Reconstructing an Engineered Environment in the Central Andes: Landscape Geoarchaeology at Chavín de Huántar, Peru

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11. Reconstructing an Engineered Environment in the Central Andes: Landscape Geoarchaeology at Chavín de Huántar, Peru

Daniel A. Contreras

Abstract: Chavín de Huántar, a Formative Period ceremonial center in the Peruvian Central Andes, has been a focus of archaeological research for more than 70 years. Nevertheless, I argue, its extent and character remain incompletely understood. This is a result of a highly active geologic environment, which both influenced human–environment interactions in Chavín’s prehistory and created a substantial taphonomic challenge to archaeological interpretation. The integration of archaeological and geologic data in a site GIS has been used to reconstruct a pre-Chavín landscape and to estimate the scale of geomorphic and anthropogenic landscape change at Chavín. That reconstruction is used to examine the dynamic and reciprocal human–environment relationship and its implications for both landscape and political processes at Chavín.

In this chapter I use data from my research carried out as part of John Rick’s Stanford University Chavín de Huántar Research and Conservation Project to argue that the site of Chavín de Huántar, in the Peruvian Central Andes, needs to be construed more broadly in several senses. This research has demonstrated that the monumental area of the site consists not just of built architectural space but also of a built landscape, whose parameters are becoming clearer. This is more, I argue, than just a question of scalar change. Expanding the area and range of construction that we understand as integral to the site—recognizing, that is, the built environment—enables us to better address some of the fundamental...
theoretical questions prompted by Chavín. Chief among these is the problem of coordinated action. At Chavín, even the landscape is not simply a palimpsest of incidental or collateral effects but rather displays planning and intentionality. But whose, and how?

**Background**

The site of Chavín sits at 3,150 m asl in a high valley on the eastern side of Peru’s Cordillera Blanca, at the confluence of the Mosna and Wacheqsa rivers. Generally recognized as a ceremonial center (cf. Burger 1992; Lumbreras 1989; Rick 2005), the site, a complex of stone-faced platform mounds, terraces, and sunken plazas, dates to roughly 1200–500 B.C.E. (though the chronology is not settled; see Burger 2008; Kembel and Rick 2004:62; Rick et al. 2008). The platform mounds are built over a complex and interconnected accretion of subsurface galleries that have been home to some of the most spectacular archaeological finds at Chavín (e.g., Kembel and Rick 2004; Lumbreras 1993) and have figured prominently in reconstructions of ceremonial practice at the site.

The site has been a focus of archaeological research in the Andes since Julio C. Tello’s 1919 visit and has been key to understandings of Peruvian culture history since Tello’s publication of his work (e.g., Tello 1943). Tello was by no means the site’s discoverer, however; the site appears in colonial chronicles and was described by early European travelers in Peru. Nor did Tello write the final word on Chavín; several researchers have followed Tello’s lead in working at the site. These include most prominently Luis Lumbreras and Hernán Amat, who excavated at Chavín between 1966 and 1973 (Lumbreras 1977, 1989, 1993), and Richard Burger, who excavated outside the monument proper in 1975–1976 (Burger 1982, 1984). Most recent has been the ongoing Stanford University Research and Conservation Project, begun in 1995 under the direction of John Rick (Kembel and Rick 2004; Rick 2005; Rick et al. 1998).

What is most noteworthy, for the purposes of this chapter, about this near-century of intensive archaeological excavation of the monument is the general confinement of research to the monument proper. There are significant exceptions—Richard Burger excavated in several areas in the modern town, as well as east of the Mosna and at the higher sites of Pojoc and Waman Wain (Burger 1982, 1984), and Julio Espejo Nuñez dealt quite broadly with the area in a regional site survey carried out in the early 1940s and excavated at the nearby Formative site of Gotush (Espejo Nuñez 1951, 1955). In addition, Wilhelm Diesl (2004) has compiled a thorough synthesis of work from the region generally. However, the near periphery of the site remains largely unknown—or, at least, poorly represented in published data.

The site originally fascinated visitors because of its scale and stonework (megalithic construction and intricate reliefs), and it later became a focus as the putative origin of the earliest of Peru’s panregional “horizons.” Chavín’s status as “mother culture” has since been challenged and dismissed (e.g., Burger 1985, 1992), but the mechanisms underlying Chavín’s rise to regional prominence—
and indeed its own local trajectory—remain of interest, in both culture-historical and theoretical terms. In particular, the problem of coordinated action has been a research focus. That is, how did a relatively small population come together to build and maintain a massive, elaborate, and technologically and ideologically sophisticated ceremonial center?

The problem of coordinated action is perhaps best illustrated if framed in terms of an overly simplistic but useful opposition: Marxian (Chavín as the product of Machiavellian elites manipulating duped masses) vs. Durkheimian (Chavín as the product of willing, informed, communal activity). This theoretical divide underlies many of the divergent interpretations of early monumental construction in the Andes (see Moore 2005).

Chavín’s setting serves as an important source of (a) evidence that can help to address this question and (b) some conceptual and theoretical inspiration. Specifically, the site’s location in the heart of a geomorphically dynamic and anthropogenically modified landscape provides a new avenue of addressing this question. In this chapter I briefly characterize Chavín’s landscape and geomorphology and describe its implications for archaeological work at the site. I also illustrate the methodology used to describe and address this landscape and describe the evidence for anthropogenic landscape modification. Finally, I return to the theoretical question of coordinated action.

