Sociopolitical and Geomorphologic Dynamics at Chavín de Huántar, Peru

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SOCIOPOLITICAL AND GEOMORPHOLOGIC DYNAMICS
AT CHAVÍN DE HUÁNTAR, PERU

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.1</td>
<td>Overview</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>Research Problem</td>
<td>4</td>
</tr>
<tr>
<td>1.3</td>
<td>Significance of Chavin</td>
<td>10</td>
</tr>
<tr>
<td>1.4</td>
<td>Methodological Concerns</td>
<td>19</td>
</tr>
<tr>
<td>1.5</td>
<td>Anthropological Context and Theoretical Considerations</td>
<td>28</td>
</tr>
<tr>
<td>2</td>
<td>Literature Review</td>
<td>36</td>
</tr>
<tr>
<td>2.1</td>
<td>Andean Ecology</td>
<td>36</td>
</tr>
<tr>
<td>2.2</td>
<td>Humans in Andean Environments</td>
<td>39</td>
</tr>
<tr>
<td>2.3</td>
<td>Debating Environment, Ecology, and Landscape</td>
<td>43</td>
</tr>
<tr>
<td>2.3.1</td>
<td>Studying Human-Environment Interactions</td>
<td>44</td>
</tr>
<tr>
<td>2.3.2</td>
<td>The Debate in the Americas: Complicating Trends</td>
<td>46</td>
</tr>
<tr>
<td>2.4</td>
<td>Convergence/Rapprochement</td>
<td>48</td>
</tr>
<tr>
<td>2.5</td>
<td>Recent Perspectives on Human-Environment Interactions in the Andes</td>
<td>51</td>
</tr>
<tr>
<td>2.6</td>
<td>Landscape and Environment at Chavin</td>
<td>52</td>
</tr>
<tr>
<td>3</td>
<td>The Paleoenvironment of Chavin</td>
<td>57</td>
</tr>
<tr>
<td>3.1</td>
<td>Setting</td>
<td>58</td>
</tr>
</tbody>
</table>
3.2 Paleoenvironmental Reconstruction and the Use of Paleoenvironmental Proxy Data
3.2.1 Paleoenvironmental Archives
3.2.2 Proxy Data
3.2.3 Temporal Scale
3.2.4 Spatial Scale
3.3 Paleoclimate
3.4 Paleoecology
3.4.1 Regional Paleoecology
3.4.2 Local Paleoecology
3.4.2.1 Pre-agricultural Period
3.4.2.2 Agricultural Period
3.5 Conclusions

4 Geomorphologic Questions at Chavin
4.1 The importance of geomorphology in archaeological interpretation at Chavin
4.2 Modern Landforms and Processes
4.3 Setting
4.4 Bedrock Geology
4.5 Local Geomorphology
4.6 Active processes
4.6.1 Geologic Hazards
4.7 Field data and interpretations
4.7.1 Geomorphology of the West Field
4.8 Implications of the local geomorphology for archaeological interpretation

5 Methodology
5.1 Overview
7.5 Human-Environment Interactions in the Prehispanic Andes – The View from Chavín

References Cited
# List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Andean Paleoclimate Archives</td>
</tr>
<tr>
<td>5.1</td>
<td>Environmental Variables</td>
</tr>
<tr>
<td>5.2</td>
<td>Landscape Periods</td>
</tr>
<tr>
<td>5.3</td>
<td>Relationship of Landscape Periods to other Chronological Schema</td>
</tr>
<tr>
<td>5.4</td>
<td>Area Sur Excavations</td>
</tr>
<tr>
<td>5.5</td>
<td>West Field Excavations</td>
</tr>
<tr>
<td>5.6</td>
<td>La Banda Excavations</td>
</tr>
<tr>
<td>5.7</td>
<td>Sources of Spatial Data</td>
</tr>
<tr>
<td>5.8</td>
<td>Datapoints used in landscape reconstruction</td>
</tr>
<tr>
<td>7.1</td>
<td>Myths of Nature</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Location of the study area</td>
</tr>
<tr>
<td>1.2</td>
<td>Local geomorphology</td>
</tr>
<tr>
<td>1.3</td>
<td>Site sectors</td>
</tr>
<tr>
<td>1.4</td>
<td>Site features</td>
</tr>
<tr>
<td>1.5</td>
<td>Excavation history at Chavín</td>
</tr>
<tr>
<td>1.6</td>
<td>Stratigraphic exposure cut by the Río Wacheqsa</td>
</tr>
<tr>
<td>1.7</td>
<td>The Cochas earth flow, looking southwest</td>
</tr>
<tr>
<td>1.8</td>
<td>Remnant megalithic wall on the east side of the Mosna River</td>
</tr>
<tr>
<td>3.1:</td>
<td>Profile of the Central Andes</td>
</tr>
<tr>
<td>3.2:</td>
<td>Elevation zones around Chavín</td>
</tr>
<tr>
<td>3.3:</td>
<td>Slopes in the Chavín region</td>
</tr>
<tr>
<td>3.4:</td>
<td>View east across the valley of the Mosna</td>
</tr>
<tr>
<td>3.5:</td>
<td>Geographic distribution of paleoenvironmental archives in the Andes</td>
</tr>
<tr>
<td>3.6:</td>
<td>Holocene Climate Reconstructions for the Central Andes</td>
</tr>
<tr>
<td>3.7:</td>
<td><em>Polylepis</em> specimen</td>
</tr>
<tr>
<td>3.8:</td>
<td>Eucalypts in Chavín area</td>
</tr>
<tr>
<td>3.9:</td>
<td>Richard Burger’s excavations at Chavín</td>
</tr>
<tr>
<td>4.1:</td>
<td>Excavations in La Banda</td>
</tr>
<tr>
<td>4.2:</td>
<td>Estimates of the extent of Janabarriu-Phase Settlement</td>
</tr>
<tr>
<td>4.3:</td>
<td>Dave Keefer examines an existing stratigraphic exposure</td>
</tr>
<tr>
<td>4.4:</td>
<td>View of prominent geologic features</td>
</tr>
<tr>
<td>4.5:</td>
<td>The valley-damming landslide</td>
</tr>
<tr>
<td>4.6:</td>
<td>Remnant wall in a modern agricultural field, north of town</td>
</tr>
</tbody>
</table>
4.7: Network of monitoring points on the Cochis earth flow......................111
4.8: View east down the Wacheqsa River.............................................117
4.9: View of West Field...........................................................................120
4.10: Stone architecture in the cut of the Wacheqsa River........................122
4.11: Stanford Project excavations in the West Field................................123
4.12: Stratigraphy of Units CdH-WF-10/10A and CdH-WF-11..................124
4.13: LP-1 landslide in the West Field....................................................126
4.14: Mito-style structure excavated in Unit CdH-WF-07/07A....................127
4.15: Fluvial deposits visible in and adjacent to Unit CdH-WF-11...............128
4.16: Late Holocene evolution of the Wacheqsa River channel...............129
4.17: Horizontal extent of fluvial deposits in cut on south side of
      the Wacheqsa River......................................................................130
4.18: Canal outlet and associated architecture in the Wacheqsa cut............131
4.19: Quartzite fins north of the Wacheqsa River....................................132
4.20: West profile of Unit CdH-AS-02....................................................134

5.1: Stratigraphic exposures documented in 2004 fieldwork......................142
5.2: Area surveyed in 2004.....................................................................144
5.3: Contreras’ 2005-2006 excavations and stratigraphic exposures...........147
5.4: Section of wall in the Area Sur exposed by undocumented excavation....148
5.5: A sample of the Chavín GIS, showing various data layers.................156

6.1: Reconstructed LP-1 Mosna River course.........................................168
6.2: Relation of Stanford excavations and surface features to hypothesized
      Mosna course..............................................................................170
6.3: Cut drawing (E-W) of Unit CdH-AS-02............................................172
6.4: Megalithic wall on east side of the Mosna River.............................175
6.5: Mosna-containment wall as exposed by Unit CdH-LB-21/22,
      with cut drawing.........................................................................178
6.6: Photo and profile drawing of the south profile of Unit CdH-LB-22.......179
6.7: Map of fills, walls, and Stanford excavations..................................183
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.8</td>
<td>East side of Structure A</td>
</tr>
<tr>
<td>6.9</td>
<td>Wall fragments retaining investigated fills</td>
</tr>
<tr>
<td>6.10</td>
<td>Wall fragments retaining as yet uninvestigated sediments and/or fills</td>
</tr>
<tr>
<td>6.11</td>
<td>Drawing of north profile of Unit CdH-WF-09</td>
</tr>
<tr>
<td>6.12</td>
<td>East profile of Unit CdH-AS-01</td>
</tr>
<tr>
<td>6.13</td>
<td>Plaque recovered from Unit CdH-AS-01</td>
</tr>
<tr>
<td>6.14</td>
<td>Units CdH-AS-03/03A/03B, AS-04, and AS-05</td>
</tr>
<tr>
<td>6.15</td>
<td>Cut drawing (E-W) of Units CdH-AS-03/03A/03B</td>
</tr>
<tr>
<td>6.16</td>
<td>Sample of decorated ceramics from Unit CdH-AS-03/03A/03B</td>
</tr>
<tr>
<td>6.17</td>
<td>South profile of Unit CdH-AS-04</td>
</tr>
<tr>
<td>6.18</td>
<td>The Area Sur in 2004, pre-excavation</td>
</tr>
<tr>
<td>6.19</td>
<td>North profile of Unit CdH-LB-23</td>
</tr>
<tr>
<td>6.20</td>
<td>Unit CdH-WQ-05</td>
</tr>
<tr>
<td>6.21</td>
<td>Schematic of present and hypothesized past slopes of the Cochas earth flow</td>
</tr>
<tr>
<td>6.22</td>
<td>Sample of Janabarriu-style ceramics from Unit CdH-WF-07</td>
</tr>
<tr>
<td>6.23</td>
<td>Datapoints used in the landscape reconstruction</td>
</tr>
<tr>
<td>6.24</td>
<td>Raster representation of cumulative landscape change since LP-1</td>
</tr>
<tr>
<td>6.25</td>
<td>Inferred LP-1 geomorphology</td>
</tr>
<tr>
<td>6.26</td>
<td>Perspective view of landscape change</td>
</tr>
</tbody>
</table>
CHAPTER 1
INTRODUCTION

1.1. Overview

One of the ongoing foci of research into the origins of social complexity has been largely congruent with a fundamental question of ecological anthropology: whether humans structure their environments or are structured by them. This question has stimulated diverse theoretical debates in the last half century (for summaries see Biersack 1999; Erickson 2000; Orlove 1980; Scoones 1999). The research emphasis has oscillated between extremes derided as environmental determinism on the one hand and cultural constructionism on the other (for samples of invective see Brumfiel 1992; Erickson 1999; Kolata 2000; Tilley 1994). An added dimension, in recent years, has been the potential contribution of such studies to modern research into human ecology. Several arguments that archaeology’s long-term perspective has much to offer to studies of sustainability and modern conservation and/or restoration efforts have been offered (e.g. Fisher and Feinman 2005; Hayashida 2005; Redman 1999; van der Leeuw and Redman 2002).

The research presented here links questions of human-environment interaction and emergent sociopolitical complexity in the context of the Central Andean Formative Period, at the early monumental center of Chavín de Huántar (see Figure 1.1). Archaeologists have long argued that Chavín was a significant early center—that is, a locus of emergent sociopolitical inequality. The nature of such ceremonial centers during the Formative Period, and thus their implications for processes of emergent authority, has been a long-term focus of Andean research (e.g. Aldenderfer 2005; Burger and Salazar-Burger 1986; Donnan 1985; Kaulicke 1998; Kembel and Rick 2004; Lumbreras 2005; Stanish 2003).
Moreover, the investigation of Andean prehistory has incorporated a significant consideration of environmental issues and factors since Julio C. Tello proposed that the major cultural divisions in Peruvian prehistory mapped onto geographic ones—into the categories of *selva*, *sierra*, and *costa* (Tello 1930). The dramatic contrasts in Andean ecosystems and the putative marginality of several of the environments have lent
themselves to many studies of past and present human-environment dynamics in the region, from a variety of theoretical perspectives (e.g. Ellenberg 1979; Lentz 2000; Rick 1980; Shimada 1987; Tosi 1960). The particularities of the Andean environment have figured prominently in several influential archaeological approaches to sociopolitical development in the region (e.g. Aldenderfer 1998; Moseley 1975; Murra 1972). A related but somewhat theoretically distinct body of work has focused on the construction and meaning of cultural landscapes of the Andes, past and present (e.g. Erickson 2000; Moore 2005; Reinhard 1985). Moreover, the broad issue of human-environment relationships has also periodically intersected investigation into the origins of sociopolitical complexity (e.g. Chapman 2003; Crumley 1994; Earle 2001; Flannery 1972; Hastorf 1990; Smith 2003; Trigger 1971, 1990).

The link between this scholarly tradition and archaeological understandings of Chavín de Huántar is explicit in the work of Luis Lumbreras, who has suggested that the development and control of specific esoteric knowledge about the environment was the key to early social differentiation in the Andes (Lumbreras 1987, 1993, 2005). Richard Burger’s work at Chavín was also informed by this strong tradition of environmental study in the Andes, drawing particularly on Murra’s notions of verticality (e.g. Miller and Burger 1995), and focusing also on Chavín’s location as a crossroads of environmental macro-regions.

Recent work in the monumental core of Chavín has focused more on architecture than environment, leading to the development of a model of “built authority” at Chavín—a vision of monumental construction and ritual practice at the site as part of a carefully designed elite project of naturalizing social inequality and elite authority (Kembel 2001; Kembel and Rick 2004; Rick 2004). Such a model, primarily the result of a dramatically-improved understanding of the complex architectural sequence at the site, rests on several inferences about the relationship of the monumental center of Chavín to its support population, who, it is argued, were also the target audience for its symbolic message. That population necessarily incorporated a substantial local component (labor force and audience), and archaeological interest in Chavín has for decades been piqued by evidence that there was also a regional component (tributaries, allies, pilgrims, competitors).
My work links this local approach to sociopolitical dynamics at Chavín with broad-based approaches to Andean human-environment dynamics, suggesting that interaction with and informed manipulation of the local environment formed a key part of the legitimation and institutionalization of sociopolitical inequality at Chavín. Such a perspective has come out of archaeological and geomorphologic work at and around Chavín, focused as much on the near periphery of the site as on the monumental core. That investigation leads me to argue that a significant part of the monumental project at Chavín consisted of the modification of the surrounding landscape. This, in turn, leads to a consideration of the nature of the monumental center itself, and the role of environmental engineering in Chavín’s changing sociopolitical setting. What did it mean, I ask here, to build and maintain a ceremonial center in the midst of a dynamic—and risky—environment? I use the material remains of the anthropogenic landscape associated with the site to explore Chavín’s interaction with and perception of its environment, and consider the role of the dynamic environment, and modification thereof, in the site’s sociopolitical trajectory.

1.2 Research Problem

Kembel and Rick have argued, based on the long trajectory of monumental construction, the high degree of centralized planning evident, and the very nature of the architectural complex, that the monumental architecture at Chavín is consciously designed to create spaces in which visitors were impressed, bewildered, and rendered susceptible to suggestion. This architectural project, Rick (2004) emphasizes, was carried out in service of attempts to reinterpret traditional shamanistic beliefs to create, nurture, and institutionalize authority—that is, to naturalize sociopolitical inequality. These arguments have followed earlier interpretations (e.g. Burger 1984; Lumbreras 1989, 1993; Patterson 1971) in seeing Chavín as a cult center, but, with a Marxian spin, have placed more emphasis on the intentionality of the process and the utility of the cult center for emergent elites wanting to foster increasing sociopolitical stratification. In this Kembel and Rick have differed strongly from Burger, who sees the cult center instead as a more Durkheimian force of social cohesion (Burger 1992).
Missing from these discussions has been direct evidence of who (and how many) the local support population of the site were, how they lived, and how they were implicated in the activity of the monumental center (Kembel 2001:247-250). As Rick has recently noted, “Certainly the organization based at Chavín needed the support of local populations and even indirect support by distant populations in the form of contributions of labor or material channeled through their own elite.” (Rick 2004:82) This echoes Burger’s argument for an extra-local component: “The resident population in Chavín de Huántar would never have been large enough to supply the manpower to construct the Temple and maintain the specialists concerned with it (priests, sculptors, etc.).” (Burger 1984:248) These questions have traditionally been addressed through regional settlement survey, following the strong Andean tradition of such studies (e.g. Billman and Feinman 1999; Earle, et al. 1987; Parsons, et al. 2001; Stanish 2001; Willey 1953). In the New World as well as the Old, regional survey has been effectively used to address questions of population size, aggregation, and relationship to the environment. The importance of regional survey data, as well as the potential difficulty of obtaining it, is well summarized by Mark Aldenderfer’s recent treatment of the Andean highlands (Aldenderfer 2005:25). Such studies have been of particular interest where it has been possible to couple these longitudinal measures of demographic and residential change to accounts of coeval social and political change (e.g. Bandy 2001, 2004; Wilkinson 2003). At Chavín, settlement survey could provide much-needed measures of population size and nucleation, both key political variables for Chavín’s development. Furthermore, excavation of the sorts of domestic areas one may hope to locate through extensive survey also offers a means of assessing the relationship of domestic practice and ritual to public, political ritual—an issue potentially key to understanding the emergence of authority (see Lucero 2003).

Settlement survey thus appeared to offer a means of identifying Chavín’s support/target population, and of shedding light on changes in the size and organization of that population during the multi-century lifespan of the monument. Previous surveys in the region (Amat Olazabal 1975; Diesl 2004; Espejo Nuñez 1951) have focused on identification of major sites rather than the creation of settlement models; recent surveys elsewhere in the sierra of Ancash have developed robust data for later
periods but have reported little for the Formative (Herrera 2004; Ibarra Ascencios 2004; Orsini 2004). Fieldwork carried out between 2000 and 2004 in the valley around Chavín revealed that the paucity of local settlement models, and perhaps even the scarcity of settlement data for the Formative Period in the region, reflected as much a pragmatic surrender to surface visibility of remains as any preferential focus on monumental remains or late occupation.

Geomorphologic mapping of the area, carried out in 2004 in collaboration with Dr. David Keefer of the U.S. Geological Survey, demonstrated that much of the valley consists of geologically active earth flows (see Formation Qls in Figure 1.2). The downslope transportation of sediment associated with these features has served, even in the geologically brief post-Chavín era (~500 B.C.E – present) to obscure paleo-surfaces around the monument. Richard Burger had noted this difficulty in the 1970s; the clear delimitation of the affected areas, combined with the results of rescue excavations carried out in 2003, demonstrated that the scope of the problem was immense. Burger noted following his work at the site that, “the principal impact of the slides and other downslope movements of material is to obscure the location and patterning of the ancient settlement at Chavín de Huántar.” (Burger 1984:14). He pragmatically chose to address the problem by investigating local sites least affected; Waman Wain and Pojoc, for example, are mid-valley sites that sit atop outcrops, making them sediment donors rather than recipients (see Burger 1982). As a result, they do not suffer the problems of site burial associated with the valley floor and the immediate periphery of the monumental center.
Figure 1.2: Local geomorphology; note that the 1945 aluvión deposit is not shown and the underlying relationships are inferred instead.
Within the core of the monumental center, in contrast, excavations have revealed structural foundations as much as 5 m below modern ground surface, in spite of six decades of excavation at the site (Kembel 2001). In the near periphery of the monumental core, salvage excavations carried out in 2003 revealed widespread, substantial, and deep domestic construction that had been invisible on the surface (Rick 2004; Rick, et al. 2004). Moreover, as Kembel and Rick note, “the site appears to have been substantially larger than what is visible today, with large platforms west of the monumental center almost wholly buried over the centuries (Rick, et al. 1998), and underground galleries existing south and north of the center.” (Kembel and Rick 2004:59) My fieldwork in 2005 and 2006 confirmed this inference by producing new evidence of large-scale construction outside of the area traditionally understood as the monumental center (see Figure 1.3). This evidence is discussed in detail in Chapter 6.
Figure 1.3: Site Sectors
The fieldwork of this project consisted of a combination of fine-grained geomorphologic mapping of the valley and strategic excavations in the near periphery of the monumental core. The data have been integrated in a project GIS, both for management purposes and to enable the reconstruction of the pre-Chavín landscape, as a means of addressing questions about rates of natural landscape change and anthropogenic modification. Ultimately this combination of methods is intended to allow characterization of the reciprocal human-environment dynamic at Chavín. Before turning to the details of that project, however, some review of the cultural and chronological setting of the site is necessary.

