiike and other buraku of Kamo village but the buraku of neighboring villages as well. It never was fully completed because its cost outran the Y240,000 fund raised to finance the project. Instead of seventy-two additional acres of fields, only twenty-four acres were created, and some land still lies too low to produce two crops each year.

Niiike, however, profited immensely from the improvements. Leveling of the entire valley floor between 1925 and 1930 made possible parallel ditches for drainage and irrigation between large, rectangular fields over most of the area; the earlier, irregular pattern, preserved where ancient tombs were not completely leveled, makes a striking contrast (see Fig. 6.3). A uniform grade of feeder-drainage ditches was established to enlarge and straighten the fields; a better drainage ditch carried run-off water from the hills on the north to the Ashimori without impeding irrigation from the river; in place of the large local pond, which shrank to a fraction of its former size, water became available from Taishō Pond in the hills of Yamate village. Also, a new road built from the highway across the valley past the settlement was wide enough to admit motor vehicle, thus vastly improving the village's communications.

Before this improvement of paddy land, most households in Niiike acquired their cash income from cotton grown on the hillside fields behind the buraku. Cotton was then a major product of the Okayama Plain, where some of Japan's largest spinning mills had been built after the Meiji Restoration. The mills later turned to the cheaper and more plentiful cotton imported from

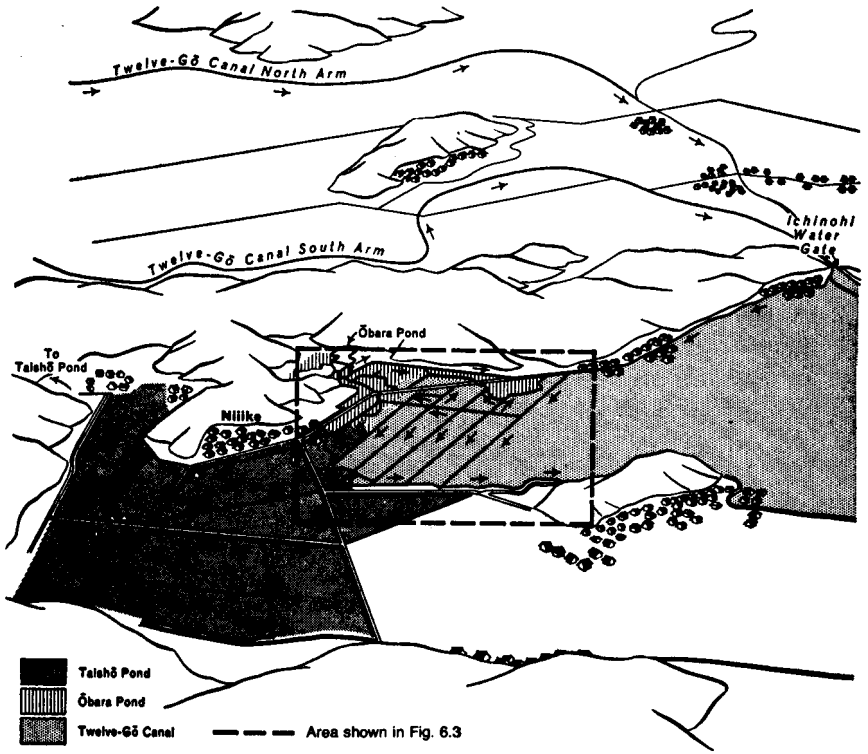

Figure 6.2. Main irrigation and drainage ditches of Niiike, 1950, showing the flow of water and the fields served by each water source.

the United States and southern Asia. The market for domestic cotton thus declined sharply after 1910. The Niiike farmer turned to raising mat rush, the basic material for the covering of floor mats. A swamp plant, this rush could be grown as a second crop even in hard-to-drain paddy fields. Intensive use of chemical fertilizer began about the same time. Household labor was needed now in the paddy fields or could be profitably employed in weaving the mat rush into *tatmi* covers. Gradually cultivation of the hillside dry fields was abandoned, and pine trees were planted. Today the major part of Niiike's cash income is derived from the cultivation of rice and mat rush. Niiike became a paddy farming village.

All parts of the valley floor low enough to lead water to are utilized for paddy. As has been said, such land is not merely cleared, it is constructed, beginning with the subsoil. Where decomposed granite from the hillsides forms the subsoil near Niiike, drainage is adequate; but where the base is muck derived from the original stream or swamp, proper drainage can be insured only by adding loads of gravel to lighten the soil. Over this base soil is

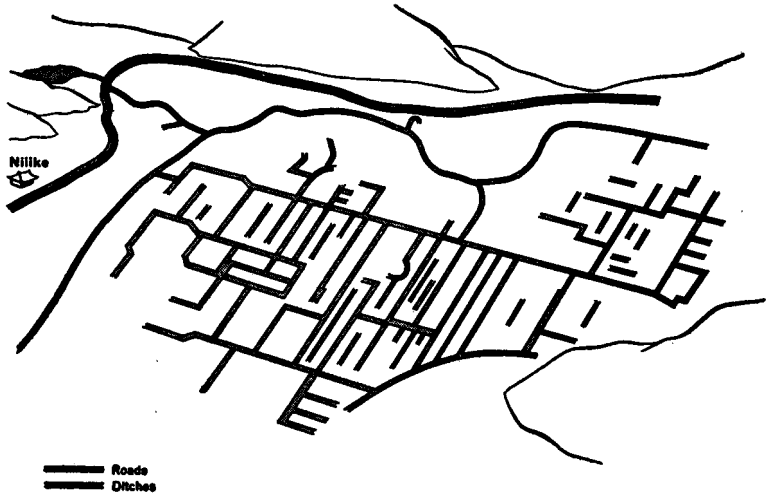

Figure 6.3. A portion of Niiike's fields in 1892, before the revision of the ditches. Compare the crop area with the fields in the area demarcated by broken lines in Figure 6.2.

