AN ETHNOGRAPHY OF A JAPANESE IRRIGATION SYSTEM

I. Research Objective.
II. Description of Project and Methodology.
   A. Definition of Project.
   B. Framework of Research Questions.
   C. Methods.
   D. Timetable.
III. Significance of Proposed Research.
IV. Preparations for Proposed Research.
V. Bibliography.

ABSTRACT

For much of agricultural Japan, the availability of a proper water supply for rice cultivation is made problematical by conditions of water scarcity or flooding. Over the centuries, these conditions have led to the construction of thousands of irrigation systems, which in turn have become important features in rural social organization.

The objective of this research is the ethnographic study of a multi-level canal irrigation system during an annual cycle of planning and use. As a case study, it will combine data on the resource characteristics of the water supply, the physical network of water delivery and drainage, and the social system of administration and allocation. The methods to be used are documentary study, interviews with officials, and extended observation of the irrigation system itself through an annual cycle of operation.

By bringing together materials on the natural, technical, and social features of an irrigation system, it is intended that the resulting ethnography will contribute to our understanding of the ways in which characteristics of natural resources constrain technical development and social organization, and, conversely, the ways in which the socio-cultural context of resource utilization determines the forms which that utilization assumes in a particular society. Japan, as a country of monsoon Asia with a highly developed agricultural sector, offers an instructive research locale. Its problems of water resource utilization provide a useful contrast to those of arid environments; at the same time, data from Japan are most valuable in improving water control strategies for the developing societies of south and southeastern Asia.
I. Research objective.

Irrigation is one of man's most significant technical developments. In arid environments of the world, agriculture is not even possible without human modification of water resources (cf. Trewartha 1961). In other parts of the world, such as monsoon Asia, where the water supply is too seasonal and variable to be reliable to cultivators, irrigation and drainage works are necessary to assure adequate yields (cf. Hanks 1972; Wickizer & Bennett 1941). For monsoon Asia, it has been shown further that improvements in water control can bring dramatic increases in agricultural productivity (Yamada & Lusanandana 1969:159-163).

In Japan, wet-rice cultivation has been the basis of agriculture for the past two thousand years (Chard 1974; Ishida 1974); as rural Japan is predominantly agricultural, rice cultivation is of fundamental importance in understanding rural social structure (Nakane 1967:58). However, for much of the country, the availability of a proper water supply for rice cultivation is rendered highly problematical by conditions of water scarcity or flooding (Noh & Gordon 1974:3; Trewartha 1965:78; Kenstushō 1973:18). Over the centuries, these conditions have led to the construction of thousands of irrigation systems; currently about 50% of Japan's cultivated acreage is irrigated (Eyre 1955:199; Nōrinshō 1972:9).

An irrigation system in a complex society is not only a technical network of diversionary canals, water gates, lifting devices, drainage ditches, etc. It has also a social structure of water-user organizations, administrators, water guards, government officials, and others, operating according to a complex matrix of water rights, historical custom, principles of allocation, and national policy objectives. Moreover, this social structure may be embedded in the political and economic structure of the local area and is generally involved in relationships with national government agencies.
The objective of the proposed research is the case study of a multi-level canal irrigation system in rural Japan, which will combine data on the resource characteristics of the water supply, the physical network of water delivery and drainage, and the social system of administration and allocation. By bringing together materials on the natural, technical, and social features of an irrigation system, it is intended that the resulting ethnography will contribute to our understanding of the ways in which characteristics of natural resources constrain technical development and social organization and, conversely, the ways in which the socio-cultural context of resource utilization determines the forms which that utilization assumes in a particular society.

II. Description of project and methodology.

A. Definition of project.

The research proposed is a synchronic case study of a multi-level canal irrigation system on an alluvial plain in rural Japan. As a synchronic investigation, it will examine a particular system during an annual cycle of planning and use. It will not be concerned with the origins and development of the system; such work is important but constitutes a separate project. Nevertheless, because water is a resource whose availability varies annually, local records of past years' rainfall, waterflow, water table, etc. will be examined in order to place the observation year in the perspective of the recent past.