1.3 Significance of Chavín

In order to contextualize the present project, I include here a brief discussion of the site of Chavín and the history of research at the site. The ceremonial center of Chavín sits at 3150 m elevation in a high valley on the eastern side of Peru’s Cordillera Blanca, at the confluence of the Mosna and Wacheqsa rivers. The site, a complex of stone-faced platform mounds, terraces, and sunken plazas (see Figure 1.4), dates to roughly 1500-500 B.C.E. (though the chronology is not completely settled; see Kembel and Rick 2004:62). The platform mounds incorporate a complex and interconnected accretion of subsurface galleries that have been home to some of the most spectacular archaeological finds at Chavín (see Lumbreras 1993; Rick in press) and have figured prominently in reconstructions of ceremonial practice at the site. These galleries have now been mapped in detail, and provide valuable information about the site’s construction history (see Kembel 2001). In addition, the site is honeycombed with smaller subsurface constructions: ventilators, drains, and canals, many yet-unmapped.
Figure 1.4: Site Features
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 1943 publication of his work (see Tello 1943). One of only a handful of monumental highland sites from this early period, it has been the subject of interpretive extremes. These vary about two major axes: the nature of Chavín’s apparently pan-Andean influence and the interpretation of its development. Along the first axis, Chavín has been described as the center of Peru’s autochthonous mother culture (see Tello 1960) at one extreme and suggested as a relatively late and synthetic center of cultural developments derived from the coast (see Burger 1981) at the other. Along the second axis, Chavín has been variously interpreted as a center of coast-jungle cultural synthesis (see Tello 1943), a pilgrimage and cult center with ideological sway over much of the Central Andes (see Burger 1988; Lumbreras 1993; Patterson 1971), an example of the early development of the Andean State (Lumbreras 2005), and a locus of the development of authority and sociopolitical complexity (Kembel and Rick 2004). As Moore points out, there is however, “a consensus rare among Andean archaeologists…and even among scholars of different theoretical stripes (e.g. Patterson 1971; Rowe 1962)...that Chavin was principally the seat of religious power.” (Moore 2005:56)

These divergent understandings of the nature of the site have been the product, in part, of the conflation of attempts to understand Chavín—the site—with attempts to understand the Chavín—the phenomenon. The latter refers not to site-specific developments, but to the spread, over both coastal and mountainous areas of the Central Andes, of the style and iconography associated with—though not necessarily derived from—Chavín de Huántar. This stylistic affinity led Tello to define what he termed the “Chavin megalithic culture” (Tello 1943:154), and to John Rowe’s definition of the period as the Early Horizon (Rowe 1967a). The recognition and definition of the Chavin Horizon spawned a considerable literature (Benson 1971; Patterson 1971; Tello 1960; Willey 1951), which eventually was critiqued and revised (e.g. Burger 1985, 1988, 1993; Pozorski and Pozorski 1987). Discussion focused on the tension between Tello’s claim that Chavin de Huántar was the origin of the Chavin style and mounting evidence that Chavin-style iconography in coastal Peru predated
that at Chavín. Recently, however, claims that Chavin was more a late, culturally synthetic center than an innovator have been challenged by Rick and Kembel’s work at Chavín, which has re-opened the debate by demonstrating an early (approximately 500 BCE) terminal date for the site (Kembel and Rick 2004:62; Rick 2004:73).

Serious archaeological investigation of the site of Chavin began with Julio C. Tello, who first visited the site in 1919 but did not excavate on a large scale until 1942, four years after Wendell Bennett had placed a series of test pits throughout the site (Bennett 1944; Lumbreras 1989; Tello 1942, 1943). A year after Tello’s last season of excavation, in 1944, the site was re-interred, and many of Tello’s stored finds lost, when a catastrophic debris flow—known locally as an aluvión—swept over the monument. That catastrophe was followed by several decades of dedicated labor by the site’s government commissioner, Marino González, who conducted extensive work throughout the site. Although his stated mission was one of conservation and restoration, González discovered several hitherto unknown galleries and cleared many areas that Tello had not previously excavated. González’ involvement with and intimate knowledge of the site spanned the research of several archaeologists, from Jorge C. Muelle in 1955 to John Rick in the late 1990s (Rick and Mendoza Rick 2003).

Other significant post-aluvión archaeological projects include most notably the work carried out between 1966 and 1973 by Hernán Amat and Luis Lumbreras (Lumbreras 1977, 1989, 1993). Their project was followed by undocumented work by Rosa Fung in 1973-74 (Burger 1998; Lumbreras 1989), by Richard Burger’s 1975-76 work, carried out outside the monument proper (Burger 1982, 1984, 1998), by the as-yet unpublished excavations in the early 1980s of Federico Kauffman Doig and Francisco Iriarte (Lumbreras 1989), and most recently by the ongoing Proyecto Stanford, begun in 1994 under the direction of John Rick (Kembel and Rick 2004; Rick 2004; Rick, et al. 1998). Figure 1.5 shows the locations of these various excavations, mapped as precisely as publications and oral history allow.
Figure 1.5: History of documented excavation at Chavín. “Other” category includes excavations by Muelle, Fung, and Kauffman and Iriarte. A notable absence is the extensive cleaning carried out by Marino Gonzales (see Rick and Mendoza Rick 2003).
In spite of the centrality of the Chavín Horizon in discussions of Peruvian prehistory, archaeological research at Chavín itself has not been overshadowed by the broader debate. If it was generally interest in the origins and meanings of the Chavín style that turned archaeological attention to the site, it was often the excavation itself that held the attention. This was due as much to the scale and sophistication of the architecture as to the substantial corpus of lithic art in the Chavín style. Tello’s work demonstrated the possibilities of finding substantial lithic art in excavation, began to suggest the scale of the site’s architecture, and linked stratigraphically excavated Chavín ceramics to other Central Andean sites. Even six decades of excavation later, impressive finds are not unusual, and the sociopolitical setting of the art and architecture has become a focus of research. Moreover, some of the basic parameters of the site—e.g. physical extent and chronology—continue to surprise.

What is most noteworthy, for the purposes of this project, about this near-century of intensive archaeological excavation of the monument is the general confinement of research to the monument proper. There are notable 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, 1998), 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 1955). Broad regional surveys have also been carried out by Hernán Amat and Wilhelm Diessl, both focused on the identification and characterization of visible sites (Amat Olazabal 1975; Diessl 2004). John Rowe, guided by Marino González around Chavín in 1961 and 1963, saw enough to lead him to argue that Chavín had been surrounded by a large settlement (Rowe 1967b:302). However, the salient point is that the near periphery of the site remains largely unknown—or, at least, poorly represented in published data. Rowe’s conclusion regarding the settlement surrounding the monumental core was apparently impressionistic; he cites no specific evidence. The surveys carried out by Espejo Nuñez, Amat, and Diessl were not focused specifically on Chavín and did not attempt to address problems of site burial, but rather sought to identify sites at the regional scale. Burger’s sample was necessarily opportunistic, and while he recognized the problems created by the valley’s
buried sites, he worked around them rather than confronting them (Burger 1984:11-14). Rescue excavations carried out east of the Mosna in 2003 strongly suggest, however, that downslope deposition has been sufficient to obscure settlements substantial and dense enough to force reinterpretation of the character of Chavín’s support (and target) population (Rick, et al. 2004).

As noted above, excavation at Chavín has largely been driven by attempts to characterize the relationship between the site of Chavín and the broadly defined Chavín Horizon (Bennett 1944; Benson 1971; Bischof 1998; Burger 1985, 1988, 1992, 1993; Lumbreras 1989, 1993; Willey 1951). This has resulted in excavation primarily directed at defining the monumental core (Bennett 1944; Lumbreras 1977; Tello 1943) and understanding the site chronology (Bennett 1944; Burger 1981, 1984; Lumbreras 1977). The tactical approach of these excavations has been, with the exception of Burger’s work, to expose as much of the monumental Chavín-period stone architecture as possible. The earliest work was straightforwardly exploratory (Bennett 1944; Tello 1943); all subsequent work has been complicated by the presence of up to 5 m of sediment deposited by the 1945 *aluvión* (though much of this has been cleared in subsequent decades).

In both areal and volumetric terms, no-one has excavated more than Hernán Amat, but his work remains unpublished; the legacy of his excavation is much of the exposed Chavín architecture visible today. Judging from what is visible (and can be ascribed, via the oral history of archaeological work at Chavín, to his efforts), his goals seem to have been removal of the remaining *aluvión* deposit, full exposure of architectural features in the site center, and exploratory excavation on a fairly large scale in the site’s near periphery. In contrast, the concurrent work of Luis Lumbreras was focused intensively on one area of the site core, where his team excavated the Circular Plaza and the adjacent Ofrendas gallery. Where Amat seems to have been concerned with defining the spaces of the site, Lumbreras’ goal was an understanding the social processes that created those spaces, inasmuch as he saw in Chavín the origins of the Andean State (Lumbreras 2005).

The other significant body of published work regarding excavations at the site comes from Richard Burger. Seeing some of the fundamental descriptive parameters
of the site as still poorly defined, Burger aimed his work—a series of excavations on
the site periphery and further afield in the valley in the mid- to late 1970s—at creating
a ceramic chronology for the site and understanding the changing sociopolitical setting
of the site over time (Burger 1984). Two decades after Burger’s work, Rick and
Kembel began a mapping project at Chavín (Rick, et al. 1998); that project continues,
and has broadened both conceptually and tactically, to include not only spatial
documentation of the known monumental architecture but also further excavation,
aimed at exploring the implications of the original mapping project.

The theoretical underpinnings of investigations at Chavín have changed during
this span, roughly reflecting the evolving theoretical commitments of twentieth-century
archaeology. Tello and Bennett were culture historians first and foremost, and their
fieldwork at Chavín reflected a desire to use architecture and material culture to
effectively systematize the chronology and cultural variability of Peruvian prehistory.
Indeed, Tello’s single most substantial and lasting contribution to Peruvian
archaeology may have been his addition to the existing Wari/Tiwanaku and Inca
Horizons of Chavín as a third major cultural complex preceding the other two.¹
Rowe’s work—though it did not include an excavation component—was motivated by
a similar commitment to using Chavín’s material culture to understand Peruvian
culture history, primarily through assessing intra-site stylistic variation and change and
regional stylistic affinities (Rowe 1962, 1967a).

These culture historians were followed by researchers motivated more by
questions of social process, as a result partly of the advances in cultural history made
by their predecessors and partly of shifting interests in the discipline. Lumbreras’ work
was explicitly theoretical, displaying a Marxist concern with attempting to understand
the social processes underlying the creation and function of the site. Burger, similarly,
was interested in underlying social processes, but reached very different conclusions
than Lumbreras. Lumbreras argues that, “Entre los años 1500 y 500 a.C., el territorio
central andino recompuso totalmente su modo de vida y una nueva formación social,
de carácter clasista, se instaló allí de modo generalizado. Chavín es solo el ejemplo

¹ This was partly motivated by Tello’s indigenist political stance; he was driven by the search for
autochthonous origins for Peru’s pre-Columbian civilizations.
más significativo de este proceso.” Burger understands Chavin to be a reflection of a similar trajectory, but with distinct causality, writing,

> If a subgroup within a small-scale, weakly differentiated society on the coast or highlands claimed economic and social prerogatives previously absent, and could implement these privileges through their association with supernatural forces and their exchange links with comparable subgroups elsewhere, the other households might have found themselves in a situation...[in which they could] either accept the new asymmetric socioeconomic arrangement or risk perishing in unsettled areas where no infrastructure exists. (Burger 1992:225)

The difference is linked to their contrasting theoretical approaches to early complex societies. Lumbreras takes an explicitly Marxist approach to what he views as the emergence of the Andean State, seeing changes in the means and control of production as causal of larger social phenomena. Burger owes more to Durkheim in viewing ideology as a sociopolitical driver.

The distinction between the two of them is, overall, between Lumbreras’ view that the Andean development of the State recapitulates the Marxist metahistorical narrative and Burger’s historical particularism with regard to the Andes. Burger writes, “the data available suggest that the developmental trajectory followed in Peru may represent a pathway dissimilar from those documented elsewhere, and that the organization of early Andean civilization may have been fundamentally different from those civilizations in the Old World and Mesoamerica.” (Burger 1992:9). The contrast with Lumbreras’ view is stark: “la tesis de V.G. Childe acerca de la necesidad de un proceso revolucionario en el tránsito hacia la primera formación clasista, enunciado sobre la base de la experiencia del Viejo Mundo, encuentra plena confirmación en el examen de las evidencias que nos entrega la experiencia central andina.” (Lumbreras 2005:254) While Lumbreras and Burger, thus, rarely differ significantly in their reconstructions of Andean prehistory, they conceptualize it at a meta-level in very different terms.

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2 “Between 1500 and 500 B.C., the Central Andean area completely remade its way of life and a new social formation, of a class nature, established itself there in a generalized way. Chavin is merely the most significant example of this process.” (My translation).

3 “V.G. Childe’s thesis regarding the necessity of a revolutionary process in the transition to the first class society, articulated on the basis of the Old World experience, finds full confirmation in an examination of the evidence offered us by the Central Andean experience.” (My translation).
As the theoretical commitments of archaeologists interested in Chavín have varied, so, similarly, have interpretations of the genesis and sustaining dynamics of Chavín. Of particular interest—and a clear source of disagreement—has been the question of what sociopolitical dynamics underlay the construction, expansion, and elaboration of the monumental architecture. There has been broad agreement that Chavín spans a period of significant sociopolitical change in the Andes (Burger 1992; Lumbreras 1989; Rick 2004); arguments have focused on the drivers of that change, and even on the sociopolitical organization of the polities involved. Broadly speaking, the question may be characterized as one of whether Chavín is to be understood as reflective—and constitutive—of emergent sociopolitical inequality or, instead, as reflective—and reinforcing—of communitarian ideology. Explicitly theorized interpretations have been offered by Lumbreras and Burger, and more recently by Rick and Kembel. I both draw on and contribute to these debates, addressing the issue by changing the scalar focus—including, that is, setting as well as site. In the process, I have had to rethink the traditionally-drawn boundaries of Chavín de Huántar.

1.4 Methodological Concerns

“The whole tactics and technique of archaeology are different in the highland.”
(Kroeber 1927:631)

The valley’s active geomorphology has both methodological and theoretical consequences, resulting in two major challenges to research at Chavín: 1) confronting the problem of archaeological visibility, and 2) understanding the implications of limited visibility for human-environment dynamics at the site. The first problem is, in effect, a more extreme version of the sampling problem that confronts archaeologists at any site: assessing the nature of the known (excavated or surveyed) sample by estimating the extent and character of the unknown. The second problem involves using those conclusions to reassess the scale, construction, and setting of the site. Examining the site’s setting in detail reveals the pervasive anthropogenic modification of the landscape. That landscape modification, coupled with the geomorphologic
dynamism of the physical environment, has significant implications for the site’s sociopolitical underpinnings.

Simply gaining access to Formative Period deposits involves excavation of as much as four meters of natural and cultural strata. As a result, large exposures of Chavín-era surfaces are difficult, expensive, and time-consuming—even deciding where to dig is a significant challenge. The problem is reminiscent of Flannery’s description of the twin challenges of understanding Formative Period communities in Mesoamerica: “(1) How can I get a representative sample of the surface remains of a Formative community, and (2) How can I excavate a representative sample of a Formative community?” (Flannery 1976:50). Part of the solution that he and Marcus Winter offer lies in site selection—avoiding deep sites—and the entire exercise is dependent on relating surficial finds to subsurface remains. Neither remedy is suitable for Chavín—we cannot choose another site, and surficial analysis gives few clues about subsurface remains. Flannery’s challenge, then, is one that excavation strategy at Chavín must address.  

Invisibility of paleo-surfaces—primarily the result of burial by 2-3 millenia of downslope movement of sediment—demands a creative and novel means of assessing the presence and nature of archaeological remains. This was approached through the combination of survey and mapping, use of available stratigraphic exposures, and strategic deep excavation. The survey and mapping focused more on geomorphologic context than absence of surficial archaeological material, ultimately demonstrating that in this context absence of evidence is not evidence of absence. More importantly, this combination of methods demonstrated that the invisible at Chavín is not insignificant: what is invisible at Chavín, and the reasons for its invisibility, have substantial implications for understanding both what Chavín was and its developmental trajectory.

The scope of the problem has been dramatically demonstrated by investigations in La Banda, an area across the Río Mosna from the monumental core. In this area (also known as Gaucho) survey in 2000 (undertaken as part of the Proyecto Stanford 4 While some efforts at remote subsurface geophysical survey have been made at Chavín (see Rick, in press), their focus was on understanding the monumental core itself rather than addressing the areal extent of the monument or assessing the extent of site burial. It should be noted, though, that these techniques seem a promising means of addressing Chavín’s challenges (see Williams et al. 2004).
by John Wolf, the author, and a team of undergraduate students) revealed scattered artifacts but did not identify any areas as densely settled. This characterization was put to the test in 2003, when road construction and subsequent rescue archaeology revealed a remarkably dense and deep Chavín-period occupation (see Rick 2004; Rick, et al. 2004). The contrast between survey and excavation in the La Banda area may be ascribed to down-slope deposition of sediments (primarily colluvium), which excavation demonstrated to have been occurring both during and after the prehistoric occupation of the area.

Identification of the problem of invisibility at Chavín, and understanding of the reasons for that invisibility, raises a series of significant theoretical issues. Recognition that site burial at Chavín is a consequence of the location of the site in such a geomorphologically dynamic environment prompts consideration of the local human-environment dynamic during the lifespan of the ceremonial center. The question of timing and causes of geomorphologic activity is critical. In the case of Chavín, the vital question is whether the documented geomorphologic dynamism has been a relatively constant background (whether gradual or punctuated) to human activity in the valley, or if it instead represents an anthropogenically or climatically induced post-Chavín change from a previous stable state.

The question is particularly germane given studies of the issue in the Mediterranean region, where van Andel and colleagues have argued for the anthropogenic origin of many of the late-Holocene sediments (van Andel, et al. 1986; van Andel, et al. 1990). The contrasting view—also pertinent for the Andes—of climatic change as precipitating erosion also has adherents (e.g. Bintliff 1976; Hassan 1985). At Chavín, however, our mapping and documentation of exposures demonstrate that earth flow activity and downslope deposition were occurring both prior to and after Chavín-period construction. This is vividly demonstrated by the exposures visible in the cut of the Rio Wacheqsa (see Figure 1.6). Paleoenvironmental background, refined geomorphologic chronology, and a thorough catalog of anthropogenic landscape modification associated with the monument are used here to approach the question of Chavín’s relationship with the local environment. These are the foci of Chapters 3, 4, and 6, respectively.
Figure 1.6: Stratigraphic exposure on the south side of the Wacheqsa River, as documented in 2004. Units CdH-WF-10/10A and CdH-WF-12 were located here in 2006 (see Figure 4.12).
I have addressed the question through geomorphologic mapping of the valley, excavation in areas of the site’s near periphery directly impacted by documented earth flows, and establishment of a program of monitoring the activity of the earth flow that most prominently threatens the site (see Figure 1.7). The mapping project served to identify several local earth flows, and highlighted the scarcity of visible paleosurfaces in the area (see Figure 1.2). The excavations, and the juxtaposition of datable cultural features with sediment deposits (visible both in excavation and in natural exposures; see Figure 1.6), currently offer the best means of dating earth flow activity in the area and assessing the timing and degree of landscape activity. The monitoring project offers an independent check on those estimates of rates of landscape change.

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5 This monitoring program serves both to generate estimates of rates of landscape change and to provide a measure of the degree to which the earth flow poses a conservation problem for the archaeological monument.
Figure 1.7: Cochas earth flow, looking southwest (monumental core of Chavin in foreground).

(Photo courtesy Dave Keefer).
In order to characterize landscape modification in spite of the burial of paleosurfaces, a combination of geomorphologic mapping, survey, and excavation was undertaken in the field. Geomorphologic mapping, carried out in collaboration with Dr. David Keefer of the U.S. Geological Survey, involved landform mapping based on stereographic overlap in aerial photographs from the Peruvian Servicio Aerográfico Nacional. Keefer’s resulting sketch map of the valley was ground-truthed in 2004 by Keefer and the author, using the aerial photographs and a handheld GPS unit to document natural exposures—primarily road- and river-cuts—throughout the valley. The identification of the several earth flows impinging on the core archaeological area was critical in the placement of the excavations undertaken in 2005; those excavations were placed in areas deemed most likely to feature buried architecture and potential inter-bedding of natural and cultural strata (see Figures 1.3 and 1.6).

While the results of the fieldwalking survey were largely not reflective of distribution of prehistoric remains (for reasons made clear by the mapping outlined above), the project did allow precise documentation of still-visible features. Archival photographs—predating the 1945 aluvión—from Julio Tello’s expeditions⁶ were also consulted. These efforts resulted in documentation of widely scattered remnant construction, primarily river control structures and terracing/retaining walls (for a prominent example, see Figure 1.8).