the surface mud, made black by tons of organic material added through the centuries. This is carefully leveled and surrounded by a low dike. Even after such careful construction, fields are not identical in their characteristics. Some are overwatered when rains are heavy. Others go dry during a drought. The wetter fields can grow only one crop a year or three crops in two years; most desirable are the fields which bear two crops each year. The most swampy fields of all, in the Nishinuma sector, are rarely planted to anything other than vetch in winter, for they can never be drained, as is required one year in every three for growing mat rush as a winter crop. But even here the unending pressure for more crop land has led to such experiments as planting wheat in wide-spaced furrows, each furrow piled extra-high to raise the roots above the standing water in the troughs.

Dry fields lie above the practical limit of irrigation. In much of the Okayama Plain, particularly the eastern half, dry fields are valuable for their orchards. The relatively dry summer climate of Okayama is beneficial for fruit. But in Niiike only two households in recent times have grown fruit for outside, city markets. Niiike's hillside fields are more important for their crops of dry grains, white and sweet potatoes, beans, and root and leaf vegetables that serve primarily for family consumption. Most of the dry fields are terraced or sloped on the hillside behind the housing area and along a strip that extends around the upper slopes of Ōbara Pond. Chemical fertilizer and compost are used chiefly in the paddy fields, but night soil is used in the dry fields. This permits their intensive use, both through cultivation of successive

crops throughout the year and through intercropping or "multi-story" cropping, the system under which one sees in a single field rows of vegetables planted between rows of grain, the whole overtopped by a grape arbor or fruit trees.

One major contrast in the economic function of dry and wet fields appears in the division of household labor. Adult men, women, and young people past school age all work in the fields. The men are invariably found in the paddy fields, not merely because of plowing and other heavy work, but because these fields produce the primary cash crops. Women and young people also work in the paddy fields, particularly at periods of peak labor, but the cultivation of dry fields on the hillside is almost exclusively their concern. The household head wields a hoe or other small hand tool in a dry field only if he raises fruit, melons, or some vegetables for sale.

There is wood lot on the hillside behind the settlement which was planted when cotton-growing was discontinued forty years ago. This wood lot meets the regular needs of each household. But most families also keep some plots of trees on the mountain slope across the valley for lumber and for winter firewood. Fast-growing species, particularly red pine, predominate; these are the trees that are massed in dark green profusion on top of nearly every hill rising out of Okayama Plain. The original, native vegetation of hardwoods such as oak and maple was cut centuries ago in most localities, to provide fuel and building lumber for the dense population of the coastal plain. Even the fast-growing species must be husbanded carefully to prevent denudation and consequent erosion, a danger of which the farmers in this area of torrential rains are keenly aware. The potential commercial value of trees has led a few households to acquire additional wood lot as an investment. During the war, higher prices and government exhortation led some households to sell patches of pine which were cut, sent away, and used in an ill-starred attempt to produce aviation fuel from resin. Such patches of land have been replanted to peach trees and edible bamboo.

Most of the smoke haze that hovers over the valley from the evening bath and cooking fires comes from rice straw, the primary cooking fuel. Charcoal, produced in the mountains and bought through stores, is used in small handfuls to provide most of the winter heat. Unlike many areas of Japan, compost made from pine needles, grass, and brush swept from beneath the trees is only of minor importance in Niiike. Nonetheless, the wild grasses which luxuriate through the summer are cut in the fall and the ground beneath the trees raked clean to make compost piles.

As in villages throughout Japan and the Orient, the land owned and worked by any one household of Niiike buraku is fragmented into many small, scattered parcels. This fragmentation and dispersal of landholdings has been a matter of concern to agricultural economists on account of the limitations such a system imposes on farm management. The factors leading to fragmentation and scattering are real and enduring.

Roughly speaking, the buraku and its lands form a unit centered upon the housing area (see Fig. 6.4). Most of the fields of Niiike lie together, distinct from fields belonging to people of other buraku. Until the land reform of 1946–47, anyone was able to buy and cultivate land wherever he could obtain it. Various land reform regulations now make it difficult for a person to obtain land unless he is an inhabitant of a nearby community. However, it is the convenience of having fields near one's house, rather than any legal necessity, that tends to concentrate a buraku's landholding. The unity, however, is far from being perfect. Various households in Niiike own plots of one or another type of land relatively distant from their own community. Conversely, the farmers of nearby buraku own and work a certain number of fields close to Niiike. The fringes of each buraku's holdings are made decidedly ragged by the way they are interlocked with fields of other buraku. Habits of cooperation with people of one's own buraku make it, on the whole, somewhat more convenient not to have an outsider working a neighboring field, but there is no strong feeling against outside ownership. Thus, it is only personal convenience and a general sense of the fitness of things that brings most land of the buraku together as a unit.

