Centralization of Irrigation Organization in a Japanese River Basin: The Case of the Aka River

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This paper is addressed to the problem of centralization as a variable in irrigation organization. Irrigation is the exploitation and use of water resources as a critical input in agriculture, and an important issue in the investigation of irrigation systems is the degree to which their management and operation is centralized. Some investigators identify centralization as an important feature of irrigation organization because of an interest in the role of irrigation in state formation (e.g. Wittfogel 1957; Steward 1955). Others consider it an important question in existing state societies because competition and control of natural resources is typically a locus of political power and conflict (e.g., Hunt & Hunt 1974). Both of these interests have led to the ethnographing of irrigation in a number of societies, and we now have at least partial descriptions of several forms of irrigation management.

It is the purpose of this paper to outline briefly a case from Japan, an under-reported society in the irrigation literature. The case is interesting because it reminds us that centralization can be a variable feature of a single irrigation system through time. In the early seventeenth century, along the Aka River on Shonai Plain, a network of branching canals was dug, using the river as water source. Despite many subsequent improvements, this branching canal network remains today the general mode of irrigation in the Aka River basin. However, the management of this irrigation network has passed through three successive phases. The first phase (1615-1875) was one of centralized management in which irrigation roles were embedded in the administrative structure of the Shonai han. This was followed by decentralized management by relatively autonomous, land-owner cooperatives at the several levels of the physical network (1875-1950). In the present period since 1950, centralized management has emerged again, this time as a hierarchical ordering of specialized organizations under the strong influence of prefectural and national agencies. The paper will describe briefly irrigation in each of these three periods to show how its management has varied in terms of

centralization.

Irrigation in the Aka River basin involves the control of the river as a water source by weirs, embankments, dams, and watershed conservation and the delivery, allocation, and drainage of water through a network of intakes, spillways, gates, pumps, canals, etc. Construction, maintenance, and allocation are among the tasks of operating this system of irrigation, and I am considering the organization or management of irrigation to be the configuration of all of the roles by which these tasks are accomplished. I refer to the degree of centralization in irrigation management as the extent to which there is a hierarchical configuration of these irrigation roles-- the extent, that is, to which there is a decided imbalance in the relative distribution of authority and a nesting pattern of areal and/or functional jurisdictions.

This approach to centralization in irrigation differs somewhat from those who explore the degree to which particular and single tasks of irrigation are centrally organized. Millon (1962), for example, attempts to scale the degree of centralization of authority over water allocation, and Hunt and Hunt (1974) focus on the centralization of irrigation conflict resolution. It may be fruitful later to analyze Aka River irrigation in these terms as well; indeed, this paper is based on a continuing analysis of materials and should be considered tentative. For the present, however, I am interested in measuring an important dimension of change over time for a particular irrigation network and so choose to focus on the configuration of roles necessary to operate it through time.

The 赤川 Aka River irrigates approximately 13,000 hectares of rice paddy land in the southern half of 庄内 Shonai Plain, a coastal plain of Yamagata Prefecture, in northern Honshu. The plain is about 50 km in its north-south length; it is about 16 km wide in the south, narrowing to 6 km in the north. It is surrounded on three sides by mountains, and to the west, it is separated from the Japan Sea by a thin, low line of sand dunes. Surface area of the plain is approximately 530 sq. km.

Structurally, Shonai Plain is an aggradational plain, which formed at the sea end of rivers whose sediment was deposited in the shallow lagoon that had developed behind emerging coastal beach bars. An uplift of several meters brought the lagoon bottom to roughly sea level. In the Aka River area, the soil is chiefly granitic in origin, reflecting the composition of the watershed mountains. From Ochiai, where the river enters the plain (see map 1), to Tsuruoka, a shallow top soil lies above a gravelly subsurface layer; paddy land in this area has quite a high water requirement. From Tsuruoka into the central portion of the plain, the subsoil is heavy and gley-like; permeation is poor, the water table is high, and drainage is difficult (Nagai 1968:193ff.).

The plain is bisected midway by the Mogami River, a long (224 km) river, which flows through a chain of interior mountain basins before a short run through Shonai to the Japan Sea. Until recently, its size and force prevented its use as a water source on the plain; rather, historically, the smaller rivers to the north and south have been exploited. The south is dominated by the Aka River, the second longest in the prefecture.

The Aka River begins in the Asahi Mountains to the south of the plain, where the Bonji (梵字川) and Otori (大鳥川) Rivers cut steep courses through granitic zones. The Otori River, with its source at Otori Lake (963 m) drops 40 km at a 1/45 grade, while the Bonji River drops 35 km at 1/60. At Ochiai (70 m above sea level), their confluence and the beginning of the Aka River proper, the river begins a 35 km run across the plain to the Japan Sea. The total drainage basin of the system is 880 km^2; 19 tributaries have a total length of 226 km (Norinsho 1959).

The steep grade in the upper section creates a fast run-off, and at Ochiai, the river has built up an alluvial fan as the sudden change in grade slows the flow considerably, causing heavier sediment to drop. Thus, in the 10 km from Ochiai to Tsuruoka, the river drops moderately at 1/250 before flattening out to 1/3000 in the final 25 km. Alluvial fans are typical of many Japanese river plains and permit a characteristic branching canal network, which some scholars propose as a generalized model of irrigation on Japanese river plains (Nagata 1971; Takaya 1975).