

**The Social Embeddedness of Southern Titicaca Basin Raised Field
Agriculture**

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One of the most significant results of the twentieth-century investigations of Titicaca Basin prehistory has been the recognition that there exist vast landscapes in the Basin which are the result of the industry of the region's prehistoric inhabitants. These landscapes consist of expanses of raised agricultural fields and associated hydrological features, such as canals, aqueducts and dikes. Most such features are located near the marshy lacustrine littoral of Lake Titicaca and in some of its more significant tributary valleys. The largest of these groups are located in the Huatta area near Paucarcolla, in Pomata and in the Pampa Koani and Desaguadero areas of Bolivia. Together these four principal raised field groups extend over approximately 800 km², to employ Denevan's estimate. Together they comprise one of the four most significant concentrations of raised field agricultural features in the New World. Altogether, the Titicaca Basin raised fields account for something like 50 million person-days of labor. Collectively they are, as Dr. Williams puts it in the session abstract, the largest, most extensive monument created by the peoples of the prehistoric Titicaca Basin.

The scale of the Titicaca Basin raised field complexes was quickly recognized; their importance to prehistoric political economies is unquestioned today. The substance of this relation, however, remains a matter of debate. Some years ago, Erickson framed the matter in terms of 'top down' versus 'bottom up' approaches to raised fields. The 'top down' approach is exemplified by the 'agro-managerial hypothesis' expounded by Kolata and colleagues, who propose that the labor and organizational requirements of large-scale raised field agriculture imply an elaborate social support structure. This support system presumably included an intricate bureaucracy capable of coordinating the efforts of a cadre of 'hydraulic engineers' and great masses of corvee laborers.

All of this obviously leads to the conclusion that the raised fields we observe today were constructed and cultivated principally during the Tiwanaku period, though they were probably used on a very small scale both before and after the florescence of the Tiwanaku civilization. Kolata envisions the situation thus: "Tiwanaku established proprietary agricultural estates in which ownership and usufruct rights were vested directly in state institutions, or perhaps more precisely in the hands of the elite, dominant classes" (1993, 120).

The logical complement of the agro-managerial hypothesis is the 'bottom up' approach of which Erickson himself is an advocate. He points out that there is ample cross-cultural evidence for non- or minimally-stratified social systems constructing and maintaining complex and extensive agricultural landscapes. The indigenous andean foot-plow, or *chaquitaklla*, he suggests, is an ideal tool for the construction of raised fields, and social groups no larger than the ethnohistorically-documented *ayllu* are more than capable of building and using such systems. Consequently, raised field agriculture was in no way tied to the presence of a state apparatus. Erickson suggests, therefore, that raised field agriculture was both more widespread and earlier in time than Kolata would consider feasible. As Erickson and Kolata have both acknowledged, these two scenarios are in principle equally plausible. The question thus becomes an empirical one; when were raised fields constructed and utilized? Was field construction and use coincident with the rise of Tiwanaku to regional prominence?

Accounts differ. Erickson believes raised field use precedes Tiwanaku by some 1000 years or more, while Seddon and Janusek, in their extensive trenching project on the Pampa Koani, associate the fields rather strictly with the Tiwanaku period. Stanish stands between these two positions, seeing an early use of raised fields which intensified and expanded up to and during the period of Tiwanaku's florescence. My purpose in this paper is to address this question through a consideration of regional population dynamics in the Tiwanaku heartland.

The Tiwanaku Heartland is a term applied to the area within an approximately 30 km radius of the prehistoric city itself (see Figure 1). So defined, the area comprises the Tiwanaku Valley, the Pampa Koani (Katari Basin), the Taraco Peninsula and the area surrounding Konkho Wankane to the south of the Tiwanaku Valley. This region is distinctive within the Titicaca Basin for a number of reasons:

1: First, this is the area in which Tiwanaku arose as a regional power sometime in the late Late Formative. The structure of the Tiwanaku political economy therefore developed locally out of a pre-existing social matrix; its basic institutions should be most clear and well-defined in the core region. If, therefore, raised fields were a vital component of the Tiwanaku political economy this association should be perfectly clear in the immediate hinterland of the city itself.