The pattern of distribution of land owned by any single household, however, is quite different. The acreage held by each house is made up of patches

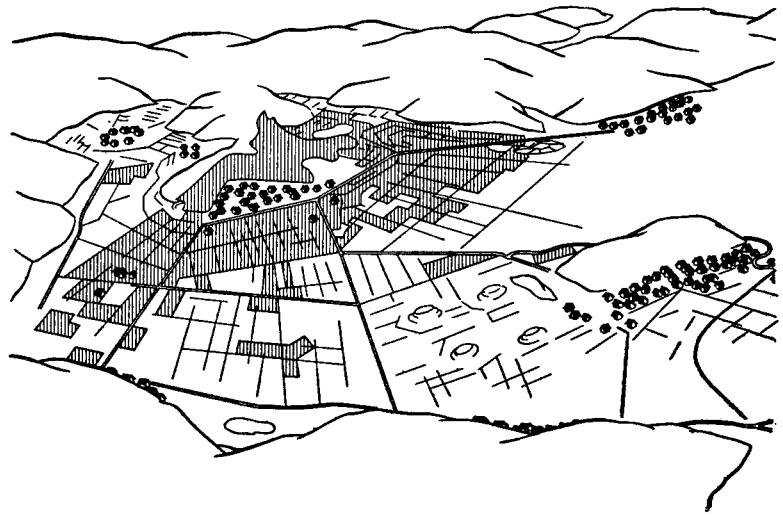

Figure 6.4. Land owned or cultivated by residents of Niiike, shown by shading, is concentrated near their houses. Wood lots, not set off here, cover the hill behind the houses and part of the hill on which we stand.

and plots scattered here and there, the number of such plots ranging from a minimum of eight to a maximum of thirty in the case of Niiike. Except for wood lots across the valley, Niiike is fortunate in having most of its fields close to the settlement. Yet for any given household, two fields seldom lie together or even on the same path. This maximizes the time spent carrying tools, seed, and fertilizer to fields and in bringing the harvest back. The same time and effort are required whether the field be a quarter-acre in size or only a few dozen square yards. Well-established households with more fields have greater carrying distances than newer dependent households with fewer plots. But the "portal to portal" distances range from 145 to 945 feet. Actually house-to-field distance in Niiike is trifling compared with that of farmers in the foothills and mountains, who measure their house-to-field distances in terms of hundreds of yards rather than feet. But in either case a great deal of effort is consumed nonproductively as a consequence of the scattering of fields. Because of the miniature scale of transport vehicles required to negotiate the narrow paths between paddy fields, several trips to a single field are often necessary for completing one operation, such as the scattering of fertilizer. This wastage of manpower is only one consideration that makes field scattering disadvantageous for farm management. Fragmentation poses great difficulties for mechanization or a possible trend toward market production of one main crop. Each field must be cultivated as a separate and distinct operation, raising tractor fuel consumption per cultivated acre to an almost prohibitive figure and canceling most of the advantages gained from working a single crop. It requires little imagination to see how fragmentation developed. Family holdings are seldom split among heirs but are passed on as a unit to a single heir. However, small plots are acquired, exchanged, and sold piecemeal as family fortunes fluctuate, new fields are developed, or the balance of cultivation is shifted. Older households, especially head households, tend to show more clustering of fields than younger or branch households, especially in areas of double-crop paddy. This is evidence of their recognition of the advantages of having fields close together. Nonetheless, the continuance of fragmentation testifies to the centrifugal tendencies built into the traditional land tenure system.

Yet, it should be noted that there are certain advantages in the scattering of fields. To the extent that each household is self-sufficient but makes its living from a very small total acreage, this acreage must be scattered in order to incorporate the different sorts of land required for different crops. Scattered holdings also provide some local security against natural disasters. If the crops are ruined in certain fields by flood, drought, or blight, others may escape. Finally, the appraising eye of the tax collector, who is traditionally regarded in the same category with natural disasters, may miss one or more fields when he visits the village to compare actual holdings with the tax records. Consequently, scattered holdings do provide security, both in terms of satisfying

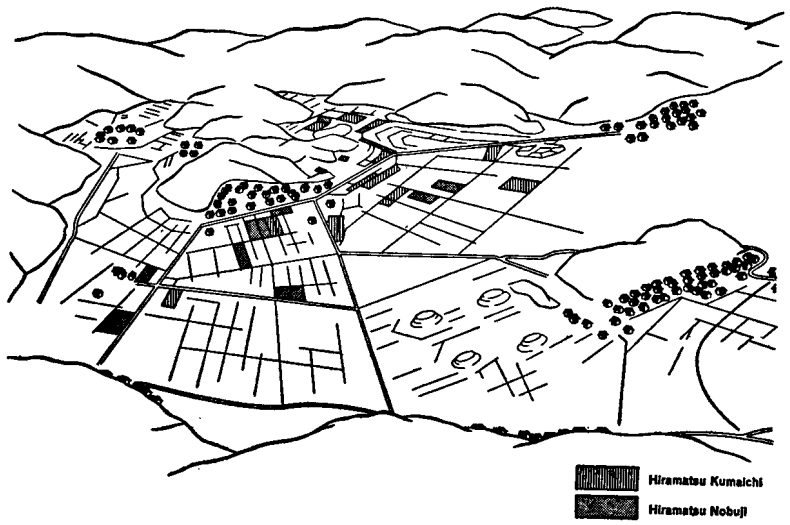

Figure 6.5. Dispersal of landholdings; the fields belonging to Hirmatsu Kumaichi and those belonging to Hiramatsu Nobuji (separately shaded) include patches in every sector of Niiike.

the diverse needs of the household and in terms of offsetting natural calamities. The farmers themselves, more concerned with the lessons of past experience than with promises of future development, have not until recently shown any serious discontent with the situation as it is.