The proposed unit of analysis is a multi-level canal system. Canal irrigation in Japan, in contrast to pond-ditch networks, tends to serve a wider area and involves, in the same physical network, a number of water user groups with separate claims. Furthermore, among canal systems, one may broadly distinguish between single-canal systems, which serve in series a small number of groups (e.g., Yoneyama 1967:225), and multi-level systems, in which canals subdivide and water is allocated at several levels to groups of successively smaller memberships (e.g., Eyre 1955). The latter systems are of particular relevance to the study of the effects of resource utilization on social
dedness of irrigation administration in political administrative structures. The system in operation: actual behavior in an annual cycle of operation. For example, potential lines of conflict of interest are suggested by the distribution of water rights and network of canals; this final category includes which disputes actually occur: on what levels do they arise and whom do they involve? How are they resolved and to whose satisfaction? Do intra-system disputes interfere with cooperative action against other systems or governmental agencies? And, given the administrative structure, to what extent is actual control placed in the hands of, or assumed by, a few persons, as has been observed for "common-interest" associations such as Agricultural Cooperatives (Norbeck 1967)?

C. Methods.

Study of documents. Relevant documents include national and prefectural codes pertaining to irrigation and river water uses; development and land rationalization plans; geological surveys and climatological records of local area; charters and other records of irrigation cooperatives; land ownership records; and court cases of water disputes. (For legal documents and materials written in old-style Japanese script, translation assistance will be required and is itemized under research expenses on the nomination form.) An additional category of necessary documents is maps, both those found in the town offices (chōyakuba) and the land use and geodetic maps prepared by prefectural and national ministries. Because certain features of irrigation are not included in sufficient detail on these maps (e.g., location and type of field intake, discharge points, inter-field flow points), it will be necessary to hire cartographic assistance to prepare maps of the system which include these features.

Interviews. Interviews with officials will be arranged through appropriate channels. Useful sources include: on the national level, officials of the Ministries of Agriculture (Irrigation and Drainage Division, Agricultural Productivity Bureau), and Construction (River Bureau), for information on irrigation plans and policies of these Ministries; on the prefectural level, officials concerned with irrigation
and the source river system; on the local level, officers of irrigation cooperatives, town officials, and others for data on the cological context physical system, and administrative structure. Interviews will be conducted in Japanese. observation. The bulk of research is the long-term observation of the system, including attendance at meetings, observations of water allocation at all levels in the system, questioning of water users and non-users, and other activities associated with the participant/observer mode of anthropological research. My wife and I will live in the area for the duration of the observation period.

While activities at each level of the system must be observed, special attention will be paid to two particular sets of fields, one in the upper section of the system and the other in the lower section, as location appears to be a factor in differential participation in the system (Befu 1962:74). For each set of fields, the following will be studied: distribution of water to each paddy; paddy ownership; other holdings, residence, and other characteristics of cultivators; nature of cooperative activities and conflicts involving water use; and patterns of decision-making and conflict resolution.

D. Timetable.

Details of the tentative timetable are given on the following page (p. 6). It should be noted that the proposed dissertation research will require eighteen months of fieldwork in rural Japan. A period of this length is required because in studying an irrigation system, it is essential to observe the entire, annual cycle of planning and operation. In addition, time is required, before and after, for site selection, preliminary interviews and document study, and follow-up interviews with cultivators and officials.