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⁶ Housed in the Tello Archive of the Museo Nacional de Arqueología, Antropología, e Historia in Lima.
Figure 1.8: Remnant megalithic wall on the east side of the Mosna River, across from the monumental core.
The excavations carried out in 2005 explored the scale, purpose, and dating of some of these structures, and added massive platform fills to the catalog of engineering efforts. Prior Proyecto Stanford excavations had also documented massive fills and landscape modification (Rick 2004:80), but exclusively within the monumental core of the site; my 2005 excavations extended the boundaries of the zone understood as monumental to include areas west, south, and east of the core, more than doubling its size (see Figure 1.3). In this effort, it proved possible (and necessary) to use a series of small, deep excavations to good effect in spite of their obvious limitations. The use of small exposures of deep stratigraphy, in this context, was necessitated by the depositional problems confronting excavation at Chavín. The scattered excavations also served to broadly sample contexts in which earth flow and site architecture were expected, based on the mapping and survey, to be interbedded.

The results of this fieldwork (and of other Proyecto Stanford excavations and survey) were integrated into a site GIS, from which an interpolated pre-temple landscape could be generated. While obviously an imprecise tool, this allows quantification of the labor involved in the construction of the site (broadly construed), and provides data for more thorough consideration of the planning processes involved in Chavín’s construction as well. More importantly still, the creation of a site GIS offers a means of addressing—at least as far as large-scale landscape engineering is concerned—the basic archaeological problem of inference from scattered and small excavation units.

While the precise dating of landscape activity remains to be accomplished, the interbedding of substantial archaeological features by slope processes—as demonstrated by my 2004 fieldwork—strongly suggests that geomorphologic activity was characteristic of the valley during the Formative Period. The overlap of geologic and archaeological timescales at the site demonstrates that burial of archaeological features at Chavín is not simply a post-depositional challenge to archaeological understandings of the site, but rather an indication of dynamic processes that would have confronted the builders and inhabitants of Chavín as much
as later observers. This has important implications, to which I will return in the next section.

1.5 Anthropological Context and Theoretical Considerations

There is much about Chavín’s landscape to suggest that it was neither easy to modify nor a passive template onto which cultural desires could be writ. Prominent amongst the characteristics of the local environment are dynamism and risk. Using risk and natural disaster as a lens through which to examine human-environment dynamics has been a strategy pursued by several anthropologists, and at least a few archaeologists (e.g. Bawden and Reycraft 2000; Moseley, et al. 1981; Oliver-Smith 1986; Oliver-Smith and Hoffman 1999). Oliver-Smith argues for the utility of disaster as a heuristic: “the nature of disaster is rooted in the co-evolutionary relationship between human societies and natural systems.” (Oliver-Smith 1999:31) This is suggestive of a human-environment reciprocity, a perspective particularly relevant to understanding Chavín, where the long record of human occupation and corporate activity at the site offers a window into the role of risk and disaster in emergent sociopolitical inequality.

Very modern evidence of the potential for environmental disaster at Chavín has confronted every archaeologist to work at the site since 1945. The event that produced that evidence bears description, as it is revealing about the character of the local environment: In January 1945, near the headwaters of the Río Wacheqsa on the eastern slope of Central Peru’s Cordillera Blanca, the normally placid waters of Laguna Ayhuinayaraju were disturbed by a landslide, causing the lake to breach the terminal moraine behind which it had accumulated and empty itself into Laguna Carhuacocha. The result was an estimated 900,000 m$^3$ slurry of ice, rock, earth, and water—known in the Andes as an *aluvión*—that descended the Quebrada Wacheqsa, averaging a speed of 32 km/h (estimates from Indacochea G. and Iberico M. 1947). At the Wacheqsa’s terminus, where it feeds into the larger Río Mosna, the *aluvión* roared over the archaeological monument of Chavín de Huántar and a portion of the adjacent modern town of Chavin. Within the site, a contemporary structure housing
lithic art collected by Peruvian archaeologist Julio C. Tello was completely destroyed, the site itself was buried by up to 4 m of sediment, and the extensive underground galleries were largely filled by the pressurized injection of aluvión material.

Modern populations in the Cordillera Blanca live in the shadow of such geologic catastrophe. In the last sixty years alone notable geologic disasters have included debris flows—aluviones—that swept through the Cordillera Blanca towns of Huaraz (1941), Chavín (1945), Ranrahirca (1962), and most disastrously Yungay (1970). As the 1945 aluvión, coupled with frequent landslides and slumps, demonstrates, the valley in which Chavín sits is an area—like much of the Cordillera Blanca—of extreme geomorphologic dynamism. This environment poses a constant threat to modern settlement, and would have been similarly menacing to prehistoric populations. The possibility that this sort of chronic but aperiodic and thus unpredictable risk may have played a role in the emergence of social complexity has stimulated many researchers in broadly similar contexts (e.g. Bawden and Reycraft 2000; Fagan 1999; Lumbreras 1987, 1993; e.g. Moseley, et al. 1981).

Environmental risk may be paired—not, I would argue, opposed—with anthropogenic modification of the landscape. At Chavín, the scale and character of environmental modification is such that that modification may clearly be considered as more than practical effort at risk management. Thus, the substantial modification of the landscape immediately around the monument proper offers evidence that the monumental project encompassed more than just the erection of the structures that comprise the ceremonial core. Rather, it included also substantial modification of the monument’s setting—primarily canalization of rivers and construction of megalithic terracing.

Moreover, inasmuch as the site is built in such a geologically dynamic highland valley, its builders had to cope with environmental hazards. This prompts the question of whether they planned for such hazards—or even took advantage of them—as well. Examination of the nature and extent of that planning allows assessment of the role that environmental modification played in the process of naturalization of sociopolitical inequality at Chavín. Evidence of large-scale
landscape modification and attempted management of substantial environmental risk shed light on prehistoric perceptions of the local environment, abilities to affect that environment, and the ways in which those perceptions and abilities intertwined with apparently waxing sociopolitical inequality over time.

Recent work at the site has engaged questions of emergent sociopolitical inequality by addressing the role which monumental construction played in establishing and naturalizing authority at Chavín during the Initial Period and Early Horizon (Kembel and Rick 2004). Kembel and Rick have argued strongly that the architectural sequence at Chavín is evidence of an elite-planned construction project designed, at least in part, to further establish sociopolitical inequality in the area (Kembel 2001; Kembel and Rick 2004; Rick 2004). Rick has argued, with regard to the function of Chavín, that,

Likely humans recognized the potential of conscious manipulation of belief systems in a strategized trajectory toward greater levels of realized power. What form this conspiracy-like forethought might have taken remains to be seen, but I believe the sophistication seen at Chavín argues for the primacy of the manipulative model of theocratic formation, at least at this point in the evolution of inequality in the Andes. (Rick 2004:86)

Understanding the causes of emergent sociopolitical inequality is significantly dependent on clearly defining exactly what is implicated in the change in question. Thus, while Rick’s statement above has uncontroversial underpinnings—the suggestion that Chavín was one of the Central Andean centers of directional sociopolitical change would nowhere excite much comment—the model of elite-directed, strategic change that he suggests is hotly debated.

My work contributes to this debate by providing further evidence. In arguing for a deliberate, strategized development (“building”) of authority at Chavin, Rick and Kembel have focused primarily on the architectural elaboration of the monumental core. Work of the Proyecto Stanford at Chavín has also hinted, however, at substantial—and successful—landscape modification during the Initial Period and Early Horizon, in the form of river canalization, reclamation of the riparian corridor for construction, and megalithic terracing (see Kembel and Rick 2004; Rick 2004; see Turner, et al. 1999). The now-destroyed stone bridge over the
Río Wacheqṣa, though its antiquity is disputed, might also be construed in these terms (Espejo Nuñez 1958). My work has amplified this picture with further evidence of constructed platforms to the south and west of the monumental core, definition of the megalithic terracing east of the Río Mosna, and evidence of an early ceremonial structure at the site’s western extreme.

That research is described here in terms of the implications of the near periphery of the site for these arguments about the sources of sociopolitical change, with the investigative focus shifting from the construction and manipulation of architectural space to the management and modification of the local environment. Investigation of that periphery, particularly the excavations undertaken in 2005, has produced further evidence of the scale and better defined the character of the environmental engineering around the monumental core, suggesting that landscape modification comprises a significant part of the project that is Chavín de Huántar. The scalar shift outward from the monumental core prompted recognition of the need to incorporate to a greater degree an additional element into understandings of the site. In the geomorphologically dynamic context of the Mosna Valley, any interaction with the local environment would necessarily have been fraught with risk. Monumental construction and landscape engineering in such a setting, in fact, directly confront geologic hazards. Understanding of these risks and Chavín’s interaction with them, as well as the scale of landscape modification of the site’s near periphery, has reinforced arguments for the strategized engineering of authority at Chavín.

Two foci of investigation result: first, the relationship of landscape modification, coupled with monumental architecture, to the changing sociopolitical fortunes of Chavín’s constituents and designers; second, the role of environmental risk—as recognized threat, structuring influence, and/or source of power—in the long-term success (perhaps as much as a millennium of monumental activity) of Chavín.

Addressing these two broad issues involves immersion in several anthropological debates/discussions. These range from the role of landscape, risk, and setting in emergent inequality to the interplay between structure and agency to
the materialization of power, and are centered around the fundamental question of the nature of human-environment dynamics in a setting of emergent inequality. The reason that these various theoretical issues are of interest here is that they all are means of approaching the relationships between the various pieces of evidence in play. If the point of departure is that 1) Chavín incorporates substantial environmental engineering, and 2) Chavín’s lifespan as ceremonial center is coeval with the development and naturalization of sociopolitical authority, then we are confronted with the challenges of both demonstrating the validity of each proposition and of exploring the relationship between the two. Several theoretical approaches to authority are suggestive of links, and the data in question allow some degree of exploration of those theoretical propositions.

Definitional issues have, to this point, remained implicit, as I have used the terms “authority” and “sociopolitical inequality” relatively interchangeably. I will continue to do so, with the clarification here that the aspect of inequality to which I mainly refer is its legitimation and institutionalization (hence the modifier sociopolitical). That is, the simple presence of power differentials in the sociopolitical life of a community—which I take to be both omnipresent and protean in their configurations—is of less interest than the instances in which (and means by which) those differentials harden into institutional social facts. The focus on naturalization makes that change of interest as much as a social phenomenon as a political one, and the role of material culture in the transformation has been a recent focus of archaeological research (DeMarrais, et al. 1996; Earle 2001). The process—glossed as the creation of authority—might be understood as the fading of the social practices that sustain inequality into the unconscious realm of habitus (Bourdieu 1977) as much as it might be characterized as the successful creation by elites of a hegemonic false consciousness. Indeed, such differences in characterization are the tinder for debates that occur in spite of broad agreement about the parameters of the prehistoric trajectory in Peru.

It is important to recognize from the beginning that at Chavín we (so far) lack the data (that is, information about domestic settings) to adequately test any of these various theoretical notions. However, what we do have is material that prompts
creative approaches to the theoretical issues involved. Specifically, Chavin’s setting resists characterization as either straightforwardly determinant of inhabitants’ behavior or wholly created by inhabitants’ activity. This is, perhaps, a fairly banal claim that might be made of any landscape—but the archaeological literature on landscape and environment is littered with such polar approaches (e.g. Bradley 1993; Erickson 1999; Kolata 2000; Thomas 2001; Tilley 1994; Wilson 1999). Chavin, by displaying both structuring and created elements, dramatically demonstrates the folly of such polarity, bringing to mind Wylie’s description of the basic archaeological aspiration: “how to interpret archaeological data as evidence so that despite its theory-ladenness, it retains a capacity to challenge our expectations about the past and even, on occasion, to subvert the framing assumptions that inform the research enterprise as a whole.” (Wylie 2002:19) Indeed, I began my work at Chavin expecting—and hoping for—a story of development constrained, and perhaps ultimately, in good parable fashion, curtailed by environmental factors. To an extent, that is what I found—but even in the uncompromising Andean highlands, I also found a landscape remarkable for the degree to which the modern natural appearance hides prehistoric engineering.

What has resulted is an intellectual need to marry disparate—and generally polemically opposed—approaches to an archaeological landscape that features both evidence of substantial anthropogenic modification and an active physical environment. This encourages consideration of the human-environment relationship at Chavin as a reciprocal and dynamic one, in which each affects the other. The site setting must be understood as both reflective of human activity and as structuring that activity. Approaches to archaeological landscapes that have managed to avoid the determinist and subjectivist extremes have set this example, as in Wilkinson’s 2003 work:

the development of different landscapes is contingent upon both local ecology and social or cultural factors. …landscape development also entails interactions between various driving and feedback mechanisms such as demographic growth, climatic fluctuations, human-induced degradation of the landscape, and a wide range of social, historical, and political factors. (Wilkinson 2003:3)
This both echoes the themes of geomorphologic chronology in the Mediterranean and suggests the role that geoarchaeological studies may play in addressing sociopolitical questions.

The project of landscape modification at Chavín, considered in the sense described by Wilkinson above, is suggestive of several archaeological arguments about the use and purpose of monumental construction, ranging from testimony about scales of labor mobilization to suggestion of design expertise to assertion of elite power (DeMarrais, et al. 1996; Earle 2001; Feldman 1987; Kolb 1994; Trigger 1990). Chavín is all the more evocative in this sense if broadly conceived as including not just the architectural features of the ceremonial core but the engineered landscape as well.

The characterization of the monument as materialized elite power is only strengthened by a consideration of the potential role of environmental risk in the Chavín elites’ project of engineering their environmental and sociopolitical setting. The monument’s deliberate situation and persistence in a particularly risky area suggests a symbolic dialogue between the monument and the power inherent in Chavín’s surroundings. Geomorphologic mapping of the valley demonstrates that placing the monument even a few hundred meters further north would have made it much safer; moreover, the monument’s long lifespan strongly suggests that ignorance of geologic hazards was unlikely. If simple practical concerns of risk avoidance did not drive the siting of the complex, several other possibilities come to the fore.

That monument might be seen as drawing upon the environmental power that is focused on that area, or as asserting immunity to or control over that power. Moreover, the constant background of environmental risk may have proved a useful tool for aspiring elites, who might well have found their way to further power by managing and/or exploiting the fear generated by that risk. Elites were certainly forced to confront environmental risk as they embarked on a program of monumental construction at Chavín; the very scale and power of the landscape itself may also have served as a creative opportunity for elites to further demonstrate, materialize, and naturalize their power. Massive environmental modification, as much as
monumental construction, seems to have served strategic elite ends. Such an argument, in turn, suggest that Chavin’s designers understood and exploited the potential of landscape as structuring setting, and may have exploited environmental risk as an element of that setting as well.

I begin with a discussion of the intellectual history and theoretical context (Chapter 2), before turning to more practical concerns. An argument focused on geomorphologic dynamism and anthropogenic landscape change must consider local paleoenvironmental conditions; I use regional data to address local paleoclimate and paleoecology in Chapter 3. With this background in place, I turn to a description of the local geologic setting and Holocene geomorphology (Chapter 4). This is followed by a detailed description of field methodology and analytic technique (Chapter 5). Chapter 6 details the results of my investigations, focusing particularly on the extensive evidence for anthropogenic landscape changes and the reconstruction of a pre-monument landscape. Finally, I conclude with a synthesis of human-environment interactions at Chavin de Huántar, and consider the general theoretical implications of this evolving community inhabiting a dynamic landscape.
Attention to human-environment relationships in the Andes has a long and distinguished history. This attention is due historically to perceptions of many Andean environments as marginal, with resultant surprise at their abundant capacity to support substantial human populations nonetheless. The tight packing of diverse environments and the dramatic climatic variability typified by El Niño have also drawn attention. While the Andes are not a neatly bounded natural laboratory (see Kirch 1997 on the Island Pacific), the juxtaposition of environmental extremes (i.e. wet/dry, high/low) that they provide has been similarly tempting for scholars of human-environment interactions.

I focus here on a brief characterization of some of the concepts key to describing Andean environments. These are also addressed in more detail in Chapter 3. I also consider here the ways in which the particular ecology of the Andes has informed archaeological research in the region, discussing the key archaeological approaches, over the last century, to human-environment relationships in the Andes. These approaches, I argue, reflect two overlapping trends. First, the global trend of scholarly description of humans in relation to their environments as first reactive, then proactive, and more recently interactive identified by van der Leeuw and Redman (2002) is evident. Second, in the Andes, as I discuss below, this trend has been complicated by its intertwining with an increasing recognition of the size and environmental impact of native populations.

From these trends, I turn to recent archaeological treatments of human-environment dynamics. I focus particularly on recent work on Andean landscapes, before turning to the application of these perspectives to archaeological interpretation at Chavín.

2.1 Andean Ecology
The Central Andes are notable for the way in which the steep topography has resulted in highly diversified ecological zones within short horizontal distances. East-west transects across the Central Andes pass from the Amazon Basin to the Pacific Coast in under 200 km, passing over peaks that can crest 6000 m and through multiple ecological zones. These were classically described by the geographers Javier Pulgar Vidal (1981, originally published 1946), Joseph Tosi (1960), and Carl Troll (1968).¹ Their work drew on both scientific description of ecological zones, defined by such geographic factors as altitude, temperature, insolation, etc. (particularly Tosi and Troll) and the identification of indigenous ethno-classification of altitudinal and ecological zones (Pulgar Vidal). These coarse-grained, sweeping studies have been complemented by detailed examinations of the ecological situations of particular communities (e.g. Brush 1976, 1977; Mayer 1979; Winterhalder and Thomas 1978 among others) and theoretical refinements that have problematized the rigid boundaries and sharp contrasts of the zone model while accepting its broad parameters (e.g. Dollfus and Lavallee 1973; Zimmerer 1999; Zimmerer and Langstroth 1993).

This vertical zonation, even if conceptualized as having patchy, overlapping boundaries, creates dramatic ecological contrasts within relatively short horizontal (and travel) distances and structures the productivity of the landscape at both macro- and micro-scales. The broad climate pattern of the Central Andes is the result of the combination of north-south spine of the Andes paralleling the coastline and the upwelling associated with north-flowing longshore Humboldt Current. These factors combine to create the stark coastal desert dissected by comparatively well-watered valleys fed with highland precipitation and glacial melt. The contrast in temperature between the cold Pacific waters and the warm desert prevents precipitation at low altitudes, while the height of the Andes prevents Atlantic-derived moisture from passing further west. Altitude is thus, on the western slope, a key determinant of precipitation as well as temperature.

The resulting vertically stacked zones were classified into eight “natural regions” by Pulgar Vidal. Roughly following Andean ethno-classification, he

¹ The publication dates cited here are of the most commonly cited works, but do not indicate an intellectual succession. Troll seems actually to be the conceptual forebear of Pulgar Vidal and Tosi, as well as John Murra (see Gade 1996).
identified eight distinct zones, moving broadly from west to east. These corresponded to coast (chala, 0-500 masl), lower slopes and highland valleys (yunga (500-2300 masl), quechua (2300-3500 masl), and suni (3500-4000 masl)), high grasslands (puna, 4000-4800 masl), high mountains (janca, 4800-6768 masl), cloud forest (rupa rupa, 400-1000 masl on the eastern slope), and jungle (omagua, 83-400 masl on the eastern slope) (Pulgar Vidal 1981). Tosi and Troll proposed finer distinctions, recognizing latitudinal and local variance in the altitudes of the life zones that Pulgar Vidal described. Tosi, using a system of landscape classification by vegetative potential (basically temperature, precipitation, and evapotranspiration), produced a classification of Peru into 34 “life-zones” with distinct suites of flora (Tosi 1960). Troll also focused on the vertical zonation of the Andean landscape, mapping Andean vegetation and inferring (micro)climatic variation from those distributions (see Gade 1996; Troll 1968). As Craig points out, however, all of these systems are vegetative zones rather than truly ecological ones, as for practical reasons they consider (at best) flora but not fauna (Craig 1985).

At the micro-scale, vertical zonation is visible—if complicated by other factors in addition to altitude—in the Andean landscape. While the convenience of the concept of altitudinal bands keeps its use common, other key factors such as aspect, slope, soil depth and quality, local mean temperature, and frost risk create local patchiness and overlap of vegetative zones (e.g. Dollfus and Lavallee 1973; Gade 1996; Zimmerer 1999). Moreover, the picture is more complicated yet with regard specifically to crop distributions, as their dispersal owes much to agricultural preference and practice, land tenure, and land modification as well as variability in environmental factors (Gade 1996; Zimmerer 1999).

This highly variegated landscape is also subject to significant seasonal and annual variability in precipitation. Rainfall in the highlands is rare in the austral winter and common in the austral summer, while on the coast moisture-bearing fog is a feature of the austral winter. Interannual variability in precipitation can also be dramatic and further emphasized by the roughly decadal occurrence of El Niño events.