Water Control: Irrigation and Drainage

Let the farmer labor ever so hard and manage ever so craftily to acquire land for his family's security, this security is valueless unless he has access to water. It is meaningless to own rice land without water. In recognition of this vital connection, legal water rights automatically go with the ownership of irrigation land. Despite such interdependence, the use of land and the use of water differ in one vital respect. Land is operated by each household as a unit. However, single households do not control irrigation water, except for very small ponds. Water is managed by communities. The households of Niiike participate in water-use communities of varying sizes, all of which are larger than the buraku itself. Community management of this vital resource has extremely serious implications for social and economic organization. Land management unites the household; water management unites the community.

Water-control problems are not limited to irrigation. Drainage and protection against flood are also of constant concern. Every measure taken to prevent drought must work also against inundation. These contradictory needs, together with the conflicting demands of the various members of the irrigation

community, make delicate and complicated the arrangement of water courses, water gates, ditches, dikes, and ponds. One cannot but marvel at the resourcefulness which, over the centuries, has provided for these conflicting needs. By the same token, one comes to understand that the inadequacies that remain cannot be settled by easy means.

The water needs of crops are so well controlled through irrigation that the day-to-day fluctuations of direct precipitation concern the farmer only when they pose a drainage problem. Ultimately, rainfall over the river drainage basins in the hills is more important than rain falling directly on the fields. Local rainfall is only a small part of the larger problem of controlling run-off to prevent or reduce floods, and this in turn is but one aspect of the problem of water control. Water control means holding back the water in times of overabundance, saving it for use when it is critically needed, and distributing it equitably to all who have a call on it.

The days when water problems were met by the buraku or its component households are lost in antiquity. Today these problems transcend buraku limits. They are handled at the lowest level by the various ōaza and, beyond that, by organizations of larger scope. Irrigation, in fact, involves the prefectural and the central government; national measures for river control, dam-building, and land reclamation have direct impact upon the buraku. But, in contrast to many phases of life which the central government absorbs completely once it touches them, irrigation problems are too complex and variant to permit higher government to take over and mold the situation at will. Water control is vital to the national economy—the rice harvest as a whole may fluctuate 20 percent or more between wet and dry years. Higher levels of government are therefore deeply concerned with irrigation and drainage. But they must rest content with sharing this responsibility with local units of government.

Among Okayama coastal plain communities Niiike has a somewhat below average proportion of irrigated land. Moreover, because of poor drainage, even this land is below average in its ability to support two crops a year. Whereas 85 percent of Niiike's cultivated land is in paddy, Kamo village as a whole has 95 percent in paddy. For all of Okayama Prefecture, which embraces mountain land up to the Chūgoku Divide as well as coastal plain, irrigated land amounts to 57 percent of all cultivated and pasture land. A large sector of rugged mountains bordering Hiroshima on the west, where all villages have less than 50 percent and sometimes as little as 20 percent paddy land, is responsible for the low prefectural average. Everywhere else, the proportion of paddy land is above 50 percent and rises almost to 100 percent in some villages of the coastal plain.

The figures for irrigation facilities suggest the complexity of irrigation development in the prefecture as a whole: there are 10,000 irrigation ponds and somewhat more than 5,700 inlets from streams. Despite this, drought and

flood are perpetual threats. The people of Okayama remember the severe droughts of 1925, 1945, and 1946, when pond-watered land lost up to 60 percent of its crop. They also recall 1953, when typhoons brought floods from one end of Japan to the other. Nonetheless, Okayama Prefecture is relatively well favored. Floods are seldom as severe as elsewhere, and the folk tradition of *amagoi,* a communal gathering around a great fire built on the hillside to call for rain in time of severe drought, is less frequently encountered than in other parts of Japan. Okayama's advantage over other prefectures is partly due to its natural setting, its screen of mountains south and north that protect it from typhoons and winter storms but provide a good rain shed. Beyond this, Okayama Prefecture escapes severe damage because its water-control facilities are far advanced.

Niiike has access to almost every important type of irrigation and drainage resource. The resources for irrigation include small ponds owned and managed by individuals, ponds managed by communities, canals owned and managed by irrigation cooperatives, and rivers in the public domain. Individually owned and managed ponds are of minimal importance in Niiike, although in areas where other water facilities are limited they may be instruments of economic coercion for the benefit of their owners. Counting even the tiny ponds used primarily for raising fish or planting lotus for its edible roots, there are sixteen. These are scattered about Niiike's fields, mostly around the uphill fringes of the main pond, Ōbara. Most are the property of individual Niiike households, but two are owned jointly by a man from Niiike and a man from the buraku of Horen. One pond, remnant of the original main water resource of the buraku Einoike, serves for little save a water reserve for fire-fighting. Title to the two larger ponds providing irrigation water for Niiike is held by the central government, so that no one pays taxes on them. This arrangement at the same time precludes their being manipulated for power purposes by an individual owner. The smaller one, Ōbara, is managed by farmers of Niiike buraku alone, on a volunteer basis, a system which exemplifies the ancient tradition of water management. The second and larger pond, Taishō, supplies five buraku of Kamo and various buraku of two other villages, Misu and Yamate.