I recognize that the Resources for the Future program provides support for the 1975-6 academic year only. It would be my intention to apply a grant from Resources for the Future to stipend and research expenses incurred in this period
### Tentative Research Timetable

<table>
<thead>
<tr>
<th>Period</th>
<th>Location</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>September- December, 1975</td>
<td>Kyoto &amp; Tokyo</td>
<td>consultations with advisor study of documents, interviews with officials of national ministries (Tokyo) and prefectural agencies selection of research site and arrangements with local people</td>
</tr>
<tr>
<td>(4 months)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>January- November, 1976</td>
<td>research site</td>
<td>field study of irrigation system</td>
</tr>
<tr>
<td>(i.) Jan.- April</td>
<td></td>
<td>(i.) emphasis on physical and administrative structure of whole system; study of local documents and records; attendance at planning meetings of cooperatives, elicitation of explanations of system's operation from users and administrators.</td>
</tr>
<tr>
<td>(4 months)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii.) May- November</td>
<td></td>
<td>(ii.) emphasis on two selected units within system; study of actual allocation of water for this growing season; detailed mapping of system</td>
</tr>
<tr>
<td>(7 months)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>December, 1976- February, 1977</td>
<td>research site (primarily)</td>
<td>observation of drainage and winter-cropping (if done); conversations with farmers and administrators concerning previous season (interviews are often easier to arrange after harvest). follow-up interviews with officials at prefectural and national levels. observation of planning for following year. study of court cases. short visits to other systems (time permitting).</td>
</tr>
<tr>
<td>(3 months)</td>
<td></td>
<td></td>
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</tbody>
</table>

*total period of field research: September, 1975 to February, 1977 = eighteen months.*
At the moment, a major stumbling block to the resolution of these hypotheses is the paucity of data on irrigation systems; anthropology still lacks detailed studies of irrigation systems (cf. Bennett 1974; Netting 1974). In a recent cross-cultural exploration of canal irrigation and social structure, it was possible to find only a handful of anthropological studies of irrigation in sufficient detail to be useful (Hunt & Hunt n.d.?). The proposed research is addressed to this need for ethnographic data.

Among irrigation societies, Japan is an especially appropriate choice for research. With a long tradition of record-keeping, even at the local levels, one can find the detailed information on population, land holding, and land use which is necessary for a case study. As part of monsoon Asia, its irrigation systems must contend with problems of water superabundance, flood control, and drainage as well as water scarcity (cf. Spencer 1974); as such, it offers an instructive contrast to irrigation in arid environments, including the arid areas of the United States, which has been more frequently investigated. On the other hand, in terms of improving water resource utilization strategies for developing societies in south and southeast Asia, Japan offers a much more appropriate model than, for example, the United States because many features of her agricultural sector—labor-intensive cultivation practices, small field size, family-organized cultivator groups—are also to be found in those societies.

Yet, despite their importance, irrigation systems have seldom served as units of analysis for investigators of rural Japan. In English, there is only the brief and largely normative report of the Twelve-G5 system of Okayama by Eyre (1955; cf. Beardsley et al. 1959:132-8). Japanese geographers such as Horiuchi (1963) and Takeuchi (1965) have described technical and administrative aspects of irrigation systems, and legal sociologists such as Watanabe (1954) have reported on water rights, but studies which integrate ecological, technical, and social structural data for a single system and detail the actual operation of the system are lacking.

Much of our information on irrigation practices in Japan comes from community
studies; in these, irrigation is of interest for its functional contribution to hamlet organization (e.g. Fukutake 1972:82-4; Johnson 1963:220; Yoneyama 1967:341; for a review, cf. Kelly n.d.). However, a community study provides only a partial view of irrigation because in Japan, the technical and social structures of an irrigation system can cross-cut settlement patterns in complex fashion. By focusing on the irrigation system directly, as the unit of analysis, the proposed research aims to provide a more complete view of irrigation than a community study can; in order to understand the social behavior associated with resource utilization, that system of utilization must itself be the center of research.