Setting

Chavín’s highland location makes for a setting that is remarkable for its steepness. Moreover, the site is located at the mouth of one river (the Wa-cheqsa) and in the valley of another (the Mosna; see Figure 11-1). The result is a landscape remarkable for its geomorphic dynamism.

The principal elements of the valley geomorphology are steep slopes thinly covered with colluvium, alluvial fans created by small tributary drainages perpendicular to the valley axis, and earthflow complexes extending from high up the valley walls to the valley floor (see Figure 11-2). Bedrock outcrops—generally clearly bedded and heavily folded—are also scattered throughout the valley at all elevations. These consist of Lower Cretaceous deposits of the Oyón Formation, comprising the majority of those in the lower and mid-valley, and the Goyllaris-quizga Group (Chimú, Santa, and Carhuaz formations) higher in the valley. All of these formations are metamorphosed sedimentary deposits. The Oyón Formation consists of siltstones, dark gray shales, and a variety of sandstones interbedded with strata of anthracite. Ascending toward the ridges, one moves from the Oyón Formation into the Chimú, Santa, and Carhuaz formations. These consist (Cobbing et al. 1996:74–90; Turner et al. 1999:48) of white, quartzitic sandstones in massive layers 1–3 m thick (Chimú Formation), blue-gray limestones 10 cm to 1 m thick (Santa Formation), and cemented silty clays (Carhuaz Formation).

The valley floor itself—a notably large swath of flat land in a landscape otherwise rarely planar (see Figure 11-3)—consists of sediments deposited when the course of the Mosna River was blocked by a major rotational landslide event
approximately 2 km north of the modern town, leading to ponding and deposition of sediment before a new channel was cut and the river downcut through the earthflow deposit. This was first suggested by Turner (Turner et al. 1999:55) and has been confirmed by further field mapping carried out by me and U.S. Geological Survey geomorphologist David K. Keefer. While this event unfortunately remains undated, it may be chronologically constrained by the presence of Chavín-period occupation atop the sedimentary deposits, north of the modern town (see Figure 11-3).

Earthflows are ubiquitous in the valley and remain active; deposition by these features has obscured much of the site in the two and a half millennia since it fell out of use. Moreover, twentieth-century geomorphic activity has dramatically demonstrated that the site is subject to dramatic fluvial erosion and equally dramatic debris flow deposition. Flooding of the Mosna River in the late 1920s and early 1930s severely damaged the southeast area of the site (Tello 1960:Láminas XIV–XVIII), and a catastrophic debris flow (known locally as an aluvión), consisting of an estimated 860,000 m$^3$ of mud and rock, buried the site in 1945 (Indacochea G. and Iberico M. 1947).

The postdepositional problem posed by Chavín’s dynamic landscape has been recognized by previous investigators, but that recognition has largely not been accompanied by realization of the full scale or implications of the issue, as
they have focused (quite appropriately; this is not a criticism of past work) on what is accessible and on more pressing research problems of culture history and process. In contrast, my work focuses directly on the challenge of the dynamic landscape. The effect of the Stanford Project’s 2003 salvage excavations in La Banda (Rick 2005; Rick and Mesia 2003), across the Mosna River from the site’s monumental core, was to confirm Burger’s stated fears that Chavín-period settlement was obscured (Burger 1984:14), offering substantial evidence that surface survey was incapable of adequately describing the extent of archaeological features. At Chavín, negative evidence—lack of surficial archaeological remains—cannot be taken as necessarily indicative of the absence of substantial subsurface archaeological features.

Recognition of the problems of site burial around Chavín predates Burger’s work and in fact is mentioned by as early an investigator as Julio C. Tello (1945:775), who wrote in 1945 that “[l]as ruinas del Templo de Chavín se hallan sepultadas por una capa de tierra descendida de los cerros vecinos.” Similarly, Lumbreras (1989:21) noted the presence of slope deposits as much as a meter

**Figure 11-2. Local surficial geomorphology (derived from fieldwork by Contreras and Keefer).**
thick over much of the site. However, discussion of depositional processes at Chavín has not previously been accompanied by either full understanding of the processes involved or thorough consideration of the implications.

In addition, architectural space has been the primary focus of archaeological research at the site since the first explorers’ accounts; even where larger-scale engineering efforts were recognized they were, in practice, backgrounded, as the basic work of describing the site’s architecture was prioritized. Focusing on landscape engineering, however, highlights Chavín’s relationship with its dynamic environment, sheds light on a previously underreported aspect of the site, and suggests that Chavín is significantly larger in scale than is commonly portrayed.

Field Methodology and Data Collection

Major changes in Chavín’s landscape during the late Holocene include both the geomorphic and the anthropogenic. The data describing them come from two major seasons of fieldwork, encompassing surface survey (archaeological and geomorphologic), work with remotely sensed images (SAN aerial photographs and IKONOS imagery for assessment of landforms), excava-
tion, and study of existing exposures (for archaeological features and sediment stratigraphy). I have also incorporated data from other excavations (1996–2006) by the Stanford Project and published data from previous projects (e.g., Burger 1984; Lumbreras 1977, 1989). Opportunistic collection of local oral history has also been useful for documenting recent geomorphic activity in the area, which is also occasionally recorded in published sources.

