

CHAPTER 7

CONCLUSIONS

INTERPRETING LAND-USE PATTERNS AND INTERMEDIATE PERIOD INTERREGIONAL INTERACTION IN COCHABAMBA REGION

This research traced certain aspects of human-land relationships through the complete prehispanic sequence in two of Cochabamba's valleys. The research had as its principal objective using patterns of land-use and settlement in these two zones of Cochabamba to test a hypothesis concerning Tiwanaku imperialism. In doing so, this research is, in part, a case-study of Tiwanaku outside the homeland, and has contributed to our understanding of relationships between the distribution of Tiwanaku style materials, ecological characteristics, and Tiwanaku's flexible politico-economic strategies.

In this chapter I compare the evolution of land-use patterns in the Capinota-Parotani and Mizque survey areas, and evaluate the results against the four models of Cochabamba-Tiwanaku Intermediate Period interregional interaction presented in Chapter 1. By basing my inferences on assumptions that underlie models of interaction proposed for the Tiwanaku polity in other regions of the south central Andes, I will at least be able to rule out some explanations in interpreting the observed archaeological variability in Cochabamba. And, by taking a diachronic and comparative perspective, my survey also illuminates

promising avenues for exploring other, more complex, explanations for autochthonous political and economic change in Cochabamba.

Comparison of land-use patterns in the Capinota-Parotani and Mizque survey areas

We might expect density of human settlement to be generally correlated with agricultural potential during each period. More specifically, if the interest of the Tiwanaku polity lay in exploitation of mesothermal crops, as Kolata (1992) has hypothesized, then the settlements with Tiwanaku style materials should concentrate in areas of greatest agricultural productivity.

We would thus predict (given the proposed relationship between Tiwanaku expansion and agricultural production) finding more Tiwanaku style materials in Mizque than Capinota-Parotani, despite Mizque's greater distance from the highlands. We might also expect that within each region (particularly Mizque), there would be a correlation between the spatial distribution of Tiwanaku style materials and the best agricultural soils.

From a diachronic perspective, we would hypothesize - - following the Tiwanaku expansion model - - that the appearance of Tiwanaku style materials would have been associated with a shift to more productive lands (in one or both survey areas) and the disappearance of Tiwanaku style materials correspondingly associated with less focus of settlement

on these lands, maybe even a return to pre-Tiwanaku patterns. As discussed in Chapter 1, we might also expect that a growth in occupation area in the Intermediate Period would reflect an interest in intensifying agricultural strategies in either region. In other words, if the Tiwanaku polity was closely tied political and economically to populations within the Cochabamba region, we would expect the polity's rise and fall to be reflected in some concomitant settlement shifts.

The Capinota-Parotani survey area has larger alluvial and mountain topographic zones than the Mizque survey area. These create an increased propensity for flooding in the alluvial zone, and larger tracts with low agricultural productivity and non-cultivable soils. In comparison, the Mizque survey area has a larger piedmont zone containing all three soil groups. The smaller piedmont zone in the Capinota-Parotani survey area has only the two less productive soils. In addition to the high productivity of the piedmont zone, there is a greater, and more predictable, supply of water available in the Mizque survey area. Under these ecological conditions, it is reasonable to expect a larger occupation in the Mizque survey area during every period.

If agricultural potential were not a factor in differential occupation of the two survey areas, the distance to the **altiplano** from each survey area by itself could have shaped the distribution of Tiwanaku style materials during the Intermediate Period. Whatever the nature of the interaction with the altiplano, all things being equal, Tiwanaku style materials should have been more common in the Capinota-

Parotani survey area than in Mizque, since the former area is closer to the altiplano. However, the Tiwanaku style materials in Cochabamba were largely locally produced, and an expected fall-off with distance in the diffusion or borrowing of Tiwanaku decorative styles or vessel forms was not realized.

The central hypothesis of the research was not confirmed. The survey results suggest that the human occupation in the Intermediate Period did not engage in differential exploitation strategies (i.e. intensification). Neither the Intermediate Period settlement patterns, nor comparisons with exploitation during the preceding period, reveal larger or denser occupation in the Mizque survey area.