IV. Preparations for proposed research.

course work: The focus of my graduate program has been the anthropology of complex societies, specifically the social and political organization of historical and contemporary agrarian societies (India, Ceylon, Mexico) as well as rural regions of industrial societies (U.S., Great Britain, Japan). Thus, my background is in the comparative study of rural social organization; this should enhance my ability to relate research in Japanese irrigation to the comparative study of irrigation societies.

field research: As part of my graduate program, I completed three months of field work in a rural area of northern Maine in 1972; my research, on the structure of lumbering and its consequences for the social organization of local residents, was reported in a series of five papers. Both the topic (the technical and social structure of resource utilization) and the methods required (documents study, interviews, and observation in the local community) provided training for this proposed research.

previous study in Japan: From January to August of 1974, I was a Visiting Scholar in the Sociology Department of Doshisha University, Kyoto. My activities included language study and library research on rural social organization and irrigation in Japan. I have recently completed a paper based on that work (Kelly n.d.).

language study: My language study, including eight months residence and study in Kyoto, is summarized on the nomination form. This summer I will complete an
intensive, fourth-year course in Japanese before beginning fieldwork. fieldwork arrangements: At present, arrangements are incomplete, although I have initiated correspondence with my former advisor at Doshisha (Prof. Kikuji Itō) and with Dr. Toshinao Yoneyama, a research professor at Kyoto University, in order to secure sponsorship for my work by either of those institutions.

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Watanabe, Yozo

Wickizer, V.D. and M.K. Bennett

Wittfogel, Karl

Yamada, Noboru and Bhakdi Lusanandana

Yoneyama, Toshinao
April 1, 1975

Dr. Marver H. Bernstein, President
Brandeis University
Waltham, Massachusetts 02154

Dear Dr. Bernstein:

I am pleased to inform you that Resources for the Future, Inc. has approved a grant of $5,000 to Brandeis University for a doctoral dissertation fellowship in natural resources. This grant is a fellowship for William W. Kelly for the support of the program described in connection with his nomination.

Mr. Kelly has been informed by us and has signified his acceptance of the award. The award consists of a basic stipend of $4,500 and a $500 expense allowance.

The enclosed statement marked Attachment A sets forth the general terms and conditions applicable to Resources for the Future grants. Attachment B, a copy of which has been sent to Mr. Kelly, sets forth certain terms for fellowships under the program. If there are any points that need clarification, or if you wish additional information, please do not hesitate to communicate with us.

Payment of the grant will be made about July 1, 1975.

On behalf of Resources for the Future, may I extend to your candidate every good wish for success in his program of study.

Yours sincerely,

[Signature]
John E. Herbert
AN ETHNOGRAPHY OF A JAPANESE IRRIGATION SYSTEM

I. Present state of knowledge.
II. Description of project and methodology.
   A. Research objective and setting.
   B. Research schedule.
III. Significance of proposed research.
IV. Bibliography.

ABSTRACT

Throughout agricultural Japan, unstable water supply conditions have necessitated the construction of thousands of irrigation systems. These systems are important constituent elements both in rural social structure and in the articulation of those areas to the larger society.

The objective of this anthropological research is the case study of a river irrigation system in rural Japan through an annual cycle of operation. The resulting ethnography will combine data on the ecological features of the area, the physical network of water delivery and drainage, and the social system of irrigation administration and water use. Existing Japanese scholarship will be used to provide historical depth and regional perspective to the case study. The system to be studied lies along the Aka River in Yamagata Prefecture.

By bringing together materials on the natural, technical, and social features of an irrigation system, the study is intended to contribute to our understanding of the ways in which characteristics of natural resources constrain technical development and social organization, and, conversely, the ways in which the socio-cultural context of resource utilization determines the forms which that utilization assumes in a particular society. Japan, as a country of monsoon Asia with a highly developed agricultural sector, offers an instructive research locale. Its problems of water resource utilization provide a useful contrast to those of arid environments; at the same time, data from Japan are most valuable in improving water control strategies for the developing societies of south and southeastern Asia.
I. Present state of knowledge.