2: Second, the Tiwanaku Heartland is distinctive in a cultural geographic sense. That is, it is clearly divided into two zones, each of which is better-suited for a particular kind of subsistence activity. On the one hand we have the large, flat inland valleys with their extensive expanses of marshes and grasslands. I refer here to the Pampa Koani and to the Tiwanaku Valley. These areas are well-suited to large-scale raised field agriculture and to extensive pastoralism. On the other hand, we have the Taraco

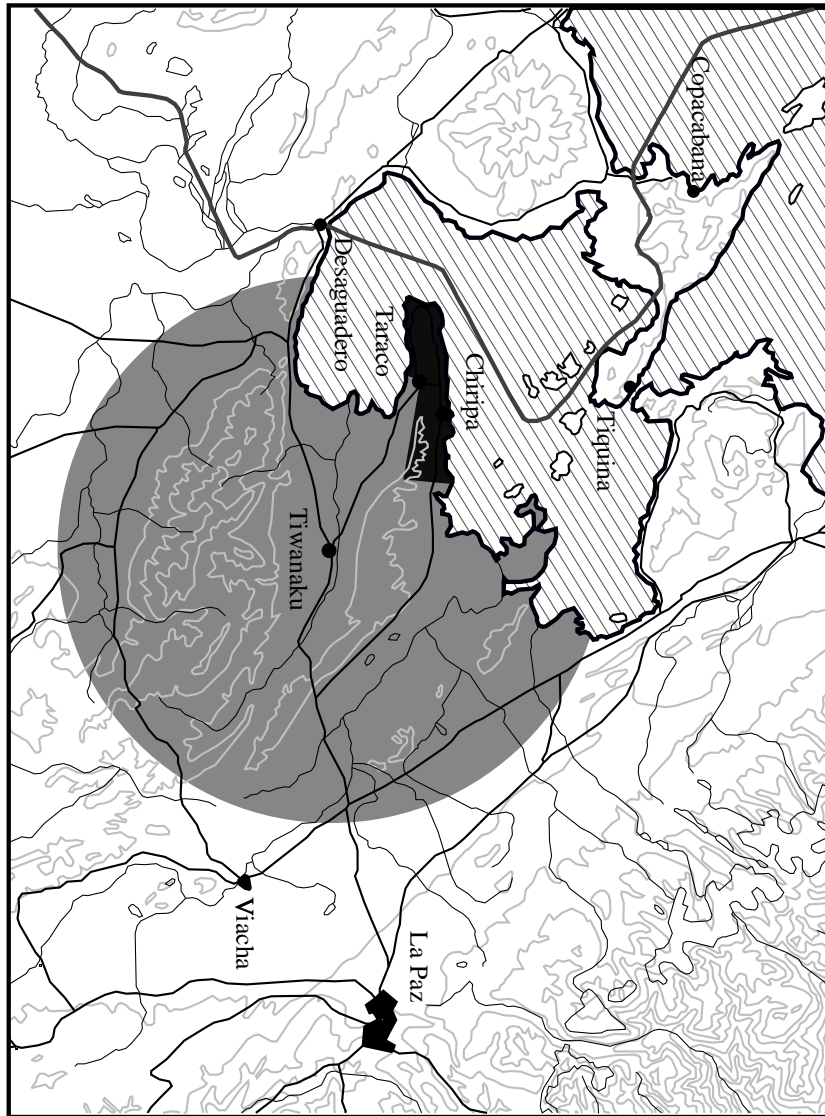


Figure 1: Map of the Southern Titicaca Basin

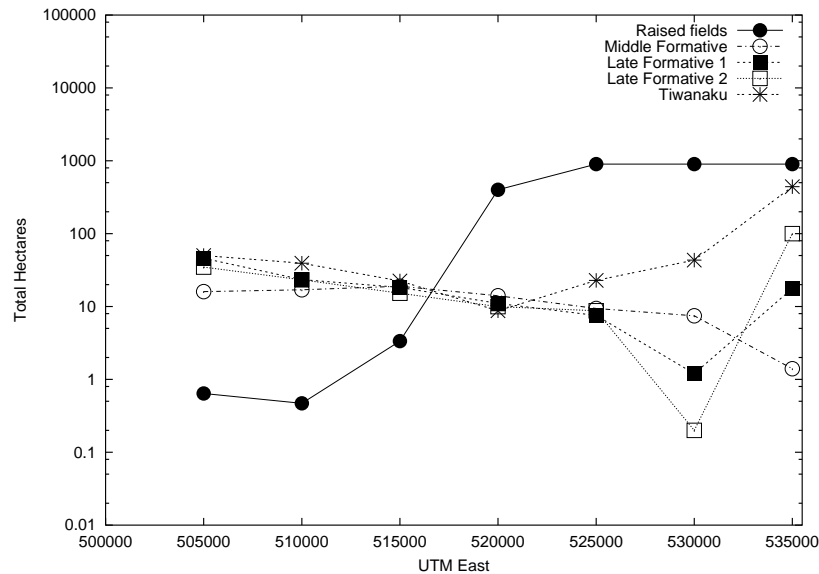


Figure 2: East-West gradients in raised field and population density

Peninsula and scattered islands in the lake itself. These areas are entirely unsuitable for large-scale raised field cultivation. However, their proximity to the lake moderates the local climate and renders these areas more productive for extensive dryland cultivation than are the harsher inland zones. Thus we have within a fairly small area what we might term a cultural geographic 'gradient' trending from West to East. To the West, toward the terminus of the Taraco Peninsula, the land is optimal for dryland cultivation and for lacustrine foraging, while to the East are vast tracts of relict raised fields and open grassland and a more extreme climate. This cultural geographic gradient is the key fact that makes settlement data relevant to the question of raised field chronology.

3: Third and finally, the Tiwanaku Heartland is, archaeologically speaking, the best-studied area in the Titicaca Basin. The Lower and Middle Tiwanaku Valley was surveyed in the late 1980s by Juan Albarracin-Jordan and James Matthews. The last few years have also seen surveys of the Pampa Koani by John Janusek and of the Taraco Peninsula by myself. Altogether