In this section I highlight some of the most significant changes in Chavín’s landscape by way of examples of both field methods and findings, before turning to the ways in which these findings have been analyzed and their implications.

For heuristic purposes, the Stanford Project has divided Chavín into several sectors, the Monumental Core, West Field, Area Sur, and La Banda; the latter three form what I term the site’s near periphery. Designations of features within the site core follow Tello (1943). Also significant in the local geography are the two rivers that flank the site, the Wacheqsa and the Mosna, and the hill southwest of the site, the active Cochas earthflow (see Figure 11-3).

For analogous reasons of temporal orientation, I divide the site’s chronology. For purposes of reconstructing the archaeological landscape—or rather landscapes—at Chavín, I have developed a series of landscape phases, to which I have assigned the major identifiable changes to the landscape. These are LP-1, LP-2, and LP-3, basically encompassing a pre-monumental phase, a monumental phase, and a post-monumental phase (with some subdivision; see Table 11-1).

**Examples**

Three examples of landscape change at Chavín serve to illustrate the anthropogenic and geomorphic changes in question, as well as the techniques used to document and interpret these. These consist of the results of research from the West Field, the southeastern portion of the monumental core, and the near periphery generally. These constitute case studies of, respectively, processes of geomorphic change characteristic of the area, an example of engineered modification of local environmental features, and the construction of a largely artificial topography.

**Case Study 1**

An example of landscape change from the West Field is telling, in terms of magnitude, frequency and type of change, and preserved evidence. The sector—comprising the area west of the monumental core of Chavín, separated from the site core by a modern road—has been recognized since at least Julio C. Tello’s visits to the site (beginning 1919) as containing Chavín-era construction. Two megalithic walls (terrace facades in modern appearance), constructed of quartzite blocks in a style similar to that of the structures in the monumental core, are visible on the surface, as is one canal draining northward into the Wacheqsa River. Until the construction in the 1970s of the road that currently separates the monumental core from the West Field, these east–west terraces were also associated with a north–south wall that was largely destroyed by the road construc-
Table 11-1. Relationship of Landscape Periods to Other Chronological Schema

<table>
<thead>
<tr>
<th>Period</th>
<th>Approximate Dates</th>
<th>Kembel/Rick Chronology&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Burger Chronology&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>LP-1</td>
<td>1500–1200 B.C.E.</td>
<td>Pre-monument</td>
<td></td>
</tr>
<tr>
<td>LP-2a</td>
<td>1200–1000 B.C.E.</td>
<td>Separate Mound, Expansion, and Consolidation Stages</td>
<td></td>
</tr>
<tr>
<td>LP-2b</td>
<td>1000–550 B.C.E.</td>
<td>Black and White Stage</td>
<td>Urabarriu Phase</td>
</tr>
<tr>
<td>LP-3a</td>
<td>550 B.C.E.–1945 C.E.</td>
<td>Support Construction Stage and Abandonment/ Collapse/Reoccupation</td>
<td>Chakinani Phase, Janabarriu Phase, and post-Chavín</td>
</tr>
<tr>
<td>LP-3b</td>
<td>1945 C.E.–present</td>
<td>Post-Chavín</td>
<td>Post-Chavín</td>
</tr>
</tbody>
</table>

<sup>a</sup>Kembel 2001, 2008.
<sup>b</sup>Burger 1984.

Data on the recent (Holocene) geomorphologic history of the West Field come from several sources. At the coarsest level, the West Field and the slopes above it were geologically mapped first by Turner (Turner et al. 1999:50) and later as part of the original geomorphologic mapping of the valley carried out by me and David Keefer (see Figure 11-2). Both mapping projects were in agreement in depicting the area as a combination of earthflow, alluvial deposit, and bedrock thinly covered by colluvium.

Further data come from stratigraphy exposed by the cut of the Wacheqsa River along the northern flank of the West Field. This exposure is visible from the mouth of the canyon of the Wacheqsa to the west to the modern bridge over the river some 300 m downstream, roughly due north of the western edge of the monumental core (see Figure 11-3). As much as 8 m of stratigraphy are often visible along the south bank of the river, exposing both geologic and archaeological strata (see Figure 11-4).

Characterization of this stratigraphy comes from multiple sources: documentation and description of visible features; correlation of visible strata with data from a 4-x-4-m excavation unit placed ~5 m south of the river cut, in the northwestern corner of the West Field; and a series of cleaned 1-m-wide profiles in the exposed cut (see Figures 11-3 and 11-4).

As Figure 11-4 demonstrates, these profiles are both heterogeneous and internally complex. Most striking is the contrast between WF-10/10A and WF-11; although only ~3 m apart, the two cleaned exposures share only a basal stratum (“B” in Figure 11-4), offset ~.5 m downward from west to east. Furthermore, the architectural stratigraphy visible in WF-10/10A and WF-12 correlates well with that excavated ~5 m to the south in WF-07/07A, but WF-11, only a few meters to the east, does not display any corresponding architectural strata.
The reconstruction resulting from this stratigraphic evidence is necessarily both geomorphic and archaeological, although it spans only a time period beginning perhaps as early as 2000 cal b.c.—a long archaeological timescale but a short geologic one.