Irrigation is one of man's most significant technical developments. In arid environments of the world, agriculture is not even possible without human modification of water resources (cf. Fukui 1975). In other parts of the world, such as monsoon Asia, where rainfall is too seasonal and variable to be reliable to cultivators, irrigation and drainage works are critical for adequate yields (Hanks 1972; Tanabe 1973).

An irrigation system in a complex society is not only a technical network of diversionary canals, water gates, drainage ditches, etc. It has also a social structure of water-user organizations, administrators, water guards, government officials, and others, operating according to a complex matrix of legal rights, historical custom, principles of allocation and national policy objectives. Moreover, this social structure is embedded in the political and economic structure of the local area and is generally involved in relationships with national government agencies.

The works of Julian Steward (1955) and Karl Wittfogel (1957) have underscored the theoretical importance of irrigation systems for social structure, but until recently, anthropologists conducting research in societies with irrigated agriculture either have paid little, if any, attention to the irrigation arrangements (e.g., Beteille 1965) or have considered them only as they impinge on community structure (Gallin 1966; Lewis 1971). Now, however, within anthropology the functional relations of irrigation, political structure, and social stratification have begun to receive serious attention (Downing & Gibson 1974). There are at hand hypotheses about irrigation and centralized administration (Millon 1962; Price 1971), about the role of local elites in water-dispute resolution (Hunt & Hunt 1974), about the social effects of equalizing access to irrigation water (Pasternak 1968), among others.

At the moment, a major stumbling block to the resolution of such hypotheses
is the paucity of data on irrigation practices. There are only a handful of anthropological studies of irrigation in sufficient detail to be useful to cross-cultural hypothesis-testing (cf. Bennett 1974; one excellent case is by Reiding, an economist:1974). The research described here, conducted in a society with a long history of sophisticated irrigation, is addressed to this need for ethnographic detail.

In Japan, irrigated rice cultivation has been the basis of agriculture for the past two thousand years (Chard 1974); as rural Japan is predominantly agricultural, rice cultivation is of fundamental importance in understanding rural social structure (Nakane 1967:58). However, for much of the country, the availability of a proper water supply for rice cultivation is rendered highly problematical by conditions of water scarcity or flooding (Trewartha 1965:78). Over the centuries, these conditions have led to the construction of thousands of irrigation systems. Present-day irrigation associations number nearly 80,000 (Nagata 1971:48).

Despite its importance, there is a paucity of information on Japanese irrigation in the English-language literature. Except for Eyre's brief report (1955) on a system in Okayama, data on irrigation practices must be culled from community studies; in these, irrigation is usually of interest for its functional contribution to hamlet organization (for a review, see Kelly n.d.). However, a community study provides only a partial view of irrigation because in Japan, as elsewhere, the technical and social structure of an irrigation system can cross-cut settlement patterns in complex fashion. By focusing directly on a single irrigation system as the unit of analysis, the research proposed here aims to provide a more complete view of irrigation than a community study can; in order to understand the social behavior associated with resource utilization, that system of utilization must itself be the center of study.

Fortunately, Japanese scholars of several disciplines have done research on irrigation in Japan. Geographers such as Horiuchi (1963) and Takeuchi (1965)
have described technical and administrative aspects of irrigation systems, and legal sociologists such as Watanabe (1954) have reported on water rights. Kitamura (1950;1973) has presented detailed historical studies of irrigation, while contemporary irrigation has been most comprehensively studied by agricultural economists such as Nagata (1971), Kanazawa (1958), and Shinzawa (1962).

In the past, this substantial body of irrigation scholarship has only infrequently informed Western analyses of rural Japan. Although this dissertation research is primarily a field project, this Japanese literature is of considerable value in placing the research site in a regional and historical perspective.