The survey results further suggest that topographic location was a factor in the location of settlements within each survey area: significant preferences for the piedmont were seen in five of eight periods. As the two survey areas differ in the soil features of their respective piedmont topographic zones, this could be interpreted as indirect evidence suggesting that the preference for settling the piedmont had a built-in agricultural advantage in the Mizque survey area, placing sites near the best soils. However, as noted in the last chapter, sites are not located directly on the best soils of that zone.

Analysis of the sequence of occupation area within each survey zone, described in Chapters 5 and 6, revealed significant differences at the 95% confidence level only for the occupation area attained in the Late Period in the Capinota-Parotani survey area, and in the growth of

the occupation area in the Early Intermediate and Late Periods in the Mizque survey area. In neither area did the transition from the Early Intermediate to the Intermediate Period produce a change in occupation area unlikely to have resulted from the vagaries of sampling. Therefore, no significant shifts in occupation area associated with the appearance of Tiwanaku style materials can be suggested (even in the confidence level is reduced from the standard 95% used here). In sum , the Intermediate Period occupation, characterized by the use of Tiwanaku style materials, does not reveal the population growth expected if occupation in this period was focused on expanded or maximizing agricultural production. In fact, the measured occupation area in the Mizque survey area drops slightly.

Similar diachronic analysis was made for each topographic and soil zone by periods using the percentage of occupation of each zone (Figures 42 and 44). In the Capinota-Parotani survey area, there was a clear preference for the piedmont during the Formative, Intermediate, and Late Periods, and significant growth in population during the Late Period. From a different perspective, we can see a significant increase in Late Period settlement of the mountain zone -- as compared to the previous period -- but this is a function of overall population increase. Similarly, the Late Period shows significantly more population on group 3 soils than during the previous period. In the Late Period, there is increased occupation in every zone and on every soil, with disproportionate settlement in the piedmont.

In the Mizque survey area, the record shows a preference for the piedmont beginning with the Early Intermediate and continuing for the next two periods. As in the case of the Capinota area, the Late Period sees a significantly larger occupation on poor group 3 soils than in the previous period, but this is a function of the significantly larger size of the Late Period population, not a preference for these soils. Residence on group 3 soils was apparently avoided by the Formative population, and during the Formative and Intermediate Periods residents avoided settling in the mountain zone as well.

Comparing total estimated occupation area

The differential agricultural potential of each survey area may be reflected in the different occupation areas during two periods (Figure 41): the Early Intermediate and Late Periods. In these two periods, the occupation area in the Mizque survey area is significantly larger than that of the less productive Capinota-Parotani survey area.

At the 95% confidence level (on which all error ranges are graphed and interpreted) the differences between the two survey areas in the occupation areas estimated for the Formative and Intermediate Period are not significant. The use of slightly lower levels of confidence to compare the occupation areas for the above two periods, however, suggests meaningful differences after all: the occupation areas for the Formative Period are significantly different at the 90% confidence level, whereas the difference between the Intermediate Period occupation

is significant at the 80% confidence level --in other words, with only a 20% chance that the two figures are not different (Figure 41).

We can be more confident (at the 95% confidence level) that there were significantly larger occupations in Mizque in the Early Intermediate and Late Periods, but not in the Intermediate Period as was expected. During the Intermediate Period, for which we had hypothesized increased emphasis on agricultural exploitation, the agricultural advantages of the Mizque survey area did not lead to significantly larger occupation than the Capinota-Parotani survey area. Differences in agricultural potential at the regional level, therefore, cannot be used to explain the distribution of Tiwanaku style materials or settlement evolution.

Preferential occupation by topographic and soil zones

Significant differences in the percentages of occupation between the topographic and soil zones within each survey area indicate a pattern of preferential settlement in particular zones, as I noted in Chapters 5 and 6. Three significant preferences were documented for each survey area; in each case, it was a native population favoring the piedmont zone (during the Formative, Intermediate, and Late in Capinota, and during the Early Intermediate, Intermediate and Late Periods in Mizque). There were no preferences for particular soil groups in either survey area (Figure 40, 43; Tables 9, 10, 12, 13).