Ōbara Pond, over two acres in area, lies in an elevated hollow around a shoulder of the hill from the housing area of Niiike. Water from this pond reaches fields totaling somewhat over 10 acres (4.11 *chō),* almost all of which are owned by Niiike residents. It is operated jointly by the sixteen households whose fields receive its water. In groups of four, the heads of participating households take turns as water guards, rotating variously over a cycle of sixteen years. Those who benefit least, through having the smallest acreage involved, work the least. But the duty is not onerous. It comes principally during the one hundred days of rice growing in the summer when one to two inches of water are constantly needed on the fields. The period of transplant-

ing mat rush during January and February again brings a brief tour of duty. This system of management exemplifies the older tradition: service is rendered by the persons who benefit, on a pattern of cooperative, rotating responsibility carried on without written rules and without a formal director. The farmers on water-guard duty receive pay for their services but at a token rate. The money comes from an assessment per acreage and is paid to the guards in two ways: a direct payment from the landowners concerned, and a payment from water taxes transmitted through the ōaza.

Formally, the ōaza is the unit in charge of Ōbara Pond and other ponds within its domain. Although it may leave the operation of the pond to the discretion of the buraku that benefits chiefly or entirely, the ōaza in effect is responsible for the system of water guards and is in charge of maintenance and repair. Each pond may be thought of as having three parts: the pond basin and dam, the lead-off ditches to the fields, and the feeder ditches from the hills. Maintenance of small lead-off ditches is invariably the responsibility of the buraku, whatever the source of water. But the ōaza, using a portion of all irrigation assessments paid it, employs "engineers" (who often are part-time farmers) to inspect and do minor maintenance of the ōaza irrigation system and to submit to the village office estimates of costs for major repairs.

Maintenance and repairs take place for the most part quite inconspicuously. However, each three or four years every pond must be drained in order to clean out weeds and water grasses and to inspect the ladder-like rows of outlet plugs. This becomes a festive occasion for the entire neighborhood, since the draining ordinarily takes place in the slack season while the rice fields are dry for ripening. The water guards set a convenient date and spread the word around the neighborhood. Old and young gather from all directions. Men and boys make great sport of wading through the shallows of the larger ponds to net fish and stab the slippery eels, and the spectators delightedly watch them getting splashed and muddy. The fish harvest is a respectable one, and it would be unneighborly of Niiike to take it all for itself. Anyone is welcome to join the festivities and share the catch, whether he uses the water of Ōbara Pond or not.

Taishō Pond lies to the west of Niiike in Yamate village. Pocketed in a group of higher hills, it is larger and deeper than Ōbara Pond and has twelve levels of drains as against three for Ōbara. Its water irrgates about 120 acres, divided among adjoining parts of three villages: Kamo, Misu, and Yamate. Built thirty years ago during the ditch-revision program of the 1920's, its management follows a new tradition of professionalism. Money collected on an acreage basis from all farmers who receive irrigation water goes from the respective buraku to their various ōaza and from there via the village offices to the office of Yamate. Yamate uses some of this money for maintenance and with the remainder hires a guard at a token annual salary of Y987, less than $2.75. The present system of a single guard is a change introduced in 1947.

Prior to that there had been five. One may well wonder why five guards should have been needed to do the work that obviously makes only a part-time job for one man. The original five guards were chosen from the three villages in approximate ratio to the land irrigated in each village. We may suppose the reduction was made after a generation of use had given some assurance that no disputes were likely to arise over the distribution of water and that there was no need for each village to protect its rights by having official representation.

As compared with canals, ponds occupy relatively large areas of otherwise productive farmland. But pond water has the advantage of being easily conducted directly into gravity-flow ditches whereas canal water must always be pumped to the ditches or fields. As many as thirty outlets may pierce the pond embankment at regular vertical intervals between high and low water levels, each outlet having its own sluice to lead the water to the regular ditch system below. Yet a field directly below a pond is not necessarily free of pumping costs. In Niiike, for example, the allocation of water from Ōbara Pond changes as the pond level drops. It is reserved during low-water periods for higher fields, not for lower ones, on the ground that to force the owners of high fields to pump water all the way up from canal level while the owners of lower fields enjoy the pond water without cost would be an unfair expense to the former. Under this low-water allotment, everyone pumps; water is lifted to the high fields from the pond, to the low fields from the canal.

Water-lifting devices, accordingly, are an essential part of everyone's farm equipment. Round about Niiike, some of this work of raising water is done by various picturesque well sweeps and water wheels. These devices now do very little of the great amount of day-to-day water-lifting, yet they are worth noting as examples of methods of older times. The sweeps, which in certain places stand tilted against the sky in clusters like a flock of alarmed wading birds, function to raise and lower buckets in wells. Except where the only water to be had comes from such wells, more efficient methods are current today. Self-acting water wheels are sometimes used at the edge of a stream or canal where a steady current flows. They cannot raise water over a high dike, but they are an ancient device, and their construction is ingenious. Around the outer rim of a large double frame of wood or bamboo, sections of bamboo that form natural tubes are lashed at just the proper angle to catch up water from the stream on the start of the upswing and empty it, on the downswing, into a trough leading to a field. The fields so served are usually ones developed temporarily (and illegally) on the government owned bottom lands inside the dikes of a stream. Water wheel, crops, and all risk being swept away when a hard rain fills the bottom with rushing floodwater.