The lowest visible stratum in any available exposure appears along the face in which WF-10, WF-10A, and WF-12 were cleaned and appears also in WF-11. As noted above, however, in the latter it is offset downward ~.5 m. This basal stratum is a diamicton resultant from a pre-Chavín debris flow that descended the canyon of the Wacheqsa River; lack of sorting and clast size (to ~.5 m on long axes) suggest a high-energy event similar to the well-documented 1945 debris flow. Unfortunately, the base of this stratum is nowhere visible; we are only able to judge it to be minimally ~2 m thick.

Following the deposition of this diamicton, a substantial rotational landslide disturbed the West Field. The basal diamicton layer is offset downward from west to east at the contact (see Figure 11-4); the eastern edge of the landslide does not display such clear stratigraphic offset but is visible and has been mapped.

Excavation approximately 5 m south of WF-11 revealed substantial and wholly intact architecture with a terminus ante quem date of ~850 cal b.c. (Unit WF-07/07A; see Figure 11-3), demonstrating that the landslide predated at least this later construction episode (stratigraphically contemporary with the most substantial construction visible in WF-10/10A [see Figure 11-4]). The first signs of construction activity in the area are of foundational construction fill, as the
surface of the debris flow was filled to level the slope and the first of several walls was constructed on it (see Figure 11-4).

The lack of apparent deposition prior to the construction on the diamicton surface suggests that these three events—debris flow, rotational landslide, and leveling fill—occurred in a relatively short span of time. A conservative estimate for the earliest monumental construction activity at Chavín (~1200 cal b.c.) thus suggests that the debris flow and landslide are unlikely to have occurred before ~1500 cal b.c. The colluvial deposit atop the landslide bench, moreover, contains scattered ceramics, unfortunately largely nondiagnostic but attributable to the Chavín period (one characteristic Chavín neckless jar rim fragment was identifiable).

These geomorphic and archaeological data in combination both document the complex history of the West Field and have significant implications for the geomorphic history of the area generally. Significantly, it is also clear that incorporating both archaeological and geomorphic data is necessary to developing this interpretation.

The geomorphic history described above (and in greater detail in Contreras and Keefer 2009) is significant for the compressed timescale within which it fits. The earliest stratum documented is unlikely to predate 1500 b.c., while the uppermost of the Chavín-period strata—approximately 2 m higher—predates 500 b.c. The remainder of the strata—post-Chavín fills, colluvium, the diamicton of the 1945 debris flow, modern soil horizons—fall within the span of the past 2,500 years. In other words, the 5 m of stratigraphy visible represents only approximately 3,500 years of geologic history. Within that span, there is evidence of at least six significant geomorphic events and at least three cultural ones.

Moreover, the clustering of the geomorphic and cultural depositional events is suggestive. Given the high frequency of geomorphic activity that we have documented in the area, the depth of stratigraphy in both cleaned profiles and excavation that consists purely of superposed architecture, without interbedding of natural strata, is remarkable. The stratigraphic record suggests a period of geomorphic activity, followed by one of cultural activity, and then a second period of geomorphic activity (see Figure 11-4). This patterning raises the specter of the possible influence of cultural behavior on the record of geomorphic activity. Is this apparent hiatus in geomorphic activity a reliable signal or a false one? That is, has evidence of geomorphic activity been obscured by cleaning or control of deposition? Direct evidence of landscape activity during LP-2 is surprisingly scant. Nevertheless, the frequency of landscape activity during LP-1 and LP-3 and additionally the ubiquity of LP-2 landscape modification features at least partially practical in function suggest the likelihood of geomorphic activity during LP-2.

Such activity, as this example from the West Field demonstrates, likely included landslide and earthflow motion, as well as fluvial changes. There is abundant evidence in the area that the local river channels are heavily influenced by landslide behavior, as slide events either dam rivers or displace them laterally. This process is both visible topographically—witness the Mosna-damming slide that created the plain north of the modern town of Chavín—and historically attested (e.g., Tello 1945:775).
Case Study 2

A second process shaping the landscape is evidenced by the deliberate anthropogenic footprint that appears in LP-2. One of the significant elements of this process is the manipulation of environmental features. The most dramatic example of this is the reclamation of part of the Mosna River’s riparian corridor for the eastward expansion of the monument, which begins at an estimated 800 B.C.E. Evidence for this comes from two excavations, one carried out by John Rick in 2001 in the center of the Square Plaza (Rick 2005, 2008) and the other by me in 2005 south of Structure E (see Figure 11-3).

Rick has argued (Kembel and Rick 2004; Rick 2005, 2008) that during the Black and White Stage the Mosna River was diverted and the riparian channel reclaimed in order to allow the eastward expansion of the monument (the construction of the Square Plaza and Structure E). This argument was based on excavations carried out in 2001 in the center of the Square Plaza, which exposed a massive boulder fill atop a streamside deposit (Rick 2008:17–18). The fill consisted of massive (up to several meters in diameter) boulders, shaped where necessary for close fit (see Kembel and Rick 2004:Figure 4.4). This massive fill implies a large-scale effort to stabilize and level the area of the Square Plaza; its still-planar surface is testament to the success of the effort. In addition, of course, this combination of massive fill and fluvial-deposit substrate argues that the construction of the Square Plaza was in part a reclamation project. In Rick’s (2005:80) stark terms, “[e]ven the course of the adjacent Mosna River seems to have been altered to accommodate the growth of the later monumental construction stages.”