In fact, a significant preference for settling the most productive soils *within* either survey area at any time could not be supported. In

Mizque, the preference for settlement in the piedmont zone means, given the soil composition of this zone in this area, could be interpreted as a preference for settling a zone containing a good proportion of the best soils of the valley. However, occupation in the Mizque piedmont did not display a proportionately larger degree of settlement on the best group 1 soils.

In summary, survey revealed no differences between the two survey areas during the Intermediate Period occupation. During this period, there were: (1) no significant differences in occupation area between the Mizque and Capinota-Parotani survey areas; (2) no significant increases in the percentage of occupation on any soil group in comparison to the previous Early Intermediate Period; and (3) no significant preference for settling the most productive group 1 soils in either survey area. There were, however, differences in the specific location of settlements within the piedmont zone of each survey area. Sites with Tiwanaku style materials in the Mizque survey area occur at locations previously occupied during the Early Intermediate Period. No single component Intermediate/Tiwanaku style occupations were found. In the Capinota-Parotani survey area, in contrast, three monocomponent sites with Tiwanaku style materials were recorded, indicating at least some pioneering settlement during the Intermediate. Whether these can be interpreted as highland "colonies" will be considered later in this chapter.

There is also continuity in the topographic preferences of residents of the Mizque survey area. Here, the piedmont zone shows a significantly higher percentage of occupation during the last three periods of the sequence. In this case, therefore, land-use patterns in the Intermediate Period follow a trend already established in the Early Intermediate Period. In contrast, the Intermediate Period preference for piedmont in the Capinota-Parotani survey area represented a change with respect to the previous period.

To review, the expectation Intermediate Period occupation favoring the best agricultural locales of the Cochabamba Valleys is not supported. Nor can we infer a strategy of settling the best agricultural soils *within* each survey area. The distribution of Tiwanaku style materials in the Mizque survey area did not reflect the availability of good soils, rather Tiwanaku style materials were largely found on sites established originally in the Early Intermediate Period, so that Intermediate Period settlement followed earlier settlement patterns of the Early Intermediate Period.

The effects of interregional interaction in land-use and settlement patterns.

What does the evolution of the land-use patterns in the Capinota-Parotani and the Mizque survey areas reveal about Intermediate Period interaction with the highlands or changes in political economy? Four models or scenarios were set out in Chapter 1 to address potential relations and potential local changes stemming from interaction. Each model specified archaeological land-use and settlement patterns that

would result from particular modes of interaction. The following section evaluates the survey results in light of these models. One possibility is that a single model is appropriate to "explaining" the distribution of Tiwanaku style materials for both survey areas. Alternatively, as originally predicted if Tiwanaku interaction with the Mizque area was greater or of a special character, the distribution of Tiwanaku style materials in each survey area might require a different model for each zone.

As discussed previously, no evidence was found for processes of interaction between the Tiwanaku polity and Cochabamba that would produce changes in land-use patterns. The Mizque population showed no signs of greater ties to Tiwanaku than the Capinota population. In neither area was the distribution of Tiwanaku style materials correlated with the best soils.

In the Early Intermediate Period, the Mizque survey area had a significantly larger occupation area than the Capinota-Parotani survey area. This difference is not surprising, given Mizque's greater agricultural productivity. In the Intermediate period, however, the population in Mizque probably declined and there were no significant differences in size of settlement between the two survey areas, and occupation in this period was not limited to, or concentrated on, the pockets of best agricultural land. The only settlement preferences documented, for the piedmont zone, could indicate that topographic

location, for strategic purposes, was an important factor in settlement location.

Investigation did not reveal a significant increase in the total occupation area from the Early Intermediate Period to the Intermediate Period in either survey area (Figure 41). The Intermediate Period was thus not associated with a population expansion as might be expected if there was an influx of highland colonists. In contrast, the subsequent Late Period occupation was significantly larger in each survey area, suggesting that a process of intensification of agricultural production would have, if anywhere, occurred in post-Intermediate Period times.