Throughout the irrigating season every household puts to frequent use a small, foot-powered water wheel. It can easily be dismantled into several sections, each one light enough to be carried from one field to another. When in use, the wheel, composed of paddles radiating out from the hub, is seated

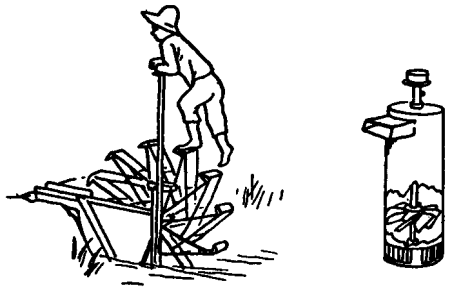

Figure 6.6. Water-lifting devices of Niiike. A foot-propelled, portable water wheel is shown assembled and in use; part of a motor-driven cylindrical pump is cut away to show the Archimedes'-screw moving part in the interior. The large, automatic water wheel used on the river and main ditches is not shown here.

into a wood frame sheathing one quadrant. The frame is lodged solidly against the ditch edge, its short trough projecting over the border of the field. Two poles rise from sockets in the frame sides to support an armrest on which the operator steadies himself as he steps from blade to blade, rotating the wheel so that each blade in turn catches water and lifts it up within the sheathing to the trough. When the field is adequately watered, he dismantles his contrivance and carries the wheel, sheathing frame, armrest, and supporting poles to the next small field.

Motorized irrigation is preferred for larger fields, provided that a path is nearby. A metal cylinder, which is open at the bottom and incloses an Archimedes'-screw core, is set into the water at the edge of a ditch so that a trough from the top of the cylinder projects over the low dike into the field. From a wheel at the top, a belt is stretched to the flywheel of the household's 4.5-horsepower kerosene motor, set nearby on its carrying sledge, and the motor spins the screw to send water gushing into the field. Powering these irrigation devices is one of the principal uses for the all-purpose motor. Weighing well over one hundred pounds at the lightest, it cannot readily be used in fields that have no nearby path or firm ground. Hence the wooden foot-turned wheel continues to be used for small or distant fields even though the motor-driven screw pump has become standard equipment on the Niiike farm.

Among water-lifting devices, there should finally be noted several large, stationary electric pumps, owned by the ōaza rather than by individual households, which help in drainage rather than in irrigation. Those that concern Niiike are installed at the dike of the Ashimori River, where they work constantly throughout the irrigating season, discharging over the dike all the water that has been pumped or led onto the fields in the valley from its ponds or canals.

Canal water supplies Niiike with about half its irrigation water. Niiike's

access to this water is through its membership in a large irrigation canal organization known as the Twelve-Gō Irrigation Association (Jūnikagō Yōsui Kumiai). Its canal runs eastward from the Takahashi River. Niiike and other burkau have no independent status in this organization but participate only through their respective ōaza and villages. The organization, despite its names, includes thirteen villages and towns and contains various suborganizations at different levels. More exactly, perhaps, we should describe the whole system as being made up of two coordinate organizations, the Twelve-Gō (Jūnikagō) and the Six-Gō (Rokkagō) irrigation associations, with subordinate units in each. Niiike is a very small part of this organization indeed, but to understand the significance of the organization to the life of people in Niiike we must step back for a large-scale view of the whole.

Eight of the thirteen villages and towns of the Twelve-Gō Canal System, including Kamo, lie in the drainage basin of the Ashimori River four to five miles east of the Takahashi River. Their access to the Takahashi River water relieves them from dependence on the capricious Ashimori, which has a dangerously torrential flow after a heavy rain but carries little water during most of the year. The Takahashi River has provided summer water to these distant villages for more centuries than to villages close by; not until recent times was a second canal system, the Eight-Gō (Hakkagō), created for the benefit of villages and towns close to the Takahashi River. The Twelve-Gō Canal, older and larger than the Eight-Gō Canal, branches from the river at Tatai, where the river first breaks out of the hills, and moves eastward across the plain, following what may once have been the bed of the Takahashi River. It soon splits into two arms. The northerly arm follows the hills on the upper edge of the plain until it spills into the bed of the Ashimori River; take-off ditches serve nearby fields en route. The southerly arm bends down to the edge of the hills along the south and, serving as a transit canal, retains all its water until just before it reaches the Ashimori River. There, at the Iwasaki water gate, it splits into three arms. One drains into the bed of the Ashimori River, mingles with the excess water of the northern arm, and flows south to be used by villages farther downstream. Of the remaining two arms, one bends around the hills on the west side of the Ashimori and eventually reaches Niiike after having been split once more into an Upper and a Lower Shinjō Canal. The remaining arm dives under the bed of the Ashimori River to re-emerge via a siphon on the east side, where it waters the lands of eastern Kamo and its neighbors. As Figure 6.7 shows, Niiike gets its share of Takahashi River water only after it has been diverted by two water gates (the Tatai water gate at the Takahashi River and the Iwasaki water gate near the Ashimori River) and channeled through several branch and subbranch ditches. Niiike's lands are only a fraction of the 13,600 acres watered by the canal.