we have 100% coverage pedestrian survey data for a contiguous 600 km² block of the Tiwanaku Heartland including Tiwanaku itself. This dataset includes almost 2000 archaeological sites representing all periods of human occupation in the area. It is thus possible to consider human population movements and demographic processes within this region in quantitative terms.

For the present discussion I will be using only the data from the Tiwanaku valley surveys and from my own Taraco Peninsula project; though I would like very much to integrate Janusek's Pampa Koani data in the future. We have, then, a settlement dataset covering about 500 km² and aligned precisely along the lakeshore-inland cultural geographic gradient I discussed a moment ago. How did prehistoric populations distribute

themselves along this gradient? The answer should shed light on the question of raised field chronology.

MF (800-250 B.C.) This is the Late Chiripa phase. Data for earlier phases is available for the Taraco Peninsula, but not for the Tiwanaku Valley, so we begin with the Middle Formative. I am fairly sure, though, that the earlier phases are substantially similar in terms of this analysis. In this phase population is very clearly located preferentially on the lakeshore end of the axis, and declines dramatically eastwards and inland. It is worth noting here that less than 20 ha of raised fields were encountered in my survey of the Taraco Peninsula. These data very clearly indicate that while raised field technology may have been known in the Middle Formative, it was not a significant part of the economy. People lived by dryland cultivation, limited pastoralism and fishing and the collection of diverse lacustrine resources. The lakeshore zone in this period is clearly the demographic nucleus of the region, with the inland areas remains only sparsely-populated.