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2 Strictly speaking, a transect would be likely to cross again through puna, suni, quechua, and yunga in descending the eastern slope of the Andes.
that can bring torrential rain to the coast and drought to much of the highlands. This modern pattern appears to have been established by approximately 3000 BP (see Sandweiss, et al. 2001; this pattern, and its establishment, is discussed in more detail in Chapter 3).

2.2 Humans in Andean Environments

Scholarship dedicated to the adequate description of the particular geography of the Andes dates back at least as far as Guaman Poma, who tried to convey the particularities of the Andean landscape in his famous missive to Spain: “And you should know that this kingdom is folded like a starched collar, that there are places half a league apart as the crow flies; where to descend to the river is four leagues, and to ascend the other side another four leagues.”\(^3\) Guaman Poma, like many human and cultural geographers who followed him, was interested in the topography of the Andes primarily for the human implications of such a landscape. Similarly, the descriptive environmental classification schemes developed by Pulgar Vidal, Tosi, and Troll were explicitly focused on the agricultural and subsistence implications of Andean geography.

These attempts to characterize the capacities and constraints of the Andean landscape were to be complemented—and in some cases challenged—by archaeological investigations of past human occupation and use of that landscape. Whereas the geographical studies generally examined either current species distribution or some measure of environmental potential, and inferred human use, archaeological studies were able to empirically examine past human use of the landscape and critically assess generalized arguments about environmental potential or the antiquity of species distributions.\(^4\) At least, conceptually they were able to do

\(^3\) “Y aúes de sauer este reyno es muy doblado como un quello almedonado, que hay lugar de un buelo tiene media legua; al auajar al río tiene quatro leguas y la subida, otros quatro leguas.” (plate 1000, http://www.kb.dk/permalink/2006/poma/info/en/project/project.htm) (My translation).

\(^4\) These contrasting approaches—privileging abstract characterization of some calculable natural potential versus assessing empirical evidence of past use—are also described by Dollfus (1982:39) with regard to historical, rather than archaeological, research. Archaeological research has also served to challenge characterizations of Andean environments as marginal by appealing to evidence of their intensive use in prehistory (e.g. Rick 1980, Erickson 2000).
this—in fact doing so required some theoretical shifts within archaeology itself (to which I turn later in this chapter).\(^5\)

Geographic attention to the Andes, then, has been accompanied by archaeological attempts to characterize the effects of that environment on human occupation. This has been a focus of at least some strands of Andean archaeology since the discipline’s early years, as increasingly has the converse—the impact of the human occupants on Andean environments. The description of vertical ecological zonation was most famously applied to Andean archaeology in John Murra’s elaboration of the concept of the vertical archipelago, or pattern of direct control by past Andean societies of territory in multiple altitudinal zones (Murra 1972; Murra 1985). Murra was by no means, however, the first to consider the implications of Andean geography for the region’s Pre-Columbian peoples.

Most simply, the critical importance of water as an agricultural resource in Peru’s coastal valleys has long been recognized—indeed, its centrality is so obvious, the constraint so apparent, that it perhaps may have stimulated early attention to ecological factors in Peruvian archaeology. Even some of the early attempts to define Peru’s culture history included attention to environment and ecology. Kroeber’s recognition of the potential for prehispanic irrigation agriculture in Peru’s coastal valleys led him to note, in an article otherwise dedicated to the cultural typology of Peruvian prehistory, that “the difference between Coast and Highland is great enough to make the environments a definite element to be considered in the tracing of cultural relations.” (Kroeber 1927:652)

Water as a limiting resource was central to the selection of a coastal valley as the unit of analysis for the first great investigation of cultural ecology in Peru, the Virú Valley Project (Willey 1953). A similar focus on the importance of fresh water as resource explicitly informed the early work of Kosok (1965), and prompted focus on

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\(^5\) This contrast is what led to Troll’s failure to recognize the legacy of human activity in modern distributions of Andean flora (see Gade 1996:313); in contrast, Budowski (1958) offered an early warning against incautiously inferring past species distributions from present ones, given the various forms of anthropogenic disturbance that affected modern distributions, and Ellenberg (1979) prominently argued for prehistoric human deforestation of the high Andes. Recent research on this issue is described in Chapter 3.
the Peruvian coast as a laboratory for examining Wittfogel’s hypotheses regarding the links between irrigation and developing social complexity (e.g. Price 1971).

The seminal contribution of Moseley’s 1975 *The Maritime Foundations of Andean Civilization* (subsequent challenges notwithstanding) was the recognition of the role that marine resources played in altering the environmental constraints of the Andean coastal desert; in this sense it was an eminently environmentally-oriented work. This suggestion that marine resources offered a means of escaping the tight resource constraints of the Peruvian coast added a dimension to studies of human-environment interactions on the coast that the majority of subsequent work has embraced (even when not agreeing with Moseley’s conclusions). This sort of emphasis on subsistence informed a large body of archaeological research that approached environment as important both as resource base for early foraging populations and basis of production for increasingly complex sociopolitical formations (e.g. Osborn 1977; Quilter and Stocker 1983). Potential and realized resource intensification, generally either through changing technology of exploitation or landscape modification, also became an important focus (e.g. Parsons 1970; West 1981).

Changes in these coastal environments became a concern as well, with attention drawn to the effects of changes in sea level on coastal resources (e.g. Richardson III 1981) and of tectonic activity on irrigation systems (e.g. Moseley 1983; Moseley, et al. 1983). Most saliently, attention to the importance of the resource base on the coast led to another environmental concern, which became the exemplar of environmental variability and potential disaster: the prehistory of El Niño. Interest in the ability of Pre-Columbian societies to survive (or fail to) the dramatic environmental perturbation of El Niño—and investigation of the antiquity of the phenomenon itself—has been a significant feature of Andean archaeology in the last three decades. Paleoenvironmental indicators of warming of marine waters and associated catastrophic flooding on the coast (e.g. Keefer, et al. 1998; Moore 1991; Nials, et al. 1979; Sandweiss, et al. 2001; Sandweiss, et al. 1996) and associated drought in the altiplano of the South-Central Andes (e.g. Binford, et al. 1997; Thompson, et al. 1985) have been correlated with the florescence and collapse of multiple Andean polities,
with varying degrees of subtlety (e.g. Paulsen 1976; Sandweiss, et al. 2001; Shimada, et al. 1991; Williams 2002).6

It is also noteworthy that attention to ecological factors in the highlands, where ecological limits are less stark, was similarly early. Tello suggested a link between the diversity of Andean environments and development of prehistoric cultures as early as 1930: “It is logical to think that agriculture and stock-raising assured the welfare and stimulated the growth of the population in proportion to the greater or lesser extension of the lands possessed and the facilities which the geographic environment offered for their benefit.” (Tello 1930:260)

This attention to environment as something more than backdrop for culture history was somewhat prophetic. As ecologically-oriented archaeology found an important natural laboratory in the coastal valleys of Peru, so eventually would it look to the highlands, in the form of both catchment-area settlement archaeology (MacNeish, et al. 1983; Parsons, et al. 2001) and excavation of deeply stratified deposits covering the entire history of human occupation of the high Andes, from the Late Pleistocene to the present (e.g. Lavallee 1982; Lynch 1967, 1980; MacNeish 1979; Rick 1980). This long time span focused interest on environmental—particularly climatic—changes, especially the Pleistocene-Holocene transition and glacial retreat (e.g. Aldenderfer 1999; Cardich 1985; Dollfus and Lavallee 1973; Hansen, et al. 1984; Rick 1983; Wright, et al. 1989, among others).

This research, like that on the coast, often included a significant interest in how (and whether) highland environmental resources provided a basis for human subsistence (e.g. Lynch 1967, 1971; Rick 1983). Dollfus and Lavallee foreshadowed this interest in 1973: “La variedad de las facetas ecológicas (geofacies) de potencialidades diferentes y complementarias hace de las grandes montañas tropicales un campo geográfico fácil de ser utilizado por grupos humanos que dispongan de una herramienta limitada.” (1973:76)7 This interest in the vertical variegation of Andean

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6 For a more thorough description of reconstructions of prehistoric El Niño patterns, see Chapter 3.
7 “The variety of ecological niches (geofacies) of differing and complementary potentials makes the great tropical mountains a geographic space that is easily exploited by human groups possessing limited technology.” (My translation).
resources—and their complementarity—is evident in much subsequent work (e.g. Aldenderfer 1993; Hastings 1987; Shimada 1987; Stanish 1989).

These convergent interests of archaeologists and geographers resulted in some synthetic publications aimed at analyzing what was distinctive about traditional human-environment interactions in the Andes (e.g. Masuda, et al. 1985; Moseley 1975; Onuki 1982). Such convergence has become more common in the last two decades. Exploration of Andean environments as contexts for human prehistory has continued, and studies of Andean environments as modified by human activity have burgeoned. These are to be found in both coastal and highland research, and include both reconstructions of environmental degradation resulting from prehistoric activity (e.g. Park 1983) and studies of deliberate anthropogenic modification of Andean landscapes, generally for enhanced subsistence (e.g. Chepstow-Lusty and Winfield 2000; Denevan 2001; Erickson 2000; Hastorf and Johannessen 1996; Kolata 1991; Stanish 1994).

A related but distinct focus has been the impact of dramatic environmental variation (e.g. drought, tsunami, earthquake, El Niño) on Pre-Columbian populations (e.g. Binford, et al. 1997; Bird 1987; Moseley, et al. 1981; Ortloff and Kolata 1993; Paulsen 1976; Reycraft 2000; Sandweiss, et al. 2001; Shimada, et al. 1991). Although many of these publications are relatively nuanced, they have resulted in dispute on the vulnerability of Pre-Columbian populations to environmental variability, with charges of environmental and cultural determinism the currency of debate (e.g. Erickson 1999; Kolata 2000; Moseley 1997). Intertwined in this debate have been several studies that explicitly construe anthropogenic activity as changing local environments and thus adaptive constraints (e.g. Branch, et al. 2007; Burger 2003; Dillehay, et al. 2004; Kolata 2000; Moore 2005; Wells and Noller 1999), and others that suggest environmental variability as a significant but not structuring factor (Chapdelaine 2002; e.g. Moore 1991; Seltzer and Hastorf 1990; Williams 2002). These are in part the intellectual heirs of a series of early suggestions by ecologists of human impacts on ancient Andean environments (e.g. Ellenberg 1979; Seibert 1983).

2.3 Debating Environment, Ecology, and Landscape
The history of Andean scholarship glossed here embodies two significant trends, one broadly characteristic of archaeological interest in human-environment interactions and one characteristic of study of the history and prehistory of the Americas generally. The first is the history of intellectual approaches to human-environment interactions suggested by van der Leeuw and Redman (2002); the second the changing perceptions in the 20th century of the size and sophistication of indigenous populations of the Americas before European arrival (e.g. Lentz 2000).

2.3.1 Studying Human-Environment Interactions

In the Andes, recent archaeological approaches have a varied heritage of human/cultural ecology, landscape archaeology, and historical ecology. The varied inputs of these differing research programs over time are roughly congruent with the tripartite division of academic approaches to human-environment interactions suggested by van der Leeuw and Redman (2002:600). They suggest that the history of academic approaches to human-environment interactions reflects changing perceptions of the nature of that interaction, and loosely define three (more-or-less successive) types of study of humans in their environments: reactive, proactive, and interactive (see van der Leeuw and Redman 2002:600-601). These might be defined, roughly, as understanding humans as 1) at the mercy of their environments, and cultural development as conditioned by environmental potentials and constraints, 2) masters of all they survey, shaping environments to fit cultural needs and desires, and 3) existing in creative tension with their surroundings.

The anthropological question underlying these shifting approaches is a fundamental one: whether humans structure their environments or are structured by them. This question has stimulated diverse theoretical debates in the last half century. The research emphases have oscillated between extremes derided as environmental determinism on the one hand and cultural constructionism on the other; some recent research has attempted to maintain an interest in these issues while moving away from the more dogmatic extremes.
The field of archaeology has taken an interest in human environments almost since its origins, as resource endowments and influences to which cultures had to adapt. Interest in various evolutionary schemes\(^8\) necessitated attention to environments as selecting influences. These functionalist and materialist approaches focused primarily on the relationship between geography and economy, theorizing that evolutionary logic dictated the importance of the environment as a structuring factor in cultural development (Trigger 1971).

The cultural ecological approach represented a more holistic, less strictly economic, interest in the environment, as did the ecosystems approach prominently advocated by Binford (1962) and Flannery (1972) (see Preucel and Hodder 1996 for a summary). Some attempts to more closely integrate archaeology into the natural sciences also fall into this category (e.g. Butzer 1982). The modifier “ecological” (like “landscape”; see below) encompasses a wide variety of theoretical and methodological approaches when attached to archaeology.

The basic critique of these studies as failing to account for many of the elements (“gender, class, and faction”) that shape human social behavior was forcefully articulated by Elizabeth Brumfiel (1992). She drew on earlier critiques that faulted ecological approaches for ignoring symbol and meaning and equating simple and generic space with complex and contingent place (see Hodder 1987 in archaeology; Tuan 1974 in geography). Ecological approaches also had their more sympathetic critics (e.g. Hastorf 1990; Jochim 1990).

The radical critiques (e.g. Thomas 2001; Tilley 1994)\(^9\) formed part of the general backlash against materialist and functionalist approaches to human culture (see Preucel and Hodder 1996). This body of work, generally termed landscape archaeology, deliberately focused on landscapes rather than environments as a means of focusing on the human experience of the environment and emphasizing the legacy of anthropogenic activity that shaped local environments (e.g. Ashmore and Knapp 1999; Tilley 1994; Ucko and Layton 1999). In its more extremely postmodern forms, this

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\(^8\) Unilineal and multilineal cultural evolution, and later dual inheritance and human behavioral ecology, to name only the most prominent.

\(^9\) This interchange is exemplary of the processual/postprocessual debate within archaeology (see Trigger 1989).
approach came to consider environments as of interest only as cultural constructs, and significant more for what they reflected about human social activity than for what might be understood about environmental influences on such activity (e.g. Bender 1993; Thomas 2001; Tilley 1994). This included significant critiques of the Cartesian nature/culture dichotomy (Ingold 2000). As Fisher and Thurston emphasize, landscape archaeology thus construed by no means represents a coherent intellectual approach, but rather a diversity of approaches to analogous materials (namely human-environment dynamics in various contexts) (Fisher and Thurston 1999:630).

A recent revival of environmentally-oriented approaches has taken many of these critiques on board while reasserting the importance of human-environment interactions as a research focus (see Scarborough 2003). The importance of such a focus, these scholars argue, is both theoretical and a function of archaeology’s potential to inform contemporary policy-making (e.g. Fisher and Feinman 2005; Hayashida 2005; Kirch 2005; Redman 2005).

2.3.2 The Debate in the Americas: Complicating Trends

The Americas have been an important stage for this debate, and laboratory for testing its postulates. They are a usefully bounded entity, both spatially and chronologically, as Lentz points out: “the Western Hemisphere represents a discrete and easily defined geographic unit with a large landmass uninhabited by humans for most of its evolutionary history.” (Lentz 2000:3) A confounding factor in the Americas, however, has been the legacy of Western suppositions about the continents colonized by Europeans in the sixteenth century. William Denevan neatly articulates this problem in terming it the “Pristine Myth” (1992), and as Stahl soberly cautions, “we must proceed with caution when applying ‘pristine,’ ‘virgin,’ or ‘natural’ as attributes of a pre-Columbian America…and take great care to avoid excess when uniformly ascribing ‘environmentalist,’ ‘conservationist,’ or ‘ecological’ ethics to its inhabitants.” (Stahl:106)

A significant question that has come into focus as the record of anthropogenic influence on the landscape has multiplied (e.g. Denevan 2001; Lentz 2000) is that of
the nature of the human-environment interaction in the prehispanic New World (Krech 1999, 2005). The dissolution of the illusions of both the “noble savage” essentially incapable of modifying the environment and the Arcadian indigene living in unchanging harmony with nature has had theoretical consequences. Approaches based on those fallacies have been replaced by approaches that emphasize environmental plasticity in order to highlight the centrality of indigenous agency (e.g. Erickson 2000), more sophisticated and subtle examinations of environmental influences (e.g. Dillehay and Kolata 2004; Marchant, et al. 2004), and nuanced approaches that see humans and their environments as mutually constitutive (e.g. Dillehay, et al. 2004; Williams 2002).

Recent decades have seen the growth of concern over the length of occupation and degree of landscape modification, and the ways in which that may have distorted traditional reconstructions of human-environment interaction in the Andes (e.g. Denevan 2001). The emphasis of this research trend has been on the long-term successful human occupation of diverse Andean environments. Even if Andean environments are not considered marginal in any pejorative sense of the term, however, the constraints they impose are very real, their thresholds (see Kolata 2000) for supporting intensive and/or extensive human occupation generally near, and the perturbations they experience dramatic.

That this may stimulate extensive human modification of the environment—rather than forcing behavioral/cultural adaptation—is a significant theoretical shift (although it might be argued that environmental modification is in fact a form of adaptation, as a growing evolutionary literature on niche construction posits (e.g. Laland, et al. 2001)). However, it only throws into sharper relief the importance of assessing paleoenvironmental conditions and changes therein. Similarly important is the assessment of anthropogenic influence on those conditions, as well as the contemporary record of sociopolitical change.

Approaches to archaeological landscapes that have managed to avoid the determinist and subjectivist extremes have set begun to outline such a position:

the development of different landscapes is contingent upon both local ecology and social or cultural factors.

...landscape development also entails interactions between various driving and feedback mechanisms such
as demographic growth, climatic fluctuations, human-induced degradation of the landscape, and a wide range of social, historical, and political factors. (Wilkinson 2003:3)

I explore below the recent development of theoretical positions that seek to bridge the ecology-landscape divide.

2.4 Convergence/Rapprochement

A variety of approaches to human-environment interactions within the last decade suggest that some convergence of positions is developing. It seems increasingly obvious that neither extreme position (environmental or cultural determinism) offers an adequate or accurate interpretation of human-environment interactions. Some signs of rapprochement have resulted, from either direction. Evolutionary biology has begun to produce analyses that consider the environment as subject to influence and modification by the organisms that inhabit it, termed niche construction (see Laland, et al. 1999; Odling-Smee, et al. 1996). Analogously, if with different intellectual heritage, archaeological approaches to anthropogenically modified landscapes often recognize that the modification of the environment need not imply that its influence on human activity is wholly managed (e.g. Marchant, et al. 2004). A built environment, a modified landscape, is never entirely manageable, its effects neither necessarily foreseeable, evitable, or alterable. At the same time, human effects on environments—intentional and collateral both—are increasingly recognized as pervasive and of deep antiquity.

Tilley was able to write with at least some justification in 1994 of moving from “the irrational abstracted idealism of a geometrical universal space to an ontological grounding of space in the differential structuring of human experience and action in the world.” (Tilley 1994:11) However, the two-step process that he describes has, I would argue, since been augmented by a third: the re-valorization of space—not as a geometric abstract, nor a simple stage for human action, but as environment/setting: specific, dynamic, and existing in interactive tension with, reciprocally influencing, its occupants.
This need not imply a full break with what has gone before. The term “landscape archaeology” is a labile one, and has already been applied to diverse archaeological approaches (see Preucel and Hodder 1996:32-33). Ideally the term might encompass, “the recognition and evaluation of the dynamic, interdependent relationships that people maintain with the physical, social, and cultural dimensions of their environments across space and over time.” (Anschuetz, et al. 2001:159)

The re-emphasis on the physical environment echoes the approach—developing in parallel to landscape archaeology—of historical ecology, which Crumley defined as, “study of past ecosystems by charting the change in landscapes over time.” (Crumley 1994a:6) Balée has more recently and broadly defined historical ecology in terms similar to those articulated by Anschuetz et al. (see above) as “a research program concerned with the interactions through time between societies and environments and the consequences of these interactions for understanding the formation of contemporary and past cultures and landscapes.” (Balée 2006:76)

While historical ecology also focuses on landscapes, however, it is not identical to landscape archaeology. Where landscape archaeology focuses on the differential experience of the landscape and the social implications thereof, historical ecology is concerned with human-environment interactions (particularly subsistence-related) and the legacy effects of anthropogenic landscape modification. Historical ecologists (among others) have argued that the landscape—as palimpsest resulting from human and natural activity—offers an unparalleled record of such activity (e.g. Balée 2006; Crumley 1994a, 1994b). Historical ecology may be evidence of a renewed convergence in archaeological approaches to the environment, evidenced also by the development of concepts like cultural niche construction (e.g. Laland, et al. 2001).