It is worth reiterating that the Intermediate Period in each survey area lack settlements with only local pottery styles. In the Capinota-Parotani survey area, assemblages dominated by the Tupuraya style were replaced by assemblages dominated by the Tiwanaku style. In the Mizque survey, a similar change occurred, with the non-Tiwanaku Omereque style constituting a substantial portion (roughly 20) of the total Intermediate Period assemblage in that area.

Finally, comparison of the Tiwanaku style materials pottery collections from each survey area revealed no major differences in assemblage composition. Shared attributes included use of a locally produced "Derived Tiwanaku style", the absence of "classic" altiplano pottery and roughly similar proportions of the most common decorated ware vessels (**keru** and **puku** vessels).

Independence scenario

One possibility was that the appearance of Tiwanaku style materials in Cochabamba was not accompanied by changes in land-use or settlements. The nature of interaction between Tiwanaku and the Cochabamba populations may not have been such as to lead to any changes. Equally, the use of Tiwanaku ceramic styles may have represented a widespread shift in stylistic preferences rather than socioeconomic changes. In other words, the "Tiwanaku" horizon in Cochabamba may be useful only as a chronological marker.

In this "status quo" scenario, the only differences between Early Intermediate and Intermediate settlements would be in the style of associated pottery. Analysis of the survey data is not complete. However, the research to date supports this "status quo" situation for land-use and settlement pattern for the Mizque survey area. This situation is slightly more complicated for the Capinota-Parotani survey area. There are no indications of changes in topographic or soil preferences, median site size, or level of occupation in the latter area, but one change did occur: the founding of several new sites with Tiwanaku style materials.

These new sites continued the preference for occupation of the piedmont topographic zone. Occupation at older sites continued, and there was no significant change in the total occupation size between the Early Intermediate and Intermediate Periods. Therefore, this change represents essentially a shift in settlement distribution rather than a demographic expansion.

Verticality scenario

As noted in Chapter 1, verticality in the form of Tiwanaku-associated should find expression in one or more Intermediate Period patterns. Most basically, we would expect to see evidence for greater interaction with the highlands - - perhaps even productive enclaves - - in the zone with the highest agricultural potential (Mizque). In other words, we would expect significantly more Tiwanaku style materials in this area. A second pattern, either in place of, or conjunction with, the first pattern, would have been a clustering of Tiwanaku style materials on the most productive soils in one or both areas. Finally, depending on the nature of the vertical system practiced, we might expect Tiwanaku verticality to have produced a pattern reflecting co-existence between local populations and highland colonists; that is, a spatially discrete clustering of Tiwanaku style materials, either at a few sites or site sectors.

None of these expectations were met by the survey results. Within the parameters of my study (based on a relatively simple classification of topographic zones and soils) we can reject the proposed relationship between agricultural productivity and the spatial distribution of the Tiwanaku style materials. Tiwanaku style materials (more precisely, settlement with Tiwanaku style materials) did not occur disproportionately in the Mizque region, nor were they restricted to the most productive zones or soils. The data do not show more intensive or expanded occupation during the Intermediate Period generally. And

finally, Tiwanaku style materials were not limited to particular Intermediate Period sites and intrasite patterns did not reveal any signs of restricted distribution within sites that would suggest "multi-ethnic" communities.

From a comparative perspective, the distribution of settlement and Tiwanaku style materials in Cochabamba is quite different from the archaeological patterns associated with vertical archipelagos in the Osmore drainage, the northern Chilean valleys, and elsewhere (Browman 1978, 1984; Goldstein 1989; Mujica, Rivera, and Lynch 1983; Mujica 1985).

Prestige-good economy scenario

In this model, the distribution of Tiwanaku style materials is best explained as the result of processes stemming from a prestige-good economy in which local elites used materials associated with the highlands to bolster their social position. Inherent in this model is a dynamic role for long-distance ties to the neighboring state, whether the prestige-goods in question were imported from that state, or merely symbolically linked to it.