One of the excavations that I carried out in 2005 was placed in order to test this hypothesis regarding the Mosna River. Unit AS-02 was located approximately 50 m to the south of Structure E, directly in the projected pre-monumental-expansion Mosna channel (see Figure 11-2). It was anticipated that if the river channel had in fact been diverted to the east, any construction found in this area—none is visible on the surface—would necessarily have been built atop reclaimed land. Subsurface sediments should either confirm or deny the presence of a pre-Chavín (and possibly more specifically pre–Black and White Stage) river channel; a further stratigraphic question was whether Chavín-period construction occurred directly atop fluvial sediments or whether instead there was an interval suggesting that the easterly movement of the river channel might predate Chavín entirely.

Two findings from Unit AS-02 are of particular interest with regard to the Chavín landscape. The 1945 aluvión deposit in this area proved to be very deep (~3 m), suggesting that the surface contemporary with the Square Plaza and Structure E was much lower than the modern one (and was in fact approximately at the level of the surface of the Square Plaza). This surface itself has not survived, due to the incursion of the Mosna River that began in 1925. This rechanneling of the river is primarily recognized for the damage it did to Structure E, destroying approximately the eastern third of the structure. Tello both lamented this damage and took advantage of the opportunity it afforded to ascertain the contemporaneity of Chavín construction and the polished black- and red-wares that he described as “classic Chavín pottery” (see Tello 1943:151).
The stratigraphy in AS-02 provided ample evidence of this fluvial incursion in the form of a clear fluvial deposit immediately below the dark diamicton of the 1945 aluvión. The excavation encountered the edge of that fluvial deposit, and we excavated the eastern margin of a silted-in canal that had been breached by the Mosna River. The canal was apparently built into a relatively casually constructed platform, much of which had been destroyed by the river but whose lower portion was preserved. A retaining wall to the east interrupted the fill, suggesting either the serial expansion eastward of the platform or the compartmentalization of the fill. That fill itself consisted of an orderly mix of mid-size angular rock and cobbles, in a clayey matrix; the matrix was noticeably distinct from the construction fills in the monumental core proper, which are orderly fills of mid-size angular rock in an extremely compact matrix of reddish clay, apparently prepared for that purpose. The few associated ceramics are Chavín-period but not adequately diagnostic to more specifically date the deposit.

It was not possible to ascertain the construction relationship between the canal and the platform; although the platform appears to extend deeper than the canal, the base of the canal was not excavated. Everywhere that the platform was excavated to access lower deposits, those deposits were fluvial gravels. Unfortunately, spatial limitations and the instability of the deposits prevented the continuation of excavation too deeply into these fluvial deposits—their base was never reached—but their identification as river channel deposits is secure.

This additional piece of evidence of an immediately pre-Chavín river channel where the southeastern portion of the site was constructed strongly supports Rick’s contention that the Mosna River was rechanneled as part of the project of site expansion in the Black and White Stage (~800–500 B.C.; see Kembel 2008). Such a project is testament to the scope of ambition and imagination with which Chavín’s planners approached their local environment.

Case Study 3

In addition to these efforts to control the behavior of the local rivers, Chavín’s landscape engineering included the alteration of the local landscape by the deposition of massive amounts of earth and stone fill. This behavior was widespread at Chavín, probably reflecting Chavín’s ties to generalized Andean traditions that clearly placed great importance on rearranging massive volumes of earth and stone. At Chavín as elsewhere in the Andes (particularly in the coastal valleys), artificial mounds generally represent not accumulations of discrete superposed structures, as is common in Old World tells, but rather deliberate construction of platforms or truncated pyramids (though these often involve multiple episodes of construction; e.g., at La Galgada, Kotosh, Mina Perdida, Cerro Lampay [Burger and Salazar Burger 1998; Grieder et al. 1988; Izumi and Terada 1972; Vega-Centeno 2007]).

Chavín is in some ways separated from those broad Andean traditions, however, by the way that its artificial mounds often house accessible and used space (the galleries). Moreover—and Chavín may by no means be unique in this—much of the construction effort at Chavín went not just into the deposition of fills that
make up the central structural mounds of the monumental core (architectural space) but also into the sculpting of the landscape itself (nonarchitectural space). Rick (2008:17) has suggested as much: “our excavations have demonstrated that many of the monumental center structures are built on top of major Chavín-period organized fill deposits, indicating major investment in constructing and shaping the landscape on top of which the center sits.” I here draw together evidence to suggest that Rick’s choice of preposition was not sufficiently ambitious. That is, not only was the landscape beneath the center constructed; that around it was as well. The evidence for such a wide array of constructed landscape areas at Chavín is suggestive of the impressive scale of landscape modification and, ultimately, emphasizes how much of the setting of the monumental center was built. This echoes Silverman’s (2004:4) general observation that “Andean people created built environments encompassing the non-architectural space as well as buildings per se.”