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10 There is an echo here of some pioneering work in geography, notably that of Carl Sauer (e.g. 1925, 1956). As early as 1925 Sauer was foreshadowing the convergence of viewpoints I focus on in this section: “The works of man express themselves in the cultural landscape. There may be a succession of these landscapes with a succession of cultures. They are derived in each case from the natural landscape, man expressing his place in nature as a distinct agent of modification.” (Sauer 1925:37) In thus recognizing “the agency of man on the earth” (as Sauer would title his 1956 article, published in the seminal volume Man's Role in Changing the Face of the Earth (Thomas et al. 1956)), Sauer was acknowledging the remarkable work of George Perkins Marsh, whose Man and Nature; or, Physical geography as modified by human action (1865) was a century ahead of its time in recognizing human impacts on the environment. Robert Heizer offered an early articulation of this perspective with a specifically archaeological emphasis (1955).
There is much to be gained from such rapprochement. Adam Smith’s recent work on the political importance of landscape offers an excellent starting point. One of the insights of Smith’s approach to landscape as an item in the political economy of a community is his suggestion that “it is quite clear that not all individuals have the same capacity to engage in the production of spaces… There are constraints on the construction of landscapes.” (Smith 2003:70) In other words, if landscapes are socially important (for a variety of reasons), and are (only to some extent, I would argue) culturally created, then individuals with power and/or influence over others will both wield disproportionate influence over the creation of landscapes and have an interest in doing so. Brumfiel’s focus on “gender, class, and faction” is thus wedded to the environment, which here is seen as important not only for its implications regarding ecological needs but also for the political uses to which it may be put.

Such a marriage has some interesting antecedents in the field of environmental history. As in archaeology, debate has focused on the degree to which humans are conceptually separable from the environment, and the possibility (or necessity) of conceiving of an environment as an independent, external influence on human affairs. The possibility of such an “actor”, and its relative importance vis-à-vis such characters as “gender, class, and faction”, has been the focus of considerable reflection (e.g. Cronon 1990; White 1990; Worster 1988, 1990). This interest followed a series of seminal works that incorporated environmental concerns into a traditionally anthropocentric discipline (e.g. Cronon 1983; Simmons 1989).

Within that movement, Steinberg sees this ecological perspective as very much politically aware, and echoes in some ways Tilley’s observation that landscapes are arenas of power relations: “…an ecologically minded and socially sensitive approach will give us a more humble view of human agency as well as a clearer picture of how oppression operates, creating a link between history and matters of everyday existence, survival, and struggle.” (Steinberg 2002:820) Steinberg is writing of the discipline of history, which has come late and lightly to treat the environment as relevant. How ironic, then, that archaeology— which arrived much earlier to a recognition of the importance of environment— has sought to abandon that emphasis as it embraces social
theory. The point, of course, is that the notion that there must be a choice between the two is fundamentally flawed.

2.5 Recent Perspectives on Human-Environment Interactions in the Andes

Even in the context of these theoretical shifts in the field, the utility of the Andes for examining questions of human-environment interaction is clear. Even if Andean environments are not considered marginal in any pejorative sense of the term, the constraints they impose are very real, their thresholds (see Kolata 2000) for supporting intensive and/or extensive human occupation generally near, and the perturbations they experience dramatic. The result is that environmental changes—whether natural or anthropogenic—are relatively likely to result in societally relevant impacts and to leave visible, material archaeological markers. Moreover, the length of human occupation of the Andes and the “mania for earth building” (Parsons 1985, cited in Denevan 1992) of many of those inhabitants has left an often-accessible material record, and the density and placement of human populations (due to imperatives—whether subsistence or social—other than security) in the prehispanic Andes often increased vulnerability to environmental catastrophe or variability.

The Andean region has variously served, thus, as exemplar of human ability to survive and thrive in harsh conditions (e.g. Moseley 1975; Rick 1980), of vulnerability of sociopolitical units to environmental perturbations (e.g. Binford, et al. 1997; Ortloff and Kolata 1993; Shimada, et al. 1991), and of the remarkable capacity of human populations to remake their environments (Erickson 2000; Moore 2005). This interpretive unevenness is testament to both intra-Andean environmental and cultural variability and the diverse research emphases of the investigators.

A further, and distinct, aspect of Andean environments has also historically attracted some scholarly attention. A significant body of ethnohistoric documentation (e.g. the Huarochirí Manuscript (Salomon and Urioste 1991), Albornoz’ Instrucción (Duviols 1984)) testifies to Inca and other Andean conceptions of certain landscape features (springs, rock outcrops, caves, etc.) as sacred elements (huacas), and to the divine significance attached to mountain peaks (apus). These were conceptually tied
together into sacred landscapes (see van de Guchte 1999). As Silverman describes it, “the Andean world was animistic: it was populated with supernatural beings, sacralized mountains, lakes, springs, irrigation canals, boulders and caves, numina-lodging objects, and anthropomorphosized forces of nature.” (Silverman 2004:5) Several archaeological projects have attempted to identify such features, with substantial success (e.g. Bauer 1998; Bauer and Stanish 2000; Glowacki and Malpass 2003; Moore 2005; Reinhard 1985a, 1985b; Reinhard and Ceruti 2005; Zuidema 1962). This interest in the symbolic significance attributed to the landscape by the Inca in some ways foreshadowed interest in symbolic and phenomenological approaches to landscape in archaeology generally, and the combination of Andean ecology and ethnohistory suggests a very real need, in Andean archaeology, for consideration of both ecosystemic and symbolic readings of environments.

A growing literature that explicitly recognizes this need has appeared in recent years. These works consist primarily of approaches that largely maintain the long-established ecological perspective common to Andean archaeology but also consider anthropogenic effects on the environment and diverse human behaviors within an ecological framework (e.g. Burger 2003; Dillehay and Kolata 2004; Hastorf and Johannessen 1996; Wells and Noller 1999). A subset of this work has also considered the symbolic and ideological content of Andean landscapes (e.g. Moore 2004; Moore 2005; Schreiber 2005), with particular attention to cases in which landscapes or landscape features have been physically altered for ideological as well as practical reasons. Moreover, a growing array of projects has recently attempted to examine changing Andean polities in their dynamic environmental contexts (e.g. Huckleberry and Billman 2003; Manners, et al. 2007; Nordt, et al. 2004; Zaro and Umire Alvarez 2005).

2.6 Landscape and Environment at Chavín

The latter category is a particularly apt one for Chavín. As I detail in subsequent chapters, my work suggests that at Chavín there is a significant intellectual need to marry disparate—and often polemically opposed—approaches to the
archaeological landscape. The landscape at Chavín features both evidence of substantial anthropogenic modification and active local geomorphology. This encourages consideration of the human-environment relationship at Chavín as a reciprocal and dynamic one, in which each element affects the other, and in which the landscape serves as testament to that mutual constitution. The site setting must thus be understood as both reflective of human activity and as structuring that activity.

A series of key elements argue for the need for such a model when considering Chavín. Chavín’s environment is significant, I argue, as geomorphologically dynamic landscape, anthropogenically modified landscape, site of potential religious/cosmological significance, and resource endowment. Each of these characteristics—simultaneous cross-cutting landscape identities—might have had political uses for Chavín’s various constituencies. Moreover, each of these facets of the landscape might have been subject to conflict and negotiation within the community. Most importantly, the reciprocal—if not always symmetric—relationship of mutual influence between humans and their environments cuts across those varying landscape identities.

The relationship of landscape change to sociopolitical change is one of the key questions raised by such a theoretical approach to the landscape. Sociopolitical evolution has long been a research focus at Chavín, as the site was one of the earliest and most impressive manifestations of increasing sociopolitical complexity in the central Andean highlands. Most recently, John Rick’s work, focused primarily on the monumental core of the site, has led to development of a model of “built authority” at Chavín—a vision of monumental construction and ritual practice at the site as part of a carefully designed elite project of naturalizing social inequality and institutionalizing authority (see Kembel and Rick 2004; Rick 2004).

My research has suggested that a similar process of conscious engineering of authority to that described above may also occur at a larger scale at Chavín, in the form of substantial landscape modification. In an effort to reconstruct the natural landscape and understand both its influence on Chavín and the human-induced changes to it, this research combined geomorphologic mapping and surface survey with excavations, existing archaeological data on Chavín, and regional-scale paleoenvironmental data.
The resulting array of data suggests that Chavín’s builders heavily modified the environment in the near periphery of the monumental center, building megalithic terraces, canalizing both of the local rivers, and even reclaiming a portion of the riparian corridor for monumental construction. In addition, of course, they engaged in the more quotidian practices of cultivation and pastoralism common to the prehispanic Andes, which also have substantial if less dramatic landscape impacts.

These efforts at landscape engineering, as well as unintentional anthropogenic effects on the environment, existed in tension with the very real—if malleable—constraints imposed by the geologically dynamic highland valley in which Chavín was built. Those constraints are primarily topographical and altitudinal; the valley offers only a small area of flat land suitable for irrigation agriculture (although more than in most comparable valleys), and the upper altitudinal limit for maize agriculture is close enough that the valley slopes are not suitable for cultivation of maize. Geologic risk—of landslide, flood, and seismic activity—is also substantial; the Cordillera Blanca is the site of some of the Andes’ most dramatic and tragic natural disasters in the modern era (e.g. the Yungay debris flow disaster in 1970, which killed ~30,000).

Landscape changes during the period in question include both anthropogenic effects and environmental changes exogenous to human activity. Anthropogenic effects range from very direct and intentional modifications to the landscape—e.g. megalithic terracing, canalization of rivers, platform construction—to inadvertent and less direct effects—e.g. changes in earthflow behavior and erosion due to possible deforestation and/or burning associated with cultivation and/or pastoralism.

Environmental changes relatively independent of human agency include earthquakes, landslides, and fluvial activity.

A substantial and growing body of literature in anthropology and geography has examined such risk the ways in which risk itself is socially constructed as well as a feature of the world external to humans (see Adams 1995; Beck 1992; Douglas and Wildavsky 1982). In the Andes specifically, several researchers have focused on geologic hazards and the ways in which they are locally understood and managed (e.g. Carey 2005; Degg and Chester 2005; Oliver-Smith 1986; Oliver-Smith and Hoffman 1999).
The sociopolitical changes in question are primarily the institutionalization of authority (e.g. Rick 2004), represented in the material record by the increasing ability to mobilize labor, long-term strategic planning evident in the monumental architecture, and corporate construction without apparent material community benefit. This is evident in the changes in character, extent, and distribution of the site’s monumental architecture (e.g. Kembel 2001), landscape engineering (Contreras in preparation), and associated community (e.g. Burger 1984; Mesia in preparation; Wolf in preparation) over time.

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 calls for understanding the site in different terms. It is not simply a ceremonial center; rather, even the landscape is not simply a palimpsest of incidental or collateral effects, but rather displays planning and intentionality.

The scale and ubiquity of landscape modification has important implications for labor mobilization and organization as well as understanding how often and how directly Chavín’s builders/planners/inhabitants were confronting their dynamic environment. An important motivator for coordinated action—whether communal or coerced—may have been the constant presence, and imminence, of an environment at once dynamic and (eventually) created. As I mention above, the later importance of peaks and waterways in Andean sacred geography is well attested, and the sacredness of the landscape in general also a subject of much ethnohistoric comment (e.g. Farrington 1992; Goodman-Elgar in press; Salomon 1991). 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/proprietors of the local landscape, or the two simultaneously—provides us with another avenue of approach to the question of the collective 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 towards this by identifying and documenting both the dynamism of the local landscape and the ubiquity and scale of landscape engineering. 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.

I would add, to Smith’s suggestions (noted above) that not all individuals have equal influence over the constitution of landscapes, the significant addendum that no individual has complete control over that landscape. No matter the political economy of the society in question; the landscape is never a *tabula rasa* and exerts an influence of its own. Where environmental thresholds (e.g. Kolata 2000) are closer, as in the Andes, and where landscapes are particularly dynamic, that influence may be felt more strongly; where landscapes are relatively quiescent it may be felt less strongly. Chavín provides an example of the former. Landscape dynamism, as this project has demonstrated, is a characteristic of the Chavín region (see Chapter 4). Moreover, an abundance of evidence (see Chapter 6) suggests that Chavin’s planners, builders, and/or inhabitants were abundantly aware of the power and significance of their landscape, and aware too of the sociopolitical implications of its construction and modification. After detailing the ways in which that evidence has been assembled (Chapter 5) and its cumulative impact (Chapter 6), I return to the these questions about the role of dynamic and sacred landscapes in sociopolitical change at Chavín (Chapter 7).
As understanding human-environment interaction through study of the landscape is the goal of this research, some background environmental reconstruction is necessary. The challenge of differentiating geomorphologic and anthropogenic landscape change requires an understanding of how landscape processes were functioning during the Chavín period. Chavín’s paleoenvironment is particularly relevant in that precipitation and land cover are critical structuring variables of the geomorphologic activity in the Chavín area—and themselves subject to anthropogenic modification. Those geomorphologic processes and structuring variables themselves are the focus of the next chapter; here I address the background conditions.

Paleoenvironmental variation, then, is relevant for several reasons. Climate—specifically precipitation, and to a lesser degree temperature—has significant potential effects on geomorphologic activity, on land cover; and on cultivation potentials. Paleoecology, similarly, has a structuring effect on landscape activity; land cover in particular has a very direct effect on landslide activity. Ultimately the question is one of the effects of climate and ecology on the validity of uniformitarian assumptions about landscape character and activity in prehistory.

In this chapter I detail Chavín’s environmental setting before turning to the issues of reconstruction of paleoclimate and paleoecology. The subsequent chapter is devoted to the local geomorphology, and is followed by a discussion of the implications of these broad reconstructions—as well as human activity—for the landscape. In the case of both paleoclimate and paleoecology, there is little to no directly applicable local data for Chavín, so I here synthesize published data that address these questions on a regional scale, extrapolating from these regional patterns the relevant conditions in Chavín and checking those patterns against the closest available paleoenvironmental archives. Of particular interest are the types of processes visible in the regional record that would have certainly had local impact—e.g. El Niño.
3.1 Setting

The predominant Central Andean climate pattern is aptly suggested by the names of the two major mountain ranges: the Cordillera Blanca (on whose dissected eastern slope Chavín is located) and the Cordillera Negra, ~30 km to the west across the Río Santa and the Callejón de Huaylas. The two ranges are so named for the glaciation and snow cover of the former; the Cordillera Negra is lower (peaking at 5187 m, versus the 6768 m in the Cordillera Blanca) and its bare aspect reflects the rain shadow of the Cordillera Blanca, as the primary source of precipitation in the Central Andes is the Atlantic Ocean. The prevailing easterlies that are the moisture source also result in humid lowlands—the western reaches of the Amazon Basin—to the east and coastal desert—resulting from the temperature inversion caused by the longshore Humboldt Current and associated upwelling of cold water—to the west (see Figure 3.1).
Chavin, at 3180 masl in the base of a high valley draining the Cordillera Blanca’s eastern slope, sits in the *quechua* altitudinal zone, not far below the transition from *quechua* to *suni* zones (see Figure 3.2 for a simple division following Pulgar Vidal’s classification; more local detail may be found in Miller and Burger 1995; see also Section 2.1). The ridges bounding the valley reach altitudes of ~4500 m, providing substantial areas in the *suni* zone; while elevations are sufficient to reach the *puna* zone, the rolling grasslands of the true *puna* are found only to the south (see
Figures 3.2 and 3.3). Slopes are steep and flat land is at a premium; within the valley the transition from relatively flat riparian land near the upper limit of the *quechua* zone to the steeper and drier valley slopes of the *suni* zone comes within (to use Pulgar Vidal’s coarse typology) 300 m above the valley floor. The abruptness of the transition and the contrast in zones is exacerbated by the fact that only the valley bottom and the very lowest slopes are irrigable, through use of the two major rivers and the small drainages descending the valley slopes, respectively.

![Vertical Zonation around Chavín de Huántar](image)

**Figure 3.2:** Elevation zones around Chavín, following Pulgar Vidal’s classification.
Figure 3.3: Slopes in the Chavín region.
The microzones that Rick describes as characteristic of highland valleys are largely obscured by the heavy anthropogenic signature on the landscape, but the typology is apt nonetheless:

Microzones present in most highland valleys would be 1) narrow riparian corridors following major streams, with low trees, shrub vegetation, and some herbaceous growth; 2) barren xerophytic areas away from streams at lower altitudes and in rainshadows; and 3) increasingly more abundant shrubby and thorn-forest vegetation as a level of 3,600 m is reached, above which the trees and shrubs thin to puna grassland. (Rick 1988:8)

A strong contrast between sheltered arroyos—even where they do not have surface water year-round—and exposed slopes is also evident. The former are filled with trees and shrubs even high on the ridges, while exposed slopes, where not cleared for cultivation, are vegetated almost exclusively with *ichu* and other bunchgrasses.

This spatial diversity is matched by temporal variability. Precipitation in the Central Andean highlands is generally highly seasonal, while diurnal temperature variation is much greater than seasonal distinction. The five months of the wet season—December through April—see the region receive roughly 70% of its annual precipitation. Interannual variation can also be quite high; in Chavín during the period between 1964 and 1985 the mean annual rainfall was 868 mm, but ranged between approximately 500 and 1300 mm (Diessl 2004:38) (see also Burger 1982:5 for comparable figures generated from 1970-75 data). Temperatures vary sharply with elevation (dropping roughly 1° C/1000 m), with the monthly average from the Querococha weather station, ~25 km from Chavín (though on the other side of the Cordillera Blanca), fluctuating within 1° C around the annual mean of 7.7° C. Diurnal variation, meanwhile is as high as 15° C (Diessl 2004:34).

This basic Central Andean pattern is heavily impacted by the climatic fluctuation known as the El Niño-Southern Oscillation (ENSO), a roughly periodic (occurring approximately every 7-10 years) warming of Pacific waters that dramatically affects Andean climate (for detailed description of El Niño impacts see Caviedes 1984; Jaksic 2001) ¹. The influence of El Niño events on the Peruvian coast is clear and dramatic, as torrential rains are the norm during El Niño years. In the

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¹ In addition, much of the attention to the Holocene paleoclimate has had to do with the onset and frequency of ENSO events (e.g. Moy et al. 2002, Ortlieb and Macharé 1993, Sandweiss et al. 2001).
highlands, however, the effect is much less plain—which there seems to be some
correlation of El Niño events with highland drought (their correlation with drought in
the Altiplano of the South-Central Andes is well-attested, but the effect in the Central
Andean highlands is less clear), there may also be an association with periods of
elevated rainfall bracketing the drought period (Diesl 2004:43-44). The limited data
from the last four decades do suggest, however, that El Niño events have resulted in
drought in Chavín (see Diesl 2004:43-44).

As the majority of the agriculture in the Chavín region is rain-fed, drought can
have serious consequences. Burger estimates that only 5% of the total agricultural land
around Chavin is irrigated, and suggests that technological improvements could not
raise that proportion past 10% (Burger 1982:4). The stretch of flat land on which the
modern town is located provides a basin suitable for irrigation agriculture, while the
valley slopes, as is common in the modern Andes, are today a patchwork of rain-fed
agricultural fields (*chacras*) in spite of the steep (~20° to ~35°) slopes (note the
patchwork of fields in Figure 3.4). According to Miller and Burger,

> the *kichwa* [quechua] zone represents a mere 4 percent of the land surface, the
*suní* habitat, favored for high-altitude agriculture, makes up almost 36 percent
of the land [within a 10 km radius of Chavín]. The remaining 60 percent of the
land lies within the puna zone, and consequently, grasslands were among the
most abundant land resources available locally. (1995:424 and Fig.2)

Modern cultigens include primarily the native crops maize, potatoes, and (at
higher elevations) *tarwi*, and introduced wheat, barley, and peas. Pastoralism is
confined to the higher reaches of the surrounding terrain, and is not seen on any
significant scale in the Mosna valley itself (though mixed agro-pastoralism with small-
scale grazing of modest numbers of livestock—primarily sheep, cattle, and donkeys—
in fallow fields is common).
Figure 3.1: View east across the valley of the Mosna. Chavín is at lower right, the Cordillera Blanca visible in the background.
This extensive and intensive modern use make Rick’s cautionary words about the difficulty of reconstructing paleoenvironmental resources in highland Andean valleys apropos here: “A reconstruction of the biotic resources characterizing the modern highland valleys is hampered by the great environmental modification of two or three millennia of intensive agriculture.” (Rick 1988:8) Similar observations about the ubiquity and complexity of the human cultural footprint in the Andes are increasingly common (e.g. Baied and Wheeler 1993; Denevan 1992, 2001; Erickson 2000; Kaulicke 1998), but detailed description of the specifics of anthropogenic modification is difficult and concomitantly rare. Such comments are particularly relevant because the very interest of the paleoenvironmental data that I muster here lies in its potential to shed light on prehistoric conditions in the area. The environmental modification to which Rick refers is in the case of Chavín not merely incidental but often intentional and complex; indeed that modification itself is in many ways the object of this study. Moreover, changing environmental conditions, whether anthropogenic or geologic in origin, would have had consequences for both the landscape itself and its inhabitants.