The Twelve-Gō Canal, an exceptionally important factor in the agricultural development of coastal land, is reputed to have been constructed along

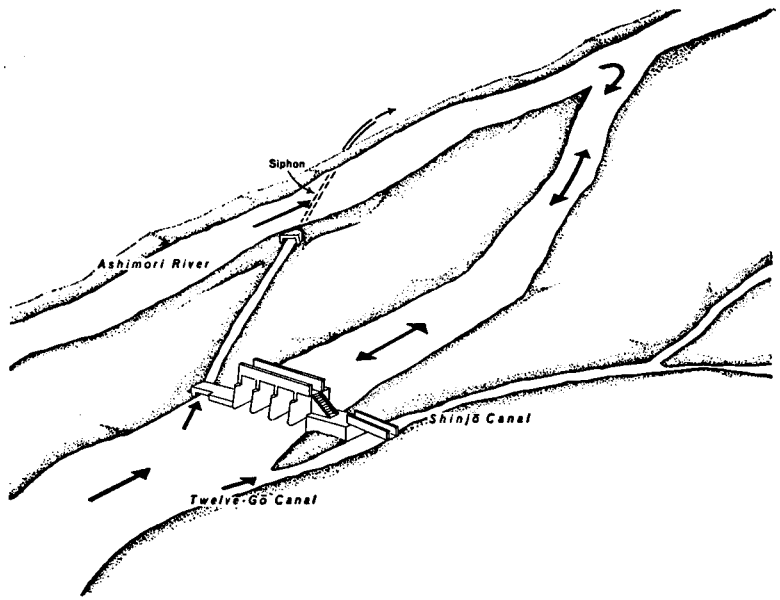

Figure 6.7. The Twelve-Go Canal at the Iwasaki water gate. Canal water flowing from the left divides here, part crossing under the river to the far side, part going through the First Gate of Shinkjo (Ichinohi) (lower right) and part falling into the Ashimori River bed for use downstream. In flood, the river water backs into the canal and may inundate fields between canal and river or beside the canal upstream.

its present general course about A.D. 1220, serving twelve of the village-like units of the time known as "*gō*." Local tradition has it that the course was laid out by Kageyasu Senotarō, who set out from the Takahashi River on horseback and had the canal dug along the twisting route he followed across the plain. Centuries afterward, as new land was created from the tide flats of Kojima Bay, the villages established there hooked onto the canal and became incorporated as downstream members of the Twelve-Gō system, which today is among the five largest irrigation systems of Okayama Prefecture.

As one follows the route of the canal and its branches today, one comes across a few control and diversion structures of recent date and modern aspect standing side by side with very humble, primitive arrangements. Prefectural loans have helped to build concrete water gates at the Tatai entrance and, since 1950, at the Iwasaki juncture with the Ashimori River. En route between the two gates, sections of concrete or rock retaining walls alternate with heavy piles or stakes interwoven with bamboo strips to support the banks. Some diversion ditches that water the fields in the vicinity are no more than holes in the bank. At other places there are crude diversion devices made of piles of submerged rocks and pine trunks laid across the canal, of calculated thickness

and depth beneath the surface to control the amount of water diverted. These simple arrangements are readily displaced by accident or high water, and their reinstallation becomes a matter of sometimes acrimonious arbitration; it is difficult to replace them with more precisely measured modern devices, not only because of the expense involved, but because of jealous fears that one side or another will come out on the short end.

Tight conservatism preserves many archaisms in the administrative organization of the canal system. It derives in large part from the tensions and jealousies over the husbandry of this important resource. All the participating villages in the several canal organizations linked under the Twelve-Gō system work on a common problem: the provision and distribution of adequate water in ways which will not jeopardize flood control. But there is no single ideal solution, since some fields are disadvantaged by conditions that are ideal for others. Each unit of a canal organization is in a sense a separate sovereignty treating with others for a satisfactory working compromise. This uneasy confederation is more apt to follow historical precedent than laboratory theories of hydraulic engineering. Although cooperation is mandatory, it is not achieved without a certain amount of hard feeling or even open conflict. Serious tensions prevail at every level of the rather complex organization.

In order to use canal water from the Twelve-Gō Canal, Niiike is a member of three organizations of successively larger size, each involving it with portions of the canal farther upstream. It belongs to the smallest through its ōaza, Upper Shinjō, which joins with Lower Shinjō to clear and repair the feeder ditch as far as the water gate at Iwasaki. The two ōaza form an organization, the Shinjō Ichinohi (Shinjō "First Gate"). Similar minimum-level organizations composed of one to three ōaza exist all along the system. The Ichinohi ditch, it will be remembered, is only one of three ditches that branch at the Iwasaki water gate. Hence the Iwasaki gate affects not only the Shinjō Ichinohi fields but also those of the ōaza of Kamo east of the river and of the six remaining villages and towns downstream. All these, accordingly, form a cooperative, in which the several ōaza of Kamo, including the two that use Shinjō Ichinohi ditch, speak through Kamo village as their administrative unit. This is the Six-Gō organization, responsible for the Iwasaki water gate and downstream ditch maintenance. Finally, the villages of the Six-Gō cooperative, because of their interest in the head water gate at the Takahashi River and in the transit ditch from there to Iwasaki, are confederated with upstream villages as members of the Twelve-Gō organization.

Formal charters cover the structure and operation of the Twelve-Gō and the Six-Gō organizations. Several of the lower echelon organizations also have charters, but most do not. All but a few of these date from 1889, the year when present village organization was formalized, but some revisions took place about 1925, when grand plans for ditch revision focused attention on irrigation matters. Chartered associations do not differ basically from the

others, for the charters did not establish them or, in essence, change them except to recognize modern village units in place of ancient ones. Each charter merely codifies tradition that has long been accepted. For example, each ōaza, as a basic participating unit of the Twelve-Gō Irrigation Association, is charged a share of the costs and allotted a percentage of water fixed to the fourth point (Upper Shinjō gets 1.6071 percent). The ratios are fixed on the basis of acreage served at some time in the distant past and have not taken into account later changes in the extent of fields. Even though charters, in a sense, merely crystallize tradition, they are nevertheless convenient and even necessary for the larger groups. Because costs vary from year to year, their apportionment in an annual budget is much facilitated by the formal organization of the irrigation group under a written charter.