II. Description of project and methodology.
A. Research objective and setting.

The objective of the research here described is the ethnographic study of a Japanese river irrigation system through an annual cycle of planning and use. It will attempt to relate data on the ecological features of river water supply and rice cultivation, the technical network of water delivery and drainage, and the social system of administration and allocation in order to provide a comprehensive case study of agricultural water use. It is hoped that the research will contribute to our understanding of the ways in which characteristics of natural resources constrain technical development and social organization and, conversely, the ways in which the socio-cultural context of resource utilization determines the forms which that utilization assumes in a particular society.

The system to be studied is the Aka River Consolidated Land Improvement District (Akagawa Tochi Kairyo Rengo), an umbrella organization of eight formerly independent Land Improvement Districts which draw irrigation water by canal from the Aka River. Despite the terminology, the land improvement district is primarily concerned with irrigation matters, and district boundaries are generally defined by the water-flow system (Ishikawa 1972). The research
area lies in the southern part of the Shonai Plain, a coastal alluvial
plain in Yamagata Prefecture in the northern part of the main island. The
plain is almost exclusively a rice cultivation area and currently has the
highest paddy land productivity in Japan (Koide 1970).

Rivers in Japan supply approximately 74% of irrigation water (Trewartha
1965:215); in contrast to pond irrigation, river irrigation systems tend to
serve a wider field area and involve, in the same canal network, a number of
water-user groups with separate claims (Nagata 1971:123-73). A river system
has been selected for two reasons.

First, the technical facilities of irrigation, by which water is diverted,
distributed, and drained, are often a determining factor in the social patterns
of cooperation and conflict among water-users. The Aka River, like many
Japanese rivers, has seen since World War II considerable technical changes
aimed at regulating river water flow, including headwater dams, extensive
concrete embankments, new head intake gates, and a diversion of the downstream
river-course. Thus, in contrast to pond irrigation which has seen far fewer
technical changes, such a river system is an opportunity to study the adapta-
tions which the older social patterns of irrigation administration have had to
make to recent, profound technical changes in river water flow.

Second, because most major rivers in Japan are now under national (i.e.,
Ministry of Construction) jurisdiction and because river water must increasingly
be shared with municipal, industrial, and hydroelectrical users, a river irri-
gation system is also an opportunity to study the organization of local
agricultural water interests in what is an antagonistic environment of competing
governmental and industrial interests. In the case of the Aka River, the recent
construction of a hydroelectric dam on one of the major headwaters has led
to considerable and as yet unresolved dispute between the regional electrical
company and the local irrigation associations. The irrigation associations
(i.e., the eight land improvement districts) retain considerable local influence,
but the degree to which they can put aside internal differences and present
an effective and unified position as a single consolidated district remains problemmatical.

As a contemporary case study, the research will examine in detail this particular Aka River system through an annual cycle of use. However, by using existing studies, the dissertation will attempt to relate the observation year to the previous development of the system, and the Aka River area has been selected because such materials exist and are available. These include two volumes, prepared jointly by a historian and an irrigation engineer, containing materials on the history of land use and irrigation facilities in the area through recent dam construction and flood control projects (Shimura & Sato 1966;1971). There is, as well, information compiled by the agricultural advisor of a local, large landowner on geological, soil, and climatological conditions (Tadahachi 1965).

B. Research schedule.

Prior to beginning this dissertation research, I completed four years of Japanese language study, including eight months in 1974 as a research associate at Doshisha University (Kyoto, Japan). In addition, I prepared a critical review of of English-language data on Japanese irrigation (Kelly n.d.). Relevant training was also provided by a three-month period of field work in northern Maine in 1972, concerning the impact of another form of resource exploitation, lumbering, on local residential organization. The dissertation research itself may be divided into three phases.

Phase one: September, 1975- January, 1976 (Kyoto University, Kyoto, Japan). This is a period of library research focusing on the secondary literature by Japanese social scientists and irrigation engineers and on the study of the relevant laws and policies regarding water use and agricultural lands. Throughout the project, I will be associated as a research worker (kenshuin) with the Institute for Humanistic Studies (Jim bun Kagaku Kenkyusho) of Kyoto University, working under Dr. Jiro Inuma, and through this first phase meet regularly with him to discuss this literature. During this period also, a
field site has been selected, and existing materials on that area are being studied.