As a result, the similarity of both the behavior patterns Miller and Burger note and the environmental zones that condition those patterns to their prehistoric analogues is the focus of my discussion of the Chavín paleoenvironment. The environmental changes associated with climatic perturbations (primarily changes in precipitation) would have had very real and immediate consequences for agricultural and pastoral activity, not to mention the effects on physical activity of the landscape itself (considered in the next chapter). Anthropogenic changes specific to Chavín are considered in the section on paleoecology, as well as treated in detail in Chapter 6.

3.2 Paleoenviromental Reconstruction and the Use of Paleoenviromental Proxy Data

The data that follow are drawn from a substantial and rapidly growing literature on Andean paleoenvironment. I will use a nested terminology to summarize the diverse data, using paleoenvironment as an all-encompassing term that includes both
paleoclimate and paleoecology, with the latter referring primarily to flora but conceptually including fauna as well. Paleoclimate and paleoecology are obviously related, both inasmuch as the former influences the latter (particularly, in the vertical environment of the Andes, in terms of species ranges) and given the common practice of using paleoecological data—often pollen or macrobotanical remains and microfauna, and sometimes macrofaunal remains as well—to infer paleoclimatic regimes.  

3.2.1 Paleoenvironmental Archives

Paleoenvironmental archives for the Holocene Period in the Andes (~11,500 cal BP – present) have been recovered primarily in three forms: sediment cores (primarily extracted from lakebed contexts (e.g. Abbott, et al. 1997; Weng, et al. 2006) but also including marine records (e.g. Rein, et al. 2005)), glacial ice cores (e.g. Ramirez, et al. 2003; Thompson, et al. 1995), and biota in archaeological contexts (e.g. Reitz 2001; Sandweiss 2003; Smith 1980b). Landforms—e.g. moraines evidencing timing of glacial advance and retreat, movement of dune fields marking periods of aridity, flood deposits testifying to storm magnitude and frequency—are also commonly used to provide paleoclimate assessments (e.g. Farber, et al. 2005; Keefer, et al. 2003; Seltzer 1990; Seltzer and Rodbell 2005). Data have been generated, primarily in the last two decades, from an increasing number of these archives in the Andes, and are now fairly widely distributed, although still much more common in the South-Central Andes (see Figure 3.5 and Table 3.1). Although dendrochronology has been little-used in the Central Andes, the conceptual archetype is the tree-ring.

2 When these data are from archaeological contexts, as many of those for the Holocene are, their interpretation is complicated by anthropogenic influences on relative species abundance in general and the sample composition in particular.

3 Creative recognition and querying of new archives is also adding to the paleoenvironmental picture (e.g. use of pack-rat middens (Betancourt et al. 2000) and use of marine mollusk remains as indicators of ENSO history (e.g. Sandweiss et al. 2001, Carré et al. 2005)).

4 Dendrochronologic data, unfortunately, are only sparsely available as yet in South America, and almost exclusively in high-latitude, temperate regions where species with clear annual rings are common. Tropical trees have been little-used in dendrochronology, due to lack of distinct annual rings in tropical tree species. However, the successful construction of a nearly 600-year dendrochronological sequence using the low-latitude, high-altitude Polylepis tarapacana in Bolivia suggests the problem may be
3.2.2 Proxy Data

soluble, and there is also evidence that tropical tree species may contain proxy records of El Niño events (Boninsegna 2002:12; see also Rodriguez et al. 1993, Chepstow-Lusty et al. 1998:167-168).
From these various archives a variety of proxy data are recovered and used to infer past precipitation, temperature, and/or vegetation. These share some basic characteristics: annual, seasonal, or at least regular deposition that reflects in some way changing local environmental conditions, and datability (for thorough discussion of use of paleoenvironmental proxies see Lowe and Walker 1997; Roberts 1998). Precision and accuracy of the resulting reconstructed patterns of climate change over time (and their relative or absolute character) varies according to proxy and core. Dating resolution, catchment area reflected in the core, and interpretation of the relationship of the particular proxy to the climatic variables in question are all variable (and often contested in the literature—e.g. Grosjean, et al. 2003). The most common proxy in the literature on Andean paleoclimate is pollen. Sediment cores from diverse locations have provided raw data on changing pollen frequencies over time, which have been used to argue for both paleoclimatic variation and anthropogenic effects on vegetation. These data have been complemented by a variety of other proxies from sediment cores, ice cores, and archaeological contexts (see Table 3.1 for a summary of relevant work, and the various proxy data employed, in the Central Andes).

Table 3.1: Andean Paleoclimate Archives

<table>
<thead>
<tr>
<th>Location</th>
<th>Type of Archive</th>
<th>Timespan 5</th>
<th>Coordinates</th>
<th>Reference</th>
<th>Proxies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laguna Titicaca</td>
<td>sediment cores</td>
<td>3500 BP - present</td>
<td>16S, 69W, 3800masl</td>
<td>Abbott et al. 1997</td>
<td>sediment stratigraphy, lithology</td>
</tr>
<tr>
<td>Laguna Potosi</td>
<td>sediment cores</td>
<td>11800 cal BP - present</td>
<td>19°38’S, 65°41’W</td>
<td>Abbott et al. 2003</td>
<td>sediment stratigraphy, lithology, bulk density, C content, biogenic silica, diatoms, δ18O</td>
</tr>
<tr>
<td>Laguna Juntutuyo</td>
<td>sediment cores</td>
<td>17°33’S, 65°39’W</td>
<td>Abbott et al. 2003</td>
<td>sediment stratigraphy, lithology, bulk density, C content, biogenic silica, diatoms, δ18O</td>
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5 Radiocarbon years, unless noted.
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<td>11000</td>
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<td>13°54'S, 71°52'W</td>
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<td>Rodbell et al. 1999, Moy et al. 2002</td>
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<td>organic C and N, stable C and N isotopes, biogenic SiO₂</td>
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<td>Grosjean et al. 2001</td>
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<td>Weng et al. 2006</td>
<td>pollen, charcoal, magnetic susceptibility, bulk density</td>
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<td>9°S, 77°44W, 4200masl</td>
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<td>Laguna Yaguarcocha</td>
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<td>0.38°N, 78.08W, 2201masl</td>
<td>Weng et al. 2004b; Colinvaux et al. 1988</td>
<td>pollen</td>
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</table>
3.2.3 Temporal Scale

Temporal coverage of relevant paleoenvironmental archives in the Andean region ranges as far back as the Late Pleistocene, with highly variable resolution. Resolution ranges from quite coarse—a handful of radiocarbon dates anchoring linearly interpolated time/depth curves—to remarkably fine—large numbers of radiocarbon dates or annually-deposited, countable layers. Much of the research has been focused on the timing of the Last Glacial Maximum and the onset of the Holocene warm period, with the result that much of the data are of interest to archaeologists only inasmuch as they shed light on the increasing habitability of the high Andes at the close of the Pleistocene (see Aldenderfer 1999; Grosjean, et al. 2004). Syntheses of the
archaeology of the early occupation of the highlands (Dillehay, et al. 2004; Lavallée 2000; Rick 1988) reflect this lack of attention to the relatively minor climate fluctuations of the Holocene when they conclude—as they generally do—that the paleoenvironmental change of interest is the onset of the Holocene. As I explore below, this selective attention seems to reflect both data availability and the relatively stable character of the Holocene. The salient question is whether that relative stability was sufficient to justify the assumption of uniformitarian principles of landscape (and environment) activity in reconstructing the Late Holocene setting of Chavín de Huántar.

In the case of Chavín, it’s important to keep the immediate goal of reconstructing paleoenvironment in mind: an key question for understanding human-environment relationships during the Chavín period is the validity of a uniformitarian assumption, particularly with regard to geomorphologic activity in the area. While the chronology of Chavín’s local antecedents is hazy, there is no strong evidence for the existence of a monumental ceremonial complex before ca. 1000 BC.⁶; a conservative estimate, then, might consider paleoclimatic data directly relevant to the ceremonial center itself as far back as 2000 BC. Though there is a growing body of evidence for substantial human presence in the valley as early as the Middle Holocene (Preceramic occupation—as early as ~3000 BC—has been uncovered by Stanford excavations in La Banda and under the modern town), these occupations cannot be directly tied to the subsequent monumental construction in the valley (Rick and Mesia 2003, 2006).⁷

The paleoenvironmental data we must consider at Chavín, then, are those of the Mid-Late Holocene generally, with particular attention to the Late Holocene from 2000 – 500 cal BC. The earlier data are useful inasmuch as they establish a baseline pattern, at least in terms of human experience of the valley. This we may examine for evidence

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⁶ Even this date is inferential. Problems of directly dating the monumental architecture at Chavin are well-documented and under attack (see Kembel 2001, Kembel et al. 2005). For the earliest phases of construction, the difficulty of obtaining datable material from stone construction is compounded, if not eclipsed, by the burial of the earliest construction phases under subsequent monumental construction.

⁷ Neither occupation shows direct continuity between hunter-gatherer occupation and Formative Period strata; while this does not necessarily argue for a broader occupational hiatus in the area it does demonstrate that the material culture associated with the monument represents a qualitative shift from earlier material. This marked change in material culture, following a substantial stratigraphic hiatus, seems sufficient to infer that monumental construction in the valley is a similarly late and de novo phenomenon.
of change associated with—either influencing or influenced by—human activity and landscape change.

### 3.2.4 Spatial Scale

As Figure 3.5 demonstrates, paleoenvironmental data specific to the highlands of the Peruvian Central Andes are sparse at best. No data exist for the Callejón de Conchucos specifically, though the region of the Cordillera Blanca is represented by studies of glacial advance and retreat (Farber, et al. 2005; Seltzer 1990; Seltzer and Rodbell 2005) and a major glacial ice core project (Thompson, et al. 1995).

Interpretive scale is also a key issue. I consider here the handful of reconstructions of the Holocene environment that are either local enough or broad-brush enough to be relevant to Chavín. A glance at the distribution of the paleoenvironmental archives makes clear that only a small subset are with even 100 km of Chavín; their concentration in the South-Central Andes makes many of the records relevant only in the broadest terms (see Figure 3.5). Figure 3.5 and Table 3.1 represent an attempt at a relatively comprehensive list of paleoenvironmental archives for the Central Andes, but contain only a scattering of sites from further afield. Nevertheless, it is apparent that data is relatively scarce for the region immediately around Chavín.

### 3.3 Paleoclimate

General climate patterns in the modern Central Andes suggest that the Huascarán core—only 70 km from Chavín—may provide a good analogue for paleoclimate in Chavín. The Cordillera Blanca receives the overwhelming majority of its precipitation from the Atlantic; this is as true for Chavín, on the eastern slope, as it is for Nevado Huascarán at the crest of the mountain range. As a result, I examine in some detail the paleoclimate data from the Cordillera Blanca as well as synthetic regional reconstructions. The data employed here come from the broad variety of archives and proxies described above and summarized in Table 3.1.
The process of creating a paleoclimate synthesis from proxy data is a massive task in itself (see, for example, Markgraf 1989; Valdes 2000); here I use extant synthetic frameworks (Grimm, et al. 2001; Hansen, et al. 1994; Markgraf 1989; Markgraf and Seltzer 2001; Weng, et al. 2004) and compare them to the relatively local records from the Huascarán ice core (Thompson 2001; Thompson, et al. 1995), glacial activity in the Cordillera Blanca (Seltzer 1990), and archaeological archives from the Callejón de Huaylas (Smith 1980a). I also consider regional-scale data that record signals broadly relevant enough to be meaningful for Chavín. In the absence of paleoclimatic data from the area immediately around Chavín, this approach is the best tool of paleoclimatic and paleoenvironmental reconstruction available.

Regional data are useful primarily in two distinct ways. First, they provide records of pan-regional climatic variation—e.g. ENSO—whose signals may be interpreted as evidence of changes that would also have had some effect in Chavín, even if the records themselves are geographically far removed and the interpretation of the specific effects in Chavín difficult (e.g. Moy, et al. 2002; Rodbell, et al. 1999; Sandweiss, et al. 2001). Second, areas with high-quality paleoenvironmental records of climatic effects that are not necessarily either pan-regional or specifically teleconnected to Chavín may still serve as exemplars of the magnitude and frequency of climatic fluctuation, even if they do not provide direct indicators of Late Holocene climate at Chavín (e.g. Abbott, et al. 2003; Chepstow-Lusty, et al. 2003; Thompson, et al. 1998; Weng, et al. 2004).

With regard to ENSO, multiple proxies, from both the Peruvian coast and the Ecuadorian highlands, indicate a relatively low frequency of El Niño events during the mid-Holocene, followed by an upturn in frequency that is variously placed around 7000 cal BP (Moy, et al. 2002; Rodbell, et al. 1999) or 5800 cal BP (Sandweiss, et al. 2001). A further increase in El Niño events—to modern frequency—occurred at approximately 3000 cal BP (Sandweiss, et al. 2001). Other paleo-ENSO records, from diverse proxies elsewhere in Peru, largely corroborate this. An 38000-year record of sediment stratigraphy recording El Niño-induced flooding at Quebrada Tacahuay on the South Coast of Peru, for instance, shows an increase in El Niño frequency beginning about 5300 cal BP (Keefer, et al. 2003), for instance. Similarly, Rein and
colleagues interpret a marine core taken off the coast of Lima to indicate the onset of the modern strong El Niño pattern between 4000 and 5000 cal BP, and also describe a mid-Holocene hiatus from roughly 8000 to 5000 cal BP (Rein, et al. 2005). Rodbell and colleagues, using data from a lake core from highland Ecuador, argue for a 7000 cal BP onset of El Niño and a 5000 cal BP increase to modern frequency (Rodbell, et al. 1999).

Sandweiss argues that modern conditions accompanied this change in ENSO regime on the coast: “Modern climatic conditions and range of interannual variability were established along the entire Peruvian coast at about 3000 cal BP.” (Sandweiss 2003:38). As mentioned earlier in this chapter, the specific effect that ENSO has in Peru’s Central Highlands is not so clear as the well-documented droughts that accompany El Niño events in the South-Central Highlands. Most important, however, is the likelihood that an ENSO regime similar to the modern was in effect by 3000 if not 5000 cal BP, suggesting that any ENSO-related climatic fluctuations were similar in magnitude and frequency for at least the majority of the center’s lifespan, if perhaps somewhat different in its earliest years.

Other climatic indicators also suggest the establishment of relatively modern climatic conditions by the later mid-Holocene. Multiple proxies from sediment cores from Lake Titicaca suggest a generally wetter climate from approximately 4500 cal BP (e.g. Baker, et al. 2001; Cross, et al. 2001; Paduano, et al. 2003), associated with changes in ENSO patterns (Rowe and Dunbar 2004). This trend is interrupted by several “pronounced century-scale droughts”, however, and the timing of the climate shifts documented in the Titicaca and other South-Central Andean records is not uniform (see Abbott, et al. 2003). Nevertheless, pollen data from sediment cores taken in the Junín area, similarly, suggest wetter conditions beginning around 5000 BP (Hansen, et al. 1994). While the specific timing of events—variable even with the South-Central Andes—can clearly not be extrapolated to Chavín, nearly 7˚ of latitude to the north, the directionality and broad timing of the climatic fluctuations are somewhat more reliably transferable.

More directly relevant data are provided by Thompson’s glacial ice cores from Nevado Huascarán (Thompson, et al. 1995). Thompson and colleagues interpret the
Huascaran record to indicate warming following the onset of the Holocene, with conditions warmest between 8400 and 5200 BP, then gradually cooling through the Little Ice Age (beginning 500 BP). Their data, they suggest, is consistent with Markgraf’s (1989) estimate that modern vegetation patterns date to approximately 3000 BP.

A selection of regional data are summarized, along with data more local to Chavin, in Figure 3.6. The overall trends indicated are a particularly warm period at the beginning of the Holocene, followed by a cooler and dryer period beginning approximately 5000 cal BP. I do not here treat the post-2000 BP period.
Figure 3.6: Holocene climate reconstructions for the Central Andes.
Figure 3.6 also highlights the difficulties inherent in the data: temporal resolution is coarse (particularly in the synthetic reconstructions), climate trends generally characterized in qualitative or at best semi-quantitative terms, proxy signals sometimes ambiguous in their relationships to temperature and/or precipitation. The salient question is what these changes meant in terms of human experience of Andean environments. I return to this question in the final section of this chapter (Section 3.5).

3.4 Paleoeecology

Paleoclimate—wet/dry and warm/cool variability—is perhaps the highest order potentially structuring environmental variable affecting Chavín, but certainly not the only one. A major contrast here is in the nature of the human-environment relationship vis-à-vis climate versus that vis-à-vis biota (and landscape, discussed in the following chapter). Whereas in the latter case the relationship is interactive and effects are reciprocal, human relationship to climate is—or was, until the industrial age—basically reactive, though of course the degree, nature, and variability of human response to climate change has been fiercely debated (e.g. Erickson 1999; Haberle and Chepstow-Lusty 2000; Kolata 2000). This contrast between exogenous (independent of human activity) and endogenous (subject to anthropogenic effects) variables is discussed more fully in Chapter 4.

Given the apparent relative climatic stability of the Holocene, anthropogenic activity may have had as great an effect on the paleoenvironment as climatic forcing. Under any past climate regime, human cultural activity in Chavín necessarily would have interacted constantly with local biota. Moreover, the local flora are not only the primary trophic level, directly or indirectly providing sustenance; they are also a significant determinant of sedimentation regimes and landslide activity. Possible effects of this sort on the environment include vegetation changes resulting from anthropogenic burns, changes in species composition due to agriculture or pastoralism, and landscape engineering efforts such as terracing, irrigation, or creation of artificial wetland areas.
Data on these changes come from many of the same proxies used to infer paleoclimatic variation. Anthropogenic influences on flora (species composition and relative frequency) and the introduction and frequency of anthropogenic fire to the landscape, in particular, are seen in pollen evidence from sediment cores throughout the Central Andean region (e.g. Chepstow-Lusty, et al. 2003; Hansen, et al. 1994; Weng, et al. 2004). Archaeological assemblages—both faunal and botanical (e.g. Sandweiss, et al. 1996; Smith 1980a)—are of course the other primary source of data (though not the only one; see discussion of proxy data earlier in this chapter).

As noted above, two cultural periods are at issue in defining the paleoenvironment—and considering anthropogenic effects thereon—around Chavín: the Preceramic Period (perhaps as early as 8000 BC until perhaps 1500 BC locally) and the Formative Period, characterized by occupation by sedentary agriculturalists associated with the initial construction and significant elaboration of the Chavín temple complex. For the former period, I draw on regional information as well as the scant Callejón de Conchucos record. The Formative Period is well represented in the local archaeological record, but—as I discuss at length in Chapter 4—its physical extent and the magnitude of the human cultural footprint is poorly understood and certainly underestimated.

Even if construction of a ceremonial center in Chavín did not begin until ~1000 BC, there is evidence of earlier human activity in the valley (see Section 3.2.3), which we can estimate would have approximated the general pattern of Preceramic occupation in the region. The Central Andean highlands were likely settled as Pleistocene glaciers receded at beginning of the Holocene (11500 cal BP), and there is some (still disputed) evidence for (presumably much lighter, given the paucity of remains) Pleistocene occupation as well (see Aldenderfer 1999; Rick 1988). The later, indisputable, more permanent and dense occupation is of more interest here; what Rick terms the “explosion of undoubted human cultural remains.” (1988:16)

That “explosion” includes within its purview foraging populations, pastoralists, and early agriculturalists, both transhumant and sedentary. By the later Preceramic, in some areas of the Central Andean highlands human occupation began to intensify and
“complexify” (as early as 3000 BC, perhaps, at least in the Huallaga Valley; see Izumi and Terada 1972). Similar, if slightly less dramatic, evidence of increasing sociopolitical complexity has been found elsewhere in the Central Andean highlands during the later Preclassic: at Huaricoto in the Callejón de Huaylas (Burger and Salazar-Burger 1985), Piruru in the upper Marañon drainage (Bonnier and Rozenberg 1988), and La Galgada on a tributary of the lower Santa (Grieder, et al. 1988), for example. This Late Preclassic complexity was apparently confined to a limited number of locales in the highlands, while much of the region remained occupied by the same sorts of relatively small and dispersed hunting and foraging populations that had inhabited the highlands since the beginnings of the Holocene (see Dillehay, et al. 2004; Lavallée 2000; Rick 1988).