The widespread fills are visible in varied contexts, widely distributed throughout the monumental core and the near periphery. Structural fills—orderly layers of angular rock in a wholly sterile matrix—are particularly evident in the eroding portions of Structures A and E. Similar fills that are foundational rather than structural have been excavated in several areas of the monumental core, notably beneath the floor of the Circular Plaza (e.g., in Unit CdH-CP-F4, excavated in 2002) and in the atrium of the Square Plaza (e.g., Unit CdH-PM-50, excavated in 2005; see Figure 11-3; also Rick 2008; Rick and Mesia 2002, 2005).

This orderly and sterile construction fill with its prepared matrix may be contrasted with those fills on the periphery of the monumental core. In the Area Sur, the West Field, and La Banda, excavations (some of them described in detail below) have revealed fills that were not laid or prepared with such care. Earlier excavations also reported a variety of fills both in the monumental core and in the near periphery (e.g., Burger 1984). In these cases of fills outside the monumental core, the stones contained in the fill are less uniform, not deposited in clear layers, and contained in matrices that are neither so uniform in character nor entirely sterile. Construction in the monumental—and presumably ceremonial—core apparently demanded a degree of care and investment not required by the (still massive) constructions of the near periphery. The latter are remarkable for their ubiquity, however.

In several areas where fills themselves are not exposed, suggestive wall segments are visible. It is generally not clear from surface inspection whether these walls represent retaining structures containing slope sediments or platform facades. In every excavated case, however, the material behind (upslope of) these walls has proven to be cultural fill. These comprise wall segments in La Banda, the Area Sur, the West Field, and the Wacheqsa Sector (Figure 11-5 illustrates one example). As yet uninvestigated wall segments include the wall fragment at the west edge of the Mosna Sector, the upper of the two walls in La Banda, and the wall fragments visible in the road cut southwest of Structure A.

Multiple walls have also been exposed by undocumented excavations in the Area Sur. Excavations in this area in 2005 were designed in part to determine whether these visible traces were the remnants of retaining walls intended
to control the effects of the Cochas earthflow. Those excavations demonstrated, however, that the visible architecture in the sector represented not erosion-control structures but rather a wholly built landscape. That is, the Area Sur, which today appears to be largely natural, in fact consists of a series of platforms.

As in the West Field, the multiple walls now documented are platform facades rather than retaining walls. In the Area Sur as in the West Field, it is likely that these multiple platforms did serve at least in part to stabilize slopes; identifying them as facades rather than retaining walls has architectural (and organizational and energetic) implications more than it does functional ones.

Excavations just upslope of the westernmost visible wall (Unit AS-04) encountered a series of intentional fills, demonstrating the wall to be a platform facade rather than a wall retaining natural sediments. The platforms that step down to the east perhaps imply that much of the area was similarly artificial in character, particularly considered in tandem with the massive fill excavated in Unit AS-01 (see Figure 11-6).

While the excavations in the sector cannot be considered an adequate sample, it is suggestive that none of them encountered evidence of natural landforms. This is particularly telling in this sector of the site, as the units excavated here are far enough south to be outside of the area buried by the 1945 aluvión. While the deposition from that debris flow was sufficient to obscure or destroy many of the built features of Chavín’s setting (see Tello 1960:Lámina LIII for a view of how much was buried), we might expect that significant areas of engineered
landscape in those areas not affected by that event would remain visible on the surface. The 2005 Area Sur excavations demonstrated otherwise, arguing that more of Chavín’s topography is anthropogenic than is obvious on the surface.

Analysis

These examples add up to a constellation of data pertaining to a variety of stages in the landscape history of the site. They are derived from a larger corpus of data about Chavín’s landscape history. The database currently comprises approximately 100 data points spread over about 20 ha (see Figure 11-7).

The challenge, thus, is one of estimating heterogeneous and topographically complex surfaces from limited data. This is both a sampling problem and an interpolation problem—the former addressed through the diverse methods of data collection I have described and the latter through use of geostatistical tools in the Surfer and ArcGIS programs. By way of example I focus here on the reconstruction of the LP-1 (pre-Chavín) landscape, emphasizing the cumulative landscape change wrought by the combination of Chavín’s builders and the active local geomorphology.
The remarkably detailed corpus of three-dimensional mapping data produced by the Stanford Project since 1995 (see Rick et al. 1998; much more data has been generated since that publication) provides the basis for modeling Chavín’s landscape. Those data are derived primarily from field mapping with a total station, supplemented by data from other sources. They include both modern topographic data and data on past surfaces generated from excavations and existing exposures. I discuss the methods of interpolation in detail elsewhere (Contreras 2007, 2009); here I focus on the results and implications of the interpolated landscapes. To begin with, I describe the clusters of known data points on the map, noting the source of the information in each case.

The majority of the available data relevant to the LP-1 landscape comes from Stanford excavations. In the monumental core, the chief effect of these has been to demonstrate the depth of post-monumental deposition and superposed monumental construction. Among the earliest of these excavations were the small but deep excavations on the west side of Structure A, designed to clarify its construction sequence. While even the deepest of these could not reach sterile soil (due to a rocky matrix), Unit CdH-Mon-11 nonetheless demonstrated that the base of the west side of Structure A is >4 m below current ground surface (Lumbreras...
et al. 2000). Similarly, Unit CdH-CP-F4, in the Circular Plaza, demonstrated that superposed fills extend to a depth of ~2 m below the plaza surface (Rick and Mesía 2002). Data of this sort comprise a series of points within the monumental core area that serve to suggest a substantially lower LP-1 surface, constrained by outcropping bedrock visible on the modern surface in two locations and inside the Rocosas Gallery (see Figure 11-7).