LF1 (250 B.C - 300 A.D.): This period correspond to the earlier half of the Late Formative period and to the time in which Kalasasaya ceramics were produced. In this period the bulk of the population is still concentrated in the lakeshore zone. However a substantial population has begun to move inland into the Tiwanaku Valley and the raised field areas there. It is in this period that we begin to see the formation of a bipolar settlement distribution along the lakeshore-inland axis. The shift in population inland will continue through the end of the Tiwanaku period. It seems that in this period people may have begun to use raised fields in a systematic manner, though they in no way accounted for the bulk of the subsistence activity of the regional population.

LF2 (300 - 550 A.D.): This is the time period often referred to as Tiwanaku III. It was at this time that Qeya ceramics were produced. In terms of the settlement distribution the process first observed in the LF1 period clearly continues. Additionally, the lakeshore zone actually suffers depopulation for the first time in the regional sequence. Elsewhere I have attributed this depopulation to state formation at the site of Tiwanaku, which grows into a proto-urban center in this period.

Tiwanaku (550 - 1100 A.D.): The trend begun in LF1 continues during the period of the mature Tiwanaku state. For the first time in this period we observe substantial populations in the inland zone which are not resident at the site of Tiwanaku itself. The trend begun in the Late Formative 1 culminates in the Tiwanaku period.

I think that these settlement data are fairly unambiguous in indicating that raised fields were not economically significant during the Middle Formative. Raised fields began to be important in the Late Formative but only became a real settlement determinant during the Tiwanaku period. In this respect I believe that my findings corroborate those arrived at by Seddon and Janusek as a result of their extensive trenching and radiocarbon dating programme on the Pampa Koani.

The gradual development during the Late Formative of a bipolar settlement distribution, with inland and lakeshore foci, is a fact of real interest. I have elsewhere suggested that the lakeshore-inland gradient was not only a geographical gradient but

also a political economic one. That is, the development of a bipolar inland-lakeshore settlement distribution may correspond to the concurrent emergence of a bipolar political economy. The gradual but accelerating movement of population inland in the Late Formative may represent the gradual increase in the importance of some new articulation of social production, one that almost certainly was crucially dependant on raised fields. This new political economy was finally to form the foundation of the Tiwanaku state.

In some respects the scenario I have presented here is quite similar to that which Stanish discovered in the Juli-Pomata area. In both areas raised fields began to be of importance in the Late Formative. Stanish also believes that raised field agriculture is implicated in the increases in political inequality and the emergence of an elite stratum of society which seem to have occurred at this time. These same processes seem to have taken place at Palermo, the principal site in the Juli-Pomata area, and at Tiwanaku at approximately the same time. The key difference, however, may be that no bipolar political economy was possible in Juli-Pomata; there was no cultural geographic gradient in that region comparable to the inland-lakeshore axis in the Tiwanaku Heartland. The developing political economy of Tiwanaku had a unique resource: an adjacent area, densely populated - I am referring here, of course, to the Taraco Peninsula - whose inhabitants were unable to compete with the emerging Tiwanaku polity on its own terms. That is, they could not build raised fields on their own land, and could therefore be incorporated into the expanding Tiwanaku political economy on a subordinate basis. No such area existed in Juli-Pomata, and perhaps nowhere else in the Titicaca Basin.

If my conjectures are correct, then raised field agriculture may well be profoundly implicated in Tiwanaku state formation. Indeed it was only with the invention of raised field agriculture and whatever political economic structure may have surrounded it, that the cultural geographic gradient I have termed the inland-lakeshore axis came to exist in the first place.

Many questions remain. I have made an attempt at sketching a possible outline of the political economy which emerged with raised field agriculture and the Tiwanaku state, but there is no time to go into that here. Suffice it to say that I consider raised fields and the inland-lakeshore axis to be fundamental to the process of Tiwanaku state formation.