In this model, evidence for increased interaction with highland populations, and the use and display of materials stylistically associated with the highland Tiwanaku polity, would be part of an evolving Cochabamba political economy.

My research was not designed to recover the information necessary to reconstruct levels of political complexity. However, we can for

argument's sake use regional population densities and site sizes as proxies for complexity. We are not yet in a position to discuss with confidence the economic basis of status differentiation in the native Cochabamba populations. However, it is very common for status differentiation to rest on domination of, or differential participation in, economic processes such as agricultural production and long distance trade (Earle 1991). One hypothesis, then, is that increases in political complexity would have been concurrent with settlement shifts associated with an increase in surplus production. A second hypothesis is that, if local aggrandizers were seeking to bolster their position through symbolic or trade contacts with the highlands, we might expect Tiwanaku style materials to display a prestige-good distribution, with Tiwanaku-affiliated materials largely limited to elite residential contexts. If this were the case, Tiwanaku styles would be most common at, if not limited to, higher order sites in the regional settlement hierarchy. We would not expect Tiwanaku styles widely distributed in small hamlets and homesteads.

Survey revealed no signs of increased political complexity in the Intermediate Period. As noted previously, in neither survey area was there a marked shift to better agricultural locations during the Intermediate Period. Nor was there a pattern in either survey area of the development of larger population aggregations during the Intermediate Period.

The spatial distribution of Tiwanaku style materials does not suggest their use by emergent elites or a privileged social stratum. Tiwanaku style vessels did not constitute an exotic or prestige good. The Tiwanaku style was very widely spread and occurred in roughly similar proportions at very small sites and at the larger centers. In fact, it represents the dominant style at nearly all sites in both survey areas during the Intermediate Period. In sum, therefore, while we cannot rule out changes in the level of political complexity during the Intermediate Period, our lines of evidence do not give any hint of such change. Therefore, there is no basis, as of yet, for ascribing an "impact" on local populations stemming from interaction with the Tiwanaku polity.

It is tempting to extend core-periphery models to Cochabamba, and they should remain useful sources of hypotheses for the future, but my study did not identify any local political or demographic consequences associated with the development of the highland Tiwanaku empire.

Political subordination scenario

This scenario entails the consolidation of Cochabamba populations into the Tiwanaku empire through direct political control of Cochabamba populations. "Territorial control" of this type is generally associated with strategies of high control and high resource extraction (D'Altroy 1987:6). Surplus mobilization is administered by a central hierarchy with, "the kinds of goods extracted and the loci of their

consumption...directly related to the overall strategy of extraction (D'Altroy 1987:7).

Political incorporation of a subject population should be manifested archaeologically in a number of ways. Direct control should entail extension of core institutions and decision-makers into the subjugated area (Goldstein 1989; Schreiber 1992). Archaeologically, this will be visible in the appearance of state administrative architecture in the subjugated area (Goldstein 1993).

Direct control also often results in a sharp reorganization of settlement to facilitate surplus production and resource extraction, and to break up local political structures (D'Altroy 1992; Schreiber 1992). Although settlement will be shaped by factors other than the state's extraction concerns, we would expect that direct control would be followed by evidence of increased surplus mobilization, through the spread of agricultural technologies or the movement of populations into the areas with the most potential for surplus production.

The last correlates of this hypothesis were those addressed by my survey. The Intermediate Period does not show a marked shift in the focus of settlement onto the most productive soils in either survey area. To reiterate, I found no evidence for a reorganization of settlement associated with the appearance of Tiwanaku style pottery in Mizque. However, several Intermediate Period settlements in the Capinota-Parotani survey area were new settlements, with a topographic zone preference (piedmont). A preference in the piedmont itself, given

the distribution of soils, would produce greater proximity to the best agricultural soils (and more so in the Mizque survey area).