A further series of Stanford excavations, located on the near periphery of the monument, has served to demonstrate that much of this area, not generally conceived of as part of the monumental construction project, is in fact built. Unit CdH-WF-09 in the West Field, for instance, reached a depth of 6 m below modern ground surface without penetrating through cultural fills to a sterile surface. Similarly, Unit CdH-WF-01, on the face of the lower terrace in the West Field, demonstrated the wall height to be ~4 m, rather than the <1 m visible on the surface. Comparable results from the Area Sur and La Banda demonstrate the pervasiveness of cultural fills and landscape-altering walls in the monument’s near periphery. These excavations, even where they have not reached a sterile LP-1 surface, have served to provide a minimal depth for that surface. The net effect is the demonstration—dramatically visible in Figure 11-8—that the LP-1 surface was substantially different from both the LP-2 and modern landscapes. The combination of architecture and built landscape required an estimated net fill of ~59,000 m$^3$ within the ~20-ha area of the monumental core and its near periphery.

The sediment stratigraphy from the excavations in and around the monument, in combination with characterization of modern geomorphic process and the sediment stratigraphy documented in extant exposures, also provides a means of reconstructing LP-1 landforms. A series of key deposits give vital information about the character, as well as the elevation, of the LP-1 landscape. Examples are the fluvial sediments excavated in CdH-PM-15/16/17/18/19/20 and CdH-AS-02 and the LP-1 aluvión and landslide deposits documented in the exposure at the north end of the West Field (described above in Case Studies 1 and 2).

The final piece utilized in reconstructing the LP-1 landscape is the array of evidence of landscape engineering projects associated with Chavín’s construction. Obviously these are not totally separable from the data discussed in the previous few paragraphs, but nonetheless they merit a brief discrete mention. The several substantial projects (e.g., river canalization, megalithic terracing, and massive fills) provide key data for reconstruction of the LP-1 landscape. The identification of such projects allows not simply an estimate of the local LP-1 surface elevation where the engineering architecture has been investigated but also the extrapolation of the effects of that architecture on the modern landscape.

This variety of data (in combination with several placeholder points derived from the modern landscape) was used to produce an interpolated LP-1 landscape (Figure 11-8; see Contreras 2007, 2009 for details). The contrast between that landscape and the modern one—mapped extensively and intensively since 1995 by the Stanford Project—is dramatic and, significantly, encompasses substantially more than the simple addition of the architecture of the monumental core to a landscape otherwise similar to the modern one.
As emphasized above, the contrast reflects the activity of a variety of processes, both geomorphic and anthropogenic. Moreover, there is a likely—if not always demonstrable—interplay between those two types of processes. That is, anthropogenic activity often affected local geomorphic processes, and geomorphic activity affected human activity. I explore this relationship in more depth elsewhere (Contreras 2007). It is noteworthy here, however, as a reminder of the combination of processes that have produced the modern landscape at Chavín and that contribute to the contrast between that modern landscape and the pre-Chavín (LP-1) one.

**Implications and Conclusions**

What does all this mean for archaeological research? The basic lesson is a simple one, but worth emphasizing: at Chavín, contrary to the popular dictum, what you see is not what you get. My work has been an attempt to figure out, essentially, what we do get. I have dealt with this by managing all the spatial data—archaeological and geomorphologic—in a GIS, and I approached the landscape history by interpolating surfaces from the known points for any given landscape phase.
One of the cumulative effects of these data is a need to reconceptualize the scale of the site. Rather than comprising a relatively compact core of architectural space—as it has generally been represented in published maps—the site (and I am certainly underestimating in this study) is significantly more extensive. As I suggested at the beginning, this is more than a change in scale—that is, I am not arguing just that rather than consider the core area of the site as comprising ~7 ha (as has traditionally been done, even while it has been broadly recognized that Chavín materials and occupation were found outside of this core area), we consider it to comprise ~20 ha.

Instead I am arguing that this additional area, which consists not simply of occupational debris (the proverbial light footprint) but of a built landscape, is of critical importance for interpreting Chavín. Reconceptualizing the scale of anthropogenic landscape transformation at Chavín has significant implications for the way we understand the engineering abilities and ambitions of Chavín’s builders, as well as the way we model sociopolitical organization at the site.