**Phase two:** February, 1976- February, 1977 (Shonai Plain, Yamagata Prefecture).
The bulk of research will be the long-term observation of the Aka River irrigation system, from early spring irrigation repairs and planning through the cultivation cycle and harvest to post-harvest field care and drainage. This includes attendance at meetings, observations of water allocation and use throughout the system, questioning of water-users and local officials of the Ministries of Agriculture and Construction, and other activities associated with the participant/observer mode of anthropological research. My wife and I will live in the research area for the duration of the period, and all research will be conducted in Japnese.

Local records will supplement this anthropological observation. Charters and other materials of the irrigation associations are necessary for the normative aspects of administration and water use. Population registers and land ownership records provide data on cultivators and land use. Court cases detail those water disputes which reach formal adjudication. Maps in the town and irrigation district offices complement the land-use and topographical maps of the national Geological Survey Institute.

**Phase three:** March, 1977- June, 1977 (Kyoto University, Kyoto).
This will be primarily a period of initial dissertation write-up under Dr. Inuma. Time will also be allocated for follow-up interviews with government officials and for brief visits to two other irrigation systems for comparative purposes (one in Saga Prefecture and one along the Yoshii River in Okayama).

At the time of submitting this application, I am preparing to move to Shonai and begin the second phase of research. I am currently receiving a 1975-76 Resources for the Future Dissertation Fellowship, and thus, this application is a request for a continuing fellowship in the 1976-77 year. Admittedly, such a request falls outside the normal terms of the program,
but the research itself appears to fit the fellowship objectives, and its length and timing are dictated by the nature of the topic. It is hoped that the fellowship committee will be able to consider the application.

III. Significance of proposed research.

Increasing attention within anthropology to "irrigation's impact on society" (Downing & Gibson 1974) has underscored the paucity of ethnographic data on this form of resource utilization. Current comparative work in irrigation (e.g., Kappel 1974) has been forced to rely on, for the most part, community studies and other reports which often provide only incomplete information on irrigation practices. Future cross-cultural comparative work must proceed from an improved data base of case studies which combine materials on its natural, technical, and social features. This research is intended as one such case study. It will attempt to introduce to this current theoretical debate both the Japanese case and the existing Japanese scholarship on that case.

Among irrigation societies, Japan is an especially appropriate choice. With a long tradition of record-keeping, one can find the detailed information on population, land holding, and land use which is necessary for a case study. As part of monsoon Asia, its irrigation systems must contend with problems of water superabundance, flood control, and drainage; as such, it offers an instructive contrast to irrigation in the arid environments of Mesoamerica, the western United States, and the Middle East, which have been more frequently investigated. Moreover, the Western researcher can take advantage of an indigenous literature on the subject by historians, engineers, geographers, and others.

As one specializing in Japan and East Asia, I intend also that this research contribute to our understanding of rural Japanese social organization. Irrigation systems are, and have been throughout Japanese history, important constituent elements in the social structure of rural areas and in the arti-
calculation of those areas with the "outside world" (Smith & Reyes 1957); however, they have seldom served as units of analysis for American anthropologists, and Japanese irrigation research has remained largely untapped. The social organization of other forms of resource utilization, such as forestry (Bennett & Ishino 1963; Ushiomi 1968), has been studied, but Western knowledge of contemporary agricultural areas has largely developed through residential hamlet and kinship studies. The proposed research will hopefully complement these community studies. Japanese irrigation, like forestry, is a form of resource utilization in which traditional social patterns persist. The study of an irrigation system allows us to investigate the adaptations these traditional patterns make both to the changing technology of water resource utilization and to an increasingly competitive, socio-political environment of antagonistic non-agricultural water interests.

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