All of this is of interest here because of the implied (growing) magnitude of the human cultural footprint on the Central Andean highlands. Between the beginnings of the Holocene and the period of Chavín’s florescence (roughly 8000 – 1000 BC), populations, population densities, and intensity of resource use all increased substantially. This is not to suggest that they did so as part of some ineluctable cultural evolutionary trajectory, but rather fitfully and locally—but nevertheless there was a significant and recognizable overall trend. This, we may hypothesize, probably had several consequences for Central Andean landscapes: habitat disturbance or even deforestation (potentially associated with increased erosion and landslide activity), changing abundances of local flora and fauna in affected areas, etc. As suggested above, these are attested to regionally by a variety of evidence: changes in pollen abundances (particularly declines in tree taxa and appearance of weedy indicator species), increases in abundance and frequency of charcoal, and increases in sediment flux, for example.

In the Cordillera Blanca surrounding Chavín, there is little direct evidence of anthropogenic effects on the local ecology, but this is due to scarcity of research and should not be taken to imply a pristine condition. Indirect but reasonably local and plausibly analogous data comes from the Huascarán ice cores (Thompson, et al. 1995) and sediment cores from a series of Central Peruvian highland lakes (e.g. Hansen, et al. 1994; Weng, et al. 2004). Effects may be inferred from the hypothetical growing and
increasingly sedentary populations of both pastoralists and agriculturalists, and extrapolated from broader regional patterns of anthropogenic effect on landscapes noted elsewhere in the Central Andes. Several specific effects stand out, chief among them the frequency and effect of anthropogenic burns, changes in forest cover, and the impact (and timing) of the adoption of domesticates (both plant and animal). I will treat here the issue of forest cover and anthropogenic fire at a regional level, and then turn to a discussion of paleoecological inferences specific to Chavín.

3.4.1 Regional Paleoecology

The issue of paleo-forest cover in the Andes generally is still debated. Ellenberg prominently argued that the high Andes were originally a treed landscape that had been heavily altered by human activity (Ellenberg 1979), but his case was largely speculative. His argument has been revived and refined (see Chepstow-Lusty, et al. 1998; Fjeldså 2002; Kessler 2002); but we still lack, in Chavín, the specific data to assess the argument there. In broad terms, recent research (summarized in Kessler 2002) suggests that the current distribution of *Polylepis* trees more likely reflects millennia of anthropogenic disturbance than the natural species range. The ancestral landscape, rather than treeless grasslands, would have featured a continuum where cloudforest grades into a patchwork of woodlands, mainly of *Polylepis*, and bushy and grassy páramo vegetation, all the way up to the level of alpine...habitats above 4500 m. The sharp treelines that are seen today are the results of thousands of years of incessant burning, and of extensive grazing by cattle and sheep during the last few centuries. (Fjeldså 2002:112)

The paucity of trees on the modern landscape around Chavín thus may not reflect an ancestral state; it is possible that modern agriculture and pastoralism restrict the range of native trees (primarily *Polylepis* spp., known locally as *queñual*) to sheltered arroyos and high altitudes (see Figure 3.7). Even grazing as early as the later

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8 Direct human modification of Andean landscapes—e.g. the creation of the ubiquitous raised fields in the Titicaca Basin or the widespread irrigation networks in Peruvian coastal valleys (see Erickson 2000, Williams 2004)—largely did not begin until somewhat later (during the Formative Period if not later). Irrigation networks on the coast may have the origins as far back as 5000 BP (see Dillehay et al. 2005), however, suggesting perhaps early widespread landscape modification on the coast.
mid-Holocene might have led to substantial deforestation of *puna* and high valleys, following domestication of camelids (or, probably more likely, the adoption of domesticates from elsewhere in the Central Andes; the center of domestication is generally taken to be the central Peruvian *puna*) perhaps as early as 6000 BP (Wheeler 2003).⁹

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⁹ Miller and Burger have argued, based on the faunal assemblages from Burger’s excavations, that in the Formative Period Chavin was indirectly exploiting a substantial camelid population in the nearby puna; they do not have evidence for earlier periods (Miller and Burger 1995:425).
Certainly there are areas of Polylepis habitat in the Chavín area today, but Polylepis trees are heavily constrained in their distribution by agriculture and the ubiquitous blue gum (Eucalyptus globulus) in the valley (and up to ~3800m) (see Figure 3.8) and by continued pastoralism at high altitudes. Agriculture may date back as far as 5000 BP in the Central Andes, according to an array of palynological data (see
Chepstow-Lusty, et al. 2003 for a summary), making it of interest to attempted environmental reconstruction, while eucalypts, introduced in the 19th century, are of interest inasmuch as they impact modern *Polylepis* range.\(^{10}\) Pastoralism in the surrounding puna, meanwhile, may date back as far as 6000 BP, with hunting/foraging populations potentially occupying the region soon after deglaciation, \(~10000\) BP (see Aldenderfer 1999; Dillehay, et al. 2004; Rick 1980, 1988).

\(^{10}\) Eucalypts (*Eucalyptus globulus*) were introduced to Peru from Australia in the mid-19th century, and were common by the beginning of the 20th century (see Dickinson 1969), popular as fuelwood and construction material. In Chavin, fully grown eucalypts are clearly visible in Roosevelt’s photographs (see Roosevelt 1935:Fig.24), taken during his 1934 trip, suggesting their introduction to the valley as early as the 1920s.
Figure 3.8: Eucalypts bordering the Mosna River on the southeast edge of the monumental core. The line of eucalypts visible in the background marks the course of the Wacheqsa River.
Both pastoralism and early agriculture were probably associated with regular anthropogenic burns. Pastoralists—or for that matter their hunter predecessors—may burn grasslands to encourage the growth of tender forage, while for agriculturalists in the Andes burns are a means of clearing land. While the bunchgrasses that characterize puna vegetation (known generically as ichu, a local term which encompasses Stipa ichu and Festuca spp.) are burn-tolerant, Polylepis are particularly vulnerable to repeated application of fire (see Kessler 2002; Laegaard 1992). Increased charcoal inputs in sediment cores beginning ~9000 cal BP, however, have been the subject of some debate; they may be associated either with early Holocene warming or human activity (see Weng, et al. 2004; Weng, et al. 2006). Where increased charcoal flux has been accompanied by increasing frequency of weedy species (e.g. Ambrosia spp. and Chenopodiaceae/Amaranthaceae; see Chepstow-Lusty, et al. 2003; Weng, et al. 2006), generally closer to 5000 cal BP, the case for human influence is clearer.

3.4.2 Local Paleoecology

3.4.2.1 Pre-agricultural Period

Estimating early (Preceramic) anthropogenic effects on the Chavín environment, then, depends on assessing the potential ramifications of hunting and foraging occupation in the valley and hunting and pastoralist occupation in the nearby puna; later effects in the valley would have been dominated by the impact of agriculture. Whether pastoral activity would have extended down into the valley is a significant question as well. That seems unlikely on several grounds. Rick concludes that pastoralism was generally restricted to puna areas (1988), and Miller and Burger argue that during the Chavín period camelid herding was primarily confined to the puna even while camelid meat was being consumed (as ch'arki) in Chavín itself (1995).\footnote{However, it is also worth considering Lane’s findings that a mixed agro-pastoral lifeway was common in the Cordillera Negra in later time periods, and such occupation descended into highland valleys (Lane 2006).} Moreover, it is suggestive that the faunal remains from the preceramic component of one of the 2003 La Banda excavations are predominantly cervid rather
than camelid, suggesting exploitation of highland valley rather than puna faunal resources, and predominance of cervids in the valley (Rosenfeld 2003).

Regional occupation patterns suggest that the nearby puna was likely more appealing (at least year-round) to preceramic populations (Rick 1988:29). Puna resources were generally more stable and predictable than those of highland valleys; the distinct appeal of the latter—seasonally well-watered zones more suitable for agriculture than pastoralism—did not apparently attract the same scale of occupation as the puna until the later Preceramic. Set against this regional pattern of puna-preference, however, is the evidence from the Chavín area (under the modern town and in La Banda; see Section 3.2.3) of Middle Preceramic occupation, suggesting at least some exploitation of this highland valley quite early. Moreover, alluvium and later settlement in highland valleys complicates the interpretation of survey results there—absence of evidence for Preceramic Period exploitation of valleys in general cannot be straightforwardly interpreted as evidence of restriction of human activity to the puna (but see Parsons, et al. 2001:Ch.6).

The environmental effects of these different lifeways on the immediate Chavín area might, moreover, be similar. Both hunting and pastoralist communities probably made extensive use of fire as a hunting and/or management tool, burning either to drive game or improve forage. Collection of fuelwood may also have had a substantial effect, though again such an impact remains largely hypothetical. Pastoralists might also have altered the landscape directly, by damming streams to create artificial bofedales (wetlands) and thus improve camelid grazing opportunities. Lane describes the extensive use of such hydrologic engineering in the Cordillera Negra, albeit in a much later period (see Lane 2006). Moreover, it is unlikely that such efforts would have directly affected the valley area. Given the likely distribution of pastoralism, the anthropogenic burns most likely to have affected the valley itself in the pre-agricultural Preceramic are those associated with hunting and foraging. However, the pattern would have changed once sedentary agriculture began to be practiced in the Chavín area. Regional evidence would suggest this may have occurred as early as 5000 BP,
but the absence of any direct evidence for a local agricultural occupation make it more likely that such occupation began later, perhaps ~1000 BC.\textsuperscript{12}

### 3.4.3 Agricultural Period

Following the introduction of agriculture to the valley (almost certainly by 1000 BC, and perhaps a millennia earlier), of course, the success of plant domesticates would have been a primary concern for residents and would have had a significant impact on the local landscape. Regarding local cultigens, Miller and Burger write of the Chavín period, “it seems probable that maize, squash, beans, and \textit{lúcuma} would have been cultivated on the valley floor, while potatoes, \textit{oca}, \textit{ollucu}, and perhaps \textit{quinoa} would have been grown in the \textit{suni} zone.” (1995:426)\textsuperscript{13} The earliest of these were likely quinoa (\textit{Chenopodium quinoa}) and squash (\textit{Cucurbita} \textit{spp.}), domesticated in the Central Andes as early as 6000 BC (Pearsall 1992); other early cultigens probably included the common bean (\textit{Phaseolus vulgaris}), maize (\textit{Zea mays}), potatoes (\textit{Solanum tuberosum}), and oca (\textit{Oxalis tuberosa}). The timing of the domestication and/or adoption of these cultigens varied throughout the Andes (see Pearsall 1992 for detail) but generally seems common to the Late Preceramic. With regard to Chavín specifically, no direct evidence for early crops is available.\textsuperscript{14} The fates of wild species—both edible and not—would also have had a relatively direct impact on Chavín, however, inasmuch as they served to support faunal resources (particularly camelids in the nearby puna but also cervids in the valley) and to stabilize—or not—local slopes.

\textsuperscript{12} Again it bears emphasizing that absence of evidence in Chavín, given the dynamism of the landscape, should be treated with caution. This estimates is conservative, and could easily be 200 years or more too late.

\textsuperscript{13} Miller and Burger note that, “Little direct evidence exists of the cultigens grown there.” (1995:426) However, macrobotanical remains offering direct evidence of the timing of adoption and relative dietary importance of cultigens in Chavín have recently begun to be recovered, promising more detail with regard to these questions (Sayre 2005).

\textsuperscript{14} Burger’s work included some stable-isotope analysis of human bone that demonstrated the consumption of maize by Burger’s Urabarriu Phase, beginning 850 BC (Burger and van der Merwe 1990). Current work by the Stanford Project at Chavín includes macrobotanical and phytolith analysis that should shed further light on the issue (see Sayre 2005).
The Chavín area is today almost wholly cultivated, in smallholdings (individually owned chacras, many owned by a few absentee landlords but also held by local—town or upland community—residents) on which crops vary both with cropping cycles and altitude (the valley floor is at ~3150 masl; surrounding ridges reach ~4600 masl). Modern crops include primarily maize, wheat, barley, peas, and potatoes. Aside from a few scattered eucalypts, and Agave americanus (a post-contact introduction; see Smith 1980b) and other shrubs hedging pathways, there is little non-agricultural vegetation on the valley slopes; moreover even many of those plants that are not cultigens are planted to mark boundaries, improve slope stability, or provide fuel and/or construction material. The degree to which the slopes were similarly cultivated in prehistory remains unknown; the only pertinent data available are from Richard Burger’s small excavations on the lower slopes of the Cochas earth flow (PAn6-18-A1, D1, and D2; see Figure 3.9), which uncovered platform constructions and no obvious cultivation features (Burger 1984). It is obviously not wise to extrapolate incautiously from this sample to the entire valley, but as further research at Chavín (e.g. the 2003 excavations in La Banda; see Section 3.2.3) continues to confirm earlier suggestions (e.g. Rowe 1967) that the area sustained a substantial population associated with ceremonial center, the inference that local cultivation would have been widespread seems more and more reasonable.
Figure 3.9: Richard Burger’s excavations at Chavin (in blue, labeled).
Prior to human settlement of the valley, then, the vegetative cover is likely to have included a mix of *Polylepis* forest, *ichu* groundcover, and shrubby species where sufficient water was available to support them; the overall picture was probably fairly similar to Smith’s characterization of the area around Guitarrero Cave during the Preceramic (Smith 1980b:77-79). Early human impacts probably induced at least some degree of deforestation, which likely was completed as valley land was brought into agricultural production.

3.5 Conclusions

The focus of this chapter has been, in essence, a reexamination of Rick’s 1988 contention that, “after the retreat of Pleistocene glaciation, there is little evidence for changing highland climate during the preceramic period” (Rick 1988:11), and the extension of the period under consideration into the Formative Period. Rick’s conclusion was based on a synthesis of published climatic data, and was in essence a claim that any climate perturbations during the Holocene would not have been sufficiently grave to preclude continued human occupation of the central highlands. At issue here, then, is whether the additional paleoenvironmental data published in the ensuing two decades, provenient from both natural or archaeological contexts, is sufficient in its resolution (spatial and temporal) to refine the picture, and whether its content is significantly different, particularly as extended into the Formative Period.

Andean archaeologists—primarily consumers of paleoclimate data—seem generally to have adopted the premise that the Holocene was a period of relative climatic stability in the highlands (e.g. Burger 1992; Dillehay, et al. 2004; Rick 1988; Smith 1980b). The general—if implicit—inference has been that this relative stability was such that climatic change was not a significant influence on human lifeways. However, recent syntheses of paleoclimatic data (e.g. Mayewski, et al. 2004; Roberts 1998) demonstrate significant—that is, relevant to human inhabitants—Holocene climate change, e.g. the ~3000 cal BP onset of the modern ENSO regime. In addition, as in earlier periods, there was significant climatic variability.
Even if the relative stability on which archaeologists have focused were still accepted, would that suggest that climate was neither dynamic nor impacting humans in meaningful ways during the Middle and Late Holocene? It is worth considering that the Medieval Warm Period and the Little Ice Age in the Late Holocene—small perturbations in climatic terms—have been posited as significant factors in historic times (e.g. Fagan 1999; Haberle and Chepstow-Lusty 2000; McGovern 1994). Moreover, the droughts and El Niño effects much-considered as potential movers in Andean prehistory (e.g. Binford, et al. 1997; Ortloff and Kolata 1993; Paulsen 1976; Sandweiss, et al. 2001; Shimada, et al. 1991; Williams 2002) are examples not of climate change so much as of climate variability (though they also point towards the significance of data about the timing of changes in ENSO regimes during the Holocene).

Positing a stable Holocene, in other words, need not imply that the climate was not a relevant factor for humans. The supposed relative stability of the Holocene upon which Andean archaeologists have generally relied should not, ultimately, be over-generalized. The Holocene includes climatic changes—e.g. the onset of the modern ENSO regime—that would have had significant implications for inhabitants of the region. Moreover, climate variation that would have had impacts on human inhabitants was almost inevitably present (raising the question of the resilience (or lack thereof) of Chavín). However, it also bears reiterating that my purpose in considering the paleoclimate of Chavín here is to consider the validity of uniformitarian assumptions about the paleoenvironment. With regard specifically to Chavín, neither climatic change nor differences in variability seem to have been of such a magnitude as to create different landscape processes than the modern ones. However, as I consider in the following chapter, rates and frequencies of activity might have varied, based upon both exogenous variables (climatic fluctuations) and endogenous variables (human activity).
Understanding geomorphology is critical to understanding Chavín. This is true both in the fairly obvious terms of archaeological methodology and in the more subtle context of human-environment interactions in prehistory. Moreover, while postdepositional challenges posed by geomorphologic processes have been recognized previously—Burger wrote in 1984, for instance, that “the principal impact of the slides and other downslope movements of material is to obscure the location and patterning of the ancient settlement at Chavín de Huántar” (Burger 1984:14)—the true scope of those problems, and their implications, have not previously been fully recognized nor explored.

The fundamental methodological problem is one of (in)visibility. As Burger recognized three decades ago (1984:14), paleosurfaces are rarely visible at Chavín. Site burial, in fact, is the single most significant taphonomic problem at and around Chavín. Recent work has amplified this observation in two significant ways: by demonstrating in more concrete terms how pervasive the problem is, and by documenting the fact that we are not missing simply sherd scatters, but also domestic structures and even truly monumental construction. Moreover, the ubiquity of earth flow complexes in the local landscape, and their antiquity (which I discuss below), argue strongly that such features are more than just a taphonomic problem facing makers of archaeological maps. Furthermore, I argue that the geomorphologic processes that have shaped our perception of Chavín—shaping site maps, for instance, in unacknowledged (though perhaps not unrecognized) ways— are more than simply postdepositional challenges to archaeological methodology and interpretations. Rather, they must be understood as a dynamic element of the Chavín-period landscape, and construction activity at Chavín must be understood as existing in a reciprocal relationship to the local environment.

1 Both La Banda—the region across the Río Mosna to the east of the monumental core—and the West Field, as well as the area immediately to the south, I have argued, have received short shrift from mapmakers (Contreras 2006).
Earth flows were also a fundamental element of the Chavin world. Chavin’s iterative and reciprocal interaction with the local environment, in which the inhabitants were shaped by but also profoundly altered their surroundings, was, I argue, not just a stimulus to landscape engineering, but also a significant element in the production of sociopolitical inequality, and even a source of religious inspiration. I will return to these larger themes in later chapters; here I address the geomorphology of the Chavin area. In this chapter I discuss the need for geomorphologic input into archaeological interpretation at Chavin before turning to a characterization of the site’s setting and description of modern landforms, geomorphologic processes, and environmental hazards. I conclude with a detailed discussion of the West Field, which serves as an exemplar of the area’s active geomorphology as well as a case study in the need for both geomorphologic and archaeological data.

4.1 The importance of geomorphology in archaeological interpretation at Chavin

The invisibility of paleosurfaces around Chavin was dramatized by the rescue archaeology carried out by the Proyecto Stanford and the local INC in 2003, in advance of the construction of the new state-financed Catac-San Marcos road. Excavations in the path of the road construction, across from the monumental core on the east side of the Mosna River, revealed an area of dense and deep domestic construction (Kirch 2005; Rick, et al. 2004). The area in which excavations revealed the densest occupation (its full extent remains unknown) was one that had been surveyed by the Proyecto Stanford in 2000, investigated by first Amat and then Burger in the 1970s, and visited by John Rowe in 1962. There has been broad consensus that the area was related to the monumental core—Rowe, noting, “There is also a considerable area of habitation refuse on the other side of the river,” even went so far as to suggest that, “Chavin thus appears to have been a large city.” (Rowe 1967:302) However, little enough concrete evidence of occupation was noted that the area was not marked as
settled in Burger’s estimates of Chavín’s extent over time (Burger 1984:Maps 2-4) and does not appear in Lumbreras’ site map (Lumbreras 1989:20).²

Rick, following the extensive salvage excavations carried out in 2003, has since described the archaeological remains in La Banda as those of “a substantial community that apparently grew over time.” (Rick 2004:72). The density of occupation is particularly telling—in 230 m² excavated in 2003 in the area designated Sector 3 almost no undeveloped space was encountered (Rick and Mesía 2003). Rather, structures of widely varying architectural quality (ranging from small, simple, and casually constructed single courses of foundational stones, presumably originally topped by perishable superstructures, to well-built stone walls several courses high, with evidence of finely plastered faces) abutted one another in an agglutinative fashion (see Rick 2004:Fig.5.4) Excavations carried out by Matt Sayre as part of the Stanford Project in 2005 also revealed dense remains; Sayre’s excavations were in Sector SM while the photo in Rick (2004:Fig.5.4) is of Sector 3 (see Figure 4.1). In spite of this unexpected density—previously, models of Chavin-period settlement around the monumental core had supposed relatively dispersed hamlets around the ceremonial core—the fieldwalking survey in 2000 had noted surface materials but not in remarkable concentration. In addition, Burger had sampled the area and concluded that it did not contain Chavín-period remains (Burger 1984:244).