This shift in the settlement patterns in the Capinota-Parotani survey area, in itself, is far from sufficient to argue for this valley becoming a province in the Tiwanaku polity. First, the scale of settlement change is not nearly as dramatic as in other cases of imperial conquest (Moquegua by the Tiwanaku polity, Carhuarazo by the Wari state, and Cochabamba and the Mantaro Valley by the Inka empire). Second, we cannot directly ascribe changes during the Intermediate Period to exogenic factors. The population in the survey areas showed a preference for the piedmont at other times. Finally, the shift might simply reflect the expansion of settlement in the piedmont by a local population that simply happened to use Tiwanaku style pottery (like the rest of the Cochabamba population). It is not possible given our knowledge now, to interpret these new settlements as Tiwanaku colonists or communities forming at the behest of a Tiwanaku provincial administration.

The information that would help shed light on these issues, lies, of course, in settlement typology and settlement hierarchy. Administrative infrastructure and decision-making sites are a central part of the "direct control" strategy in other regions of the Andes. No potential Tiwanaku administrative or ceremonial sites as were identified in the Capinota-Parotani survey area, but my methods were not designed to do so.

In summary, my findings best meet the "independence scenario." Tiwanaku style pottery was locally produced, was far too widespread to be a "prestige-good," and the adoption of Tiwanaku styles was not associated with major changes in settlement or land use. There is no evidence, at least in the valleys I examined, to suppose Tiwanaku colonies or political control. More broadly, there is no reason at this point to assign importance to interaction with Tiwanaku, or to external factors in general, in the evolution of the Cochabamba populations.

Prehispanic Settlement and Land Use: Directions for Future Research

As a first step in understanding the long term evolutionary trajectory of Cochabamba populations, this research does not support the important role ascribed to the Tiwanaku polity. Accordingly, future research should be directed to understanding development in terms of internal processes, both local and regional in scale. My survey provided information on more than the Intermediate Period. The research allowed us to compare, of necessity in broad strokes, the prehispanic evolution of human-land relationships in two ecologically contrasting areas. The relationship between settlement pattern and agricultural potential in settlement studies has been a longstanding concern of scholars interested in settlement. Although not fine-grained, my analysis of the agricultural ecology of the Cochabamba Valleys revealed a significant difference between the two valleys in agricultural potential. This difference was reflected in total occupation size in every period after

the Formative, with the Mizque area supporting a markedly larger population (Figure 41). The disparity in population increased in the Late Period, during which each area showed a significant increase in occupation area over the previous period. Whether this rise in population was gradual or fairly rapid cannot yet be determined, given the current state of the ceramic chronology. However, the Late Period, particularly in the Mizque, presents several of the patterns we would expect for increasing agricultural production and surplus mobilization. We know that the Post-Tiwanaku period in the South Central Andes in general was characterized by the emergence of "kingdoms" or "señorios" in both the highlands and the eastern Andean slopes. The shifts and increased population density in the Late Period in the Mizque area may be associated with such a process of political evolution.

Archaeologists and geographers have stressed the importance of agricultural land as a factor influencing settlement, and, in some cases, have been able to predict the development of settlement patterns based on the distribution of arable land. My investigation revealed clear preferences for particular topographic zones, but elucidating the connection between these preferences, actual site location, and agricultural potential will require further analysis.

My investigation took place on the largest scale possible. While this may be necessary to identifying "macropatterns," a full comprehension of settlement evolution requires information on patterns at the sub-regional and community level. Accordingly, the next step in

this research will be generating a more sophisticated understanding of the factors structuring the locations of individual settlements. Attributes relating to agricultural productivity may cluster in particular topographic zones, as with the association of Group 1 soils and the preferred piedmont in the Mizque area. A preference for this zone, then, could potentially reflect a concern for access to prime agricultural land.

One approach to measuring the association between sites and their agricultural setting will be a catchment zone analysis. This approach, the next stage in my analysis of the survey data, will focus on addressing two questions: (1) Were individual sites located so as to maximize access to superior agricultural lands?, and (2) Is there a relationship between site size and local agricultural catchment? Answering these questions will advance our understanding of the factors governing the evolution of settlement in the Cochabamba Valley. Examination of these issues may also lead to revision of some of the conclusions I have drawn above, as we explore the spatial scales on which humans adapt to the environment.