The mayor of Kamo is fairly prominent in the councils of the twenty-four-man administrative board of the Twelve-Gō organization, because, by tradition, he is chief administrator of the Iwasaki water gate, located near the Kamo village office. The fact that Kamo is farthest upstream and the oldest participant in the Six-Gō system also gives him seniority.

Irrigation taxes rise as the years go by because cash expenses have gradually increased. Villagers themselves once took care of most maintenance and repair, contributing their free labor; unpaid labor is still contributed but extends only to maintenance and repair of the smallest ditches within each buraku. Cash is now needed to hire guards for each water gate, to hire workers for repair of the main canal, to pay for major improvements, and for incidental organizational expenses. These costs are met by an earmarked irrigation tax in each village budget.

Water Control: Tensions and Disputes

The theoretical rights to a certain percentage of water are clearly established by charter or by tradition for each participating unit. The problem is to implement these rights in practice. The condition of the canal itself makes this difficult. At certain points, facilities are precisely and firmly fixed; for example, the dimensions of the outlet from the main canal to the Shinjō Ichinolhi branch, 1.1 feet high by 3 feet broad, were fixed by arbitration and made permanent by being cast in concrete. As the people say, every man knows these figures as well as he knows his own house number. But no one has measured the precise volume and rate of flow of water either in the canal or in the river from which it comes, nor does anyone know what happens to the water as it passes over and around crumbling rock dams and rotting diversion logs before reaching the Ichinohi outlet.

Equally important as a source of friction is the tradition of unequal water rights. In time of drought the villages on the reclaimed land in Kojima Bay get shortchanged, according to their view. Their claim to this water goes back

only a century, at most, and they are at the tail end of the canal. Hence, the older villages upstream claim prior right to the water. In any case they have first access to it, and it is their own people who decide, as water guards, how much to let through. Frictions thus are inevitable. At a still higher level, the Eight-Gō organization has gone to court against the Twelve-Gō organization in a dispute over division of the Takahashi River water. The dispute concerned the question of how high the Twelve-Gō organization ought to be allowed to build its diversionary dam. Because there is no codified law concerning water rights, the case stagnated until both parties, appalled at the mounting expense of lawyers and litigation, compromised out of court. Such friction occurs at every organizational level down to the ōaza and, in some cases, among individual farmers within the ōaza. The details of the following dispute show how difficult it is to reconcile conflicting interests.

Rice fields near the Six-Gō water gate at Iwasaki but upstream from the gate are not entitled to water from the transit canal bordering them but instead draw their water from the canal arm running along the edge of the hills to the north. The tangle of river and canal channels near the Iwasaki gate is arranged to prevent flooding at that point but, at the same time, to water fields on the downstream side of the gate. Ordinarily, the trickle of water in the bed of the Ashimori seems much too small to justify the high dikes that border the river; the river bed serves merely as a convenient channel to carry canal water. After a hard rain, however, the river rises twelve or fourteen feet. The canal level fluctuates only slightly, owing to the fixed size of the opening from the Takahashi River. Thus, the flooded Ashimori may back up along the canal and, since no high dikes border the canal, may flood the low fields there unless the water gates are closed in time. Although the canal may serve as a safety valve for the river in flood and prevent its bursting its dikes elsewhere, farmers owning fields at this point suffer if the water gates are opened. Shortly after a heavy rain, we saw the gates standing open, the rice in low fields nearby completely under water, and a crowd of angry farmers clustered on and around the water gate. The mayor of Kamo, summoned posthaste, splashed up through the mud to learn that unknown persons, presumably those with fields at a higher level nearby, had used a bootleg crank to raise the gates and water their fields. The cultivators of the low fields, upon seeing the water rise over the top of their rice, had stormed up to the water gate and were now demanding that the gate be closed and they be compensated for damage. The mayor's decision, finally, to close the gates did not relieve him of having to hear a half-hour tirade launched against the suspected culprits, the system, and his own management, delivered with violent gestures by the disputants on both sides.

Although there is no visible end to disputes of this sort, progress can be made toward solving one of the basic irritants, periodic shortages of water. Small ponds and ditches already exploit localized ground water so thoroughly

that additional water needs cannot be met except by major projects in the upstream drainage basins of large rivers. This requires action quite beyond the domain of single villages or canal cooperatives. Prefectural and national dam-building is required. Such action has been started in the postwar period. The prefecture has pushed plans for construction of major, multipurpose dams on two important rivers, the Takahashi and the Asahi. The irrigation community to which Niiike belongs is to benefit directly from the smallest of these, the Osakabe Dam. This, besides supplying 3,000 kilowatts of electricity and impounding water to diminish the flood threat along the Takahashi River will provide irrigation water during the low-water season. A still larger dam downstream, not yet in the blueprint stage, will provide even more water than the Osakabe Dam and will further alleviate the perennial water shortage of villages on the downstream end of the Twelve-Gō Canal. The central government, which advances the entire cost to begin with, is eventually repaid 40 percent of this amount, 15 percent by the prefecture and 25 percent by the participating irrigation cooperatives. This postwar dam-building, involving both local communities and the highest levels of government, is something new in water control in the Okayama Plain. It is occurring in the normal course of events rather than as a specific outcome of war or occupation. As such, it seems a token of a future in which communities such as Niiike will be linked ever more intimately into an economic and financial framework of prefectural and national scale.