In addition to the intentional and engineered landscape changes I describe here, the transition from LP-1 to LP-2 would have had profound ecological effects. Numerous ecological studies have demonstrated that anthropogenic modification of landscapes impacts the overall abundance, richness, and diversity of indigenous floras and faunas (see Balée and Erickson 2006; Hayashida 2005; Kirch 2005; Stahl 1996). Presumably, the relationship between landscape modification activities and the composition of local biomes operated similarly in the past. At Chavín, without (to date) direct evidence with which to characterize this change, we may infer the basic types—if not the specific character—of the changes in question. The deposition of massive amounts of fill and management of the river channels, as well as the presumed clearing of the valley bottom and lower slopes for agriculture, would have had similar effects to those of this sort of activity in any other context. Clearing—likely by burning—generally reduces the number and diversity of flora and consequently fauna and encourages the growth of ruderals that favor disturbed ground (this is commonly observed today with Solanum hispidum, which is found widely distributed throughout the valley where not controlled by weed ing). At the same time, the increased patchiness caused by small, controlled burns and mosaiced agricultural plots can serve to increase local diversity of flora and create habitat for fauna that prefer edge habitats (Balée 2006). We lack data to assess the relative importance of these processes at Chavín but may presume that as the valley was progressively transformed by settlement and agriculture the local flora and fauna underwent significant changes, both managed and collateral.

In addition, the removal of trees for use as fuel and construction material presumably would have rapidly deforested the valley slopes and nearby puna of Polylepis trees, though the degree to which these habitats were ever forested remains debated (Ellenberg 1979; Fjeldsä 2002; Kessler 2002) and the literature is at the regional rather than local scale (see Contreras 2007:237–245). The changes in species composition of the local flora were likely broadly similar to those described around Guitarrero Cave, which is at a comparable altitude approximately 100 km to the west in the Callejón de Huaylas, by C. E. Smith Jr. (1980). In ad-
dition, the general pattern of slope clearance, whether of tree species or smaller flora, would have exacerbated slope stability problems during the wet season (Stokes et al. 2008).

Faunal species that require larger ranges, whether consuming graze or browse (e.g., wild camelids and cervids), would have been similarly disadvantaged and likely to relocate elsewhere, while commensal species (e.g., the leaf-eared mouse [Phyllotis spp.]) and domesticates (e.g., camelids [Lama glama and Lama pacos] and guinea pig [Cavia porcellus]) were presumably widespread by this point. Faunal remains from archaeological contexts (Miller and Burger 1995; Sayre and Rosenfeld 2005) testify directly to the presence of camelids, guinea pigs, and canids (not differentiable as wild or domestic) by the earliest phases of occupation of the monumental center, as well as the continued presence of cervids within hunting range (though the percentage of faunal remains belonging to cervids drops over time, suggesting either their decreased abundance locally or a shift in subsistence practices).

However significant these impacts on flora and fauna, and even the associated changes in the landscape, they nonetheless lack the element of intentionality that is of such interest in the case of the built landscape. Considering intentional, planned landscape modification offers another avenue of approaching the problem of coordinated action at Chavín. The scale and ubiquity of landscape modification have important implications for labor mobilization and organization as well as for understanding how often and how directly Chavín’s builders, planners, and inhabitants were confronting their dynamic environment. An important motivator for coordinated action—whether communal or coerced, informed or beguiled—may have been the constant presence, and imminence, of an environment at once dynamic and eventually visibly created. The later importance of peaks and waterways in Andean sacred geography is well attested, and the sacredness of the landscape in general is also a subject of much ethnohistoric and archaeological comment (e.g., Duviols 1984; Glowacki and Malpass 2003; Moore 2005; Reinhard 1985; Silverman 2004). The possibility of laying claim to these sources of power—by elites locating themselves as putative intermediaries to the sacred, by the community as inhabitants, elements, and proprietors of the local landscape, or by the two simultaneously—provides us with another avenue of approach to the question of the coordinated action that created Chavín. If the landscape itself was sacred, and active, what a statement—even if one we have trouble interpreting—to modify it!

The content of that message—and, perhaps as importantly, its authors—remain to be understood. However, at Chavín we have taken the first steps toward this by identifying and documenting both the dynamism of the local landscape and the ubiquity and scale of landscape engineering. Moreover, the series of arguments that Rick and Kembel have advanced for the site as a product of design—and thus, inferentially, elite planning—are as applicable to landscape engineering as to architecture (see Kembel and Rick 2004; Rick 2005). Understanding Chavín’s environment as built encourages and enables us to ask questions not just of the site’s architectural space but of its entire setting.
Notes

1. “The ruins of the temple of Chavín are found buried by a layer of earth derived from the neighboring hills” (my translation).

2. Date on wood charcoal, 2712 ± 42 B.P. (AA 69447; δ\(^{13}\)C = –23.6 percent). Other dates are consistent with this one (see Contreras in press; Contreras and Keefer 2009).

3. This timescale holds if the chronology in the West Field is consistent with that in the monumental core, where monumental construction ceases by 500 B.C. if not before (as Kembel and Rick [2004] argue). This raises the significant question, not addressed by Kembel and Rick (due to lack of evidence), of the degree to which monumental construction and the Chavín Period are congruent; addressing that is beyond my scope here.

4. The destruction wrought by the Mosna was a source of common concern to Chavín’s early excavators. In addition to Tello’s brief description of it in his 1943 article, the Archivo Tello in the Museo Nacional de Arqueología, Antropología e Historia contains a series of detailed notes on the subject (Tello 1945). Tello’s 1960 book (Chavín: Cultura matriz de la civilización Andina) maps the Mosna River at its point of greatest intrusion into the site (Tello 1960:Figure 4) and includes two of Cornelius von Roosevelt’s 1934 photos of Building E with the river lapping against it (Tello 1960:Láminas XIV and XV).

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