² Tantalizingly, however, Witt in his 1842 visit drew ruins east of the Río Mosna, though he did not describe them in any detail (see Witt 1992:Ilustración 5) and it is difficult to know what to make of his drawing.
The effect of the 2003 excavations 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. Negative evidence—lack of surficial archaeological remains—could not 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, who wrote in 1945 that, “Las ruinas del Templo de Chavín se hallan sepultadas por una capa de tierra descendida de los cerros vecinos.”3 (Tello 1945:775) This theme was developed further in Tello’s 1960 publication: “Estas infiltraciones han producido constantemente el deslizamiento de las masas de tierra…han originado el descenso de grandes extensiones hasta cubrir una gran parte de los edificios más importantes del templo de Chavín.”4 (Tello 1960:48) Similarly, Lumbreras noted that, “sí hemos hallado…evidencias de desprendimientos del cerro Puca Orqo, cuya tierra rojiza cubre gran parte del sitio, con secciones en donde la deposición puede tener hasta un espesor próximo al metro.”5 (Lumbreras 1989:21) 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. The 2003 work in La Banda forced recognition of the fact that the depositional processes involved were significantly shaping archaeological interpretations of the Chavín-period presence in the valley. Even using only the evidence from the 2003-2005 excavations in La Banda, it is possible to quickly demonstrate, for instance, that in discounting La Banda Burger’s maps of the extent of settlement at and around Chavín reflect what is not visible as much as they document what is known (see Figure 4.2).6

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3 “The ruins of the temple of Chavín are found buried by a layer of earth derived from the neighboring hills.” (My translation).
4 “These filtrations have produced chronic slides of the earth masses [of the hill]…they have caused the descent of large amounts of earth, enough to cover a large part of the most important structures of the temple of Chavín.” (My translation).
5 “We have found…evidence of slides from the hill Puca Orqo, whose reddish soil covers a large part of the site, with areas in which the deposition is as much as a meter thick.” (My translation).
6 This should not be construed as a criticism of Burger, who had no choice but to extrapolate from limited data, but rather as a statement of the magnitude of the problem.
Figure 4.2: Estimates of the extent of Janabarriu-Phase Settlement
My attempt to come to terms with those slope processes resulted in the detailed geomorphologic mapping of the valley, carried out in July and August 2004 with Dr. David Keefer of the U.S. Geologic Survey. The primary product of our work was a geomorphic map of the valley’s chief features (Figure 1.2), discussed below. The practical result of that mapping effort was to establish definitively that paleosurfaces are extremely rare in the area, particularly on the valley floor. The general scarcity of surficial archaeological materials, particularly early ones, is due at least in part to the local geomorphology. It is unlikely to be coincidence that documented early sites are generally on outcrops high on the valley sides—such areas have served as sediment donors rather than recipients, leaving archaeological material exposed (Burger 1982:Fig.1; Diessl 2004:Fig.INT58; Espejo Nuñez 1941:Fig.1).

The scarcity of paleosurfaces highlights the importance of subsurface investigation around the monumental core. Excavation, given this perspective, becomes important not simply for its capacity to reveal previously unknown archaeological features and materials, but for what it may reveal about landscape changes in the last 2-4000 years. The key task becomes the relation of the modern landscape and the current geomorphologic processes to the Chavín-period landscape and processes. Several steps are necessary in such an undertaking: 1) thorough description of modern landforms and processes, 2) understanding of the history of these processes, and their operation at least as far back as the Middle Holocene (~3000 cal BC), 3) extrapolation of the character of the Chavín-period natural (and anthropogenic) landscape, using these reconstructed geomorphic processes and the paleoenvironmental patterns described in the previous chapter, and 4) inference about the ways in which Chavín’s builders interacted with and modified that landscape, potentially both exacerbating and mitigating hazards. These steps (1-2 are described here; 3 and 4 in subsequent chapters) provide a window into the Chavín-period landscape, which I construe not as a static backdrop for human activity but rather a dynamic feature, at once constituted by and constitutive of cultural activity.
4.2 Modern Landforms and Processes

Description of the modern landforms and processes of the Chavín area can draw on published data as well as fieldwork. The geologic conditions around Chavín have historically been of interest for three primary reasons. Primarily, in general terms, the sierra of Ancash has been seen as a mineral resource, and expeditions since the 19th century (including such high-profile explorations as Antonio Raimondi’s) have sought to identify the mineral wealth—both real and imagined—of the region. This has resulted in substantial attention to the basic regional geology, which has resulted most saliently in a major INGEMMET publication: *Geología de los Cuadrángulos de Huaraz, Recuay, La Unión, Chiquian y Yanahuanca*, published in 1996 (Cobbing, et al. 1996). This provides excellent background for the archaeological investigator, but is also an excellent example of the contrasting scales—both spatial and temporal—of geology and archaeology. While it provides excellent raw material for characterizing the region around Chavín as a backdrop for human activity, the INGEMMET volume (and accompanying geologic map, at 1:100,000) lacks the resolution necessary to examine any human-environment interplay.

That background geology has, however, served as the raw material for a second sort of geologic interest: the identification of exotic materials in Chavín. This has ranged from the presence of obsidian (from sources nearly 600 km away, at a minimum) at the site (see Burger 1984: Appendix E), to the identification of exotic clay sources in the site’s ceramics (e.g. Druc 2004; Lumbreras, et al. 2003), to the use of massive limestone and granite blocks in the monumental construction. The nearest bedrock sources of these are 3-4 km and ~18 km away, respectively. Explicitly archaeological interest in the local geology of this sort is recent; the only published work is Turner et al. 1999.

Turner and colleagues also address the third category that has attracted geologic attention, that which is of most interest here: landform processes. While they do so out of archaeological interest, attention to the geomorphology of the Chavin region has generally had to do not with the area’s archaeology but with its recent historical past. Chavín, in the mid-20th century, was the scene of one of the Cordillera Blanca’s many
dramatic natural disasters. In January 1945, an estimated 900,000 m$^3$ slurry of ice, rock, earth, and water—known in the Andes as an *aluvión* and in technical geomorphic parlance as a channelized debris avalanche—descended the Quebrada Wacheqsa, averaging a speed of 32 km/h (estimates from Indacochea G. and Iberico M. 1947).

This catastrophic event and others like it in the region (*e.g.* the aluvión that destroyed the town of Yungay, in the neighboring Callejón de Huaylas, in 1970) have attracted considerable geologic and anthropological attention (*e.g.* Carey 2005; Cluff 1971; Oliver-Smith 1986; Oliver-Smith and Hoffman 1999; Plafker and Ericksen 1978; Plafker, et al. 1971). The resultant literature is of interest for what it suggests about the periodicity and severity of environmental risk (and human response thereto) in the region as well as its implication for landscape formation processes.

The archaeologically relevant—that is, meaningful on a human timescale—information provided by the geological research described above consists primarily of the data necessary to characterize the modern landscape and the post-Pleistocene processes that have shaped it. Those data have been combined with the results of extensive fieldwork, described below.

### 4.3 Setting

Chavín de Huántar is located high on the eastern flank of the Cordillera Blanca, in the north-south trending drainage known as the Callejón de Conchucos. The Mosna River, adjacent to which the site is located, forms the primary waterway of the drainage, which eventually feeds into the Río Marañon and thence to the Amazon.

At 3180 masl, Chavín is 1600 m below the lowest of the passes over the Cordillera Blanca to the west, but is only ~15 km as the crow flies from the crest of the range, and peaks over 6000 m are visible from the ridges above the site. The site sits just upstream of the confluence of the Mosna and Wacheqsa rivers. Below the confluence, to the north, is an area of flat alluvial land (2.5 km long by 1 km wide) rare in the region; the site is at the head of this plain, where the valley begins to narrow again. The irrigable land of this plain may have been one of the area’s draws, in addition the site’s location astride routes crossing the Cordillera Blanca and descending
into the *selva* to the east. This broader context is discussed in more detail in Chapter 3, Section 3.1.

4.4 *Bedrock Geology*

Geomorphologic mapping around Chavín de Huántar was carried out by the author and Dr. David Keefer of the U.S. Geologic Survey in 2004. Aerial photographs of the region (purchased from the Servicio Aerográfico Nacional de Peru) were used to map landforms, and ground-truthed using surficially visible stratigraphic exposures. Existing exposures also provided diachronic data on landform processes; we were able to take advantage of the cuts of the valley’s two rivers—the Río Mosna and the Río Wacheqsa—as well as road- and trail-cuts and the channels eroded by tributary drainages on the steep valley slopes (see Figure 4.3).
The principle 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 earth flow complexes extending from high up the valley walls to the valley floor (see Figure 1.2). Bedrock outcrops—generally clearly bedded and heavily folded—are also scattered throughout the valley at all elevations (see Figure 4.4). These consist of Lower Cretaceous deposits of the Oyón Formation (the majority of the lower and mid-valley) and the Goyllarisquizga 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 grey shales … yellowish-brown, grey, and light grey sandstones in strata 5-30 cm thick…interbedded with strata of anthracite”. Ascending towards the ridges, one moves from the Oyón Formation into the Chimú, Santa, and Carhuaz formations. These consist, respectively, of white, quartzitic sandstones in massive layers 1-3 m thick (Chimú Formation), blue-grey limestones, 10 cm to 1 m thick (Santa Formation), and cemented silty clays (Carhuaz Formation) (Cobbing, et al. 1996:74-90, my translation; Turner, et al. 1999:48). The resistant quartzite layers tend to form steep near-vertical fins (including the prominent outcrop immediately northwest of the site, known locally as Shallapa), while the more easily eroded shales form more moderate slopes.

Figure 4.4: View southeast across the Square Plaza. Bedrock fins visible in background. Note also earth flow visible in the middle ground.

7 The practical upshot of this in archaeological terms is the ready availability of quartzite and sandstone construction material that tended to readily fracture in relatively rectilinear blocks. Conversely, the limestone and granite employed in construction had to be imported from at least 3 and 15 km distant, respectively (see Turner et al. 1999: 54-55).
4.5  *Local Geomorphology*

The valley floor itself—a notably large swathe of flat land in a landscape otherwise rarely planar (see Figure 3.3)—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 landslide deposit (see Figure 4.5). This was first suggested by Turner (Turner, et al. 1999:55) and has been confirmed by further field mapping carried out by Contreras and Keefer.
Figure 4.5: The valley-damming landslide. Below, view north down the valley, with the monumental core in the foreground. In the background, north of the modern town, the remnant of the Mosna-damming slide is visible on the eastern side of the valley. Above, detail of the toe of the landslide; the cut of the Mosna River is visible.

While this event unfortunately remains undated, it may be chronologically constrained by the presence of apparently Chavin-period architecture atop the sedimentary deposits, north of the modern town (see Figure 4.6). Those remains, as well as several walls in the modern town (Burger 1984; Diessl 2004:420-433) and the 2006 excavations adjacent to the Plaza de Armas (Rick and Mesia 2006), demonstrate that the breaching of the landslide dam and draining of this paleo-lake predated Chavin-period occupation of the valley.
Figure 4.6: Remnant wall in a modern agricultural field, north of town.

The topography flanking this deposit of flat land is dominated by earth flow deposits (see Figure 1.2). Given their importance to the local landscape and their dynamism in recent geologic time (i.e. the Late Holocene), their description must be accompanied by a brief review of landslide geology. I draw here primarily on Keefer and Johnson (1983) and Cruden and Varnes (1996), with particular reference to defining the morphology of the landslides mapped in the Chavín area.

The terms earth flow and earth flow complex, as used here, follow the definitions used by Keefer and Johnson (1983), and form only a subtype of the landslides discussed by Cruden and Varnes (1996). Earth flows as here defined are incremental processes of downslope transport in which a body of material moves by shear processes with little internal deformation, with mean velocities ranging from the

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8 Cruden and Varnes note that Keefer and Johnson’s “use of earth flow thus covers landslide modes from slow earth flow through slow, composite earth slide-earth flow to slow earth slide.” (Cruden and Varnes 1996:65)
sub-mm/day to 4.2 m/day (Keefer and Johnson 1983:44-45). This range of rates of movement falls into the velocity classes “Extremely Slow”, “Very Slow”, “Slow”, and “Moderate”, as defined by Cruden and Varnes (Cruden and Varnes 1996:50, Figure 3-17).

The large landslides in the valley around Chavín may be separated into two types, based on their surficial morphology: relatively shallow earth flow complexes whose movement is primarily translational, and deep-seated rotational slumps. The majority of the flows are of the former type; the massive landslide at the northern extreme of the valley, that responsible for the Mosna-damming event, provides an example of the latter type. The most distinctive morphological characteristics for either type are the main scarp at the landslide’s upper limit, a main body of material, displaced downslope, that is longer than it is wide, a zone of depletion, and a zone of accumulation) (for an idealized schematic, see Cruden and Varnes 1996:Fig.14; also Keefer and Johnson 1983:8).\(^9\)

A further significant distinction in the context of Chavín is that between earth flows and more catastrophic processes like debris flows, though both fall under the rubric of “landslide”. Also noteworthy are the composite formations termed earth flow complexes: these are areas of overlapping earth flow deposits that result in surface morphology more varied than that of the idealized earth flow. They consist of a combination of active earth flows and inactive earth flow deposits, and can be “irregular in outline and blanket broad areas with hummocky, disrupted topography.” (Keefer and Johnson 1983:17)\(^10\) Such deposits do not necessarily threaten catastrophic downslope movement—they are active only in segments, and irregularly—but in aggregate consistently transport material downslope.

The Cochas earth flow is such an earth flow complex, extending ~1.8 km (slope distance) from its headscarp high on the west side of the valley to its toe on the valley floor. First formally described by Turner (1999:51), it widens to ~1.7 km wide at the toe and displays the characteristic hummocky topography that Keefer and Johnson describe (see Figure 1.7 and Turner, et al. 1999:Fig.4c). The soils that make up the

\(^9\) For a full description of earth flow morphology, see Keefer and Johnson 1983:8-10 and Cruden and Varnes 1996:40-41.

\(^10\) Compare with the Cochas earth flow, to the southwest of the site (see Figure 1.7).
earth flow—clearly exposed in the roadcut through the earth flow toe and in small scarps and trail cuts on the slope—are reddish silts with significant proportions of sand and clay, little organic content, and abundant clasts of small angular rock. Monitoring (see Section 4.5) suggests modern activity in at least some segments of the earth flow complex, and signs of instability (e.g. localized slumps) are visible on the slope.

These varied large landslides form only part of the valley topography. The geomorphologic units identified by surface mapping include the major elements of the large landslides (Qls and Qlsa—“landslides” and “active landslides”—on Figure 1.2) and the alluvial plain on which the modern town is located (Qoal—“older alluvium”—on Figure 1.2). The large landslides that make up the sides of the valley are interspersed with talus slopes (Qtl—“talus”—on Figure 1.2) and bedrock covered by thin colluvium (b/c on Figure 1.2), and dissected by small drainages that form small alluvial fans as they descend into the valley (Qaf on Figure 1.2). The topography of the valley walls is the result of the activity of the large landslides coupled with the variable resistance of the bedrock—the resistant quartzite forming prominent fins while the more easily eroded shales form the more moderate colluvial slopes between them. Shallow debris slides, rockfall, and accumulated talus are associated with these features.

Along the valley floor, the diamicton of the 1945 aluvión (not shown in Figure 1.2) and recent alluvium (Qyal—“younger alluvium”—on Figure 1.2) are dominant. These are flanked in places by remnant alluvial terraces, stranded by the downcutting Mosna (Qt on Figure 1.2). As I discuss in detail elsewhere (see Chapter 6), the area surrounding the monument (and probably the area under the modern town, though it remains little-investigated) has also been heavily modified by human activity in the last three millennia.

4.6 Active processes

Although the earth flows around Chavín have now been well-mapped (see Figure 1.2; also Turner et al. 1999), estimates of their activity—i.e. rates and frequency of movement—have been speculative. To address this question, a network of
monitoring points—rebar stakes driven into concrete foundations, located with sub-cm precision with a total station—was established in the summer of 2005 on the Cochas earth flow (see Figure 4.7). Monitoring of these points continues to provide data with which to estimate modern rates of earth flow movement, at least for the Cochas earth flow, which most directly threatens the monument today and is most likely to have directly impacted it in past. The preliminary data from this network of monitoring points suggest that the Cochas earth flow is indeed active (if unevenly so) today, with a down-slope displacement recorded at one point (CdHMP-12; see Figure 4.7) in the two-year period between August 2005 and August 2007. In addition, fresh scarps and damaged architecture visible on the lower slopes in the valley suggest that additional movement to that recorded has taken place in the last few years to decades.
Figure 4.7: Network of monitoring points on the Cochas earth flow. Point with recorded downslope displacement noted with arrow.

Relating these modern rates of movement to earth flow activity in prehistory raises the question of whether it’s appropriate to back-extrapolate estimates of contemporary earth flow behavior into the period in which Chavín was a functional ceremonial center—as much as 3500 years in the past. Thus the fundamental question is whether an assumption of uniformitarianism with regard to earth flow behavior is
justified, and, if not, whether change in earth flow activity has been due to climatic or anthropogenic factors.

The question of the antiquity of earth flow behavior around Chavín brings up paleoenvironmental questions as well. The primary variable affecting earth flow behavior is precipitation, though the relationship between increased soil pore pressure and earth flow movement is neither direct nor simple (Keefer and Johnson 1983:53). In Cruden and Varnes’ more abstracted discussion, they identify three broad categories of catalysts of landslide mobilization: increased shear stresses, low material strength, and reduced material strength (Cruden and Varnes 1996:68). In practical terms, important variables involved are precipitation, land cover, surface morphology, and material. In order to make estimates about past earth flow activity around Chavín, thus, we must make informed estimates about not only past landforms, but also both local paleoclimate and prehistoric land cover. These variables may be separated into exogenous ones—precipitation, material—that are out of reach of human affect and endogenous ones—land cover, surface morphology—that humans can and do (and did in prehistory) impact. That is, some variables are coupled to processes effectively outside of that local system while others are internal to it. This conceptual contrast is visible, though not explicitly made, in Cruden and Varnes’ checklist of landslide causes (1996:70).

The exogenous variables to which Chavín was linked include one relatively fixed—substrate—and two dynamic—precipitation and seismic activity. We may assume earthquake activity in the area in prehistory, given the seismically active nature of the region (see Cobbing, et al. 1996; Diessl 2004:16-17), but without paleoseismic research in the Callejón de Conchucos lack direct evidence. A notable exception is Rick’s suggestion that Chavín, late in its use-life as a ceremonial center, suffered extensive earthquake damage (Rick in press:20-21). In any case, earthquake-triggered landslides, if they were a concern for Chavín’s inhabitants, were not a predictable one; such seismic events would have no recognizable periodicity or patterning. Moreover, although the relative abundance of earthquakes in the seismically active Central Andes is well-documented (see Degg and Chester 2005; Dorbath, et al. 1990), earthquakes only rarely trigger earth flows (Keefer 1984).
By contrast, precipitation in the Central Andes is highly seasonal, with pronounced wet (December-April) and dry (May-November) seasons (see Chapter 3, Section 3.1). Regional-scale proxy climate data going back throughout the Holocene give a sense of climate patterning. This is of interest both for identifying periods that might have been higher-risk (wetter) and for the uniformitarian argument—if the earth flows are active now, and climate hasn’t changed too much, then they would have been active in the past as well, presuming that other variables have also remained relatively constant (see Chapter 3).

The endogenous variables of land cover and surface morphology are not only theoretically subject to anthropogenic influence; in the case of Chavín the direct evidence of anthropogenic activity altering the landscape is overwhelming. The impacts of both of these variables on earth flow behavior, moreover, are significant and fairly direct. While earth flow movement is directly coupled to pore pressure and thus precipitation, is also highly dependent on other variables. In broad terms, land cover may be understood to mediate the relationship between precipitation and earth flow activity, due to its impact on both soil stability—through the contribution of root structures to increased stability—and rates of evapotranspiration. In studies of the effects of de- and re-forestation in New Zealand, estimates are that average movement rates on forested slopes are 10% of those on denuded slopes (Marden, et al. 1992; Pearce, et al. 1987). Paleovegetation—particularly clearing of the valley slopes—thus would have significantly affected earth flow activity (see also Begueria 2006; Ekanayake and Phillips 2002). Unfortunately data tracking these variables in the Late Holocene around Chavin specifically is yet unavailable (see Chapter 3 for details), but the link between vegetative cover and earth flow activity is clearly an important one. The southwest corner of Structure A, even after extensive excavation, remains buried by up to 6 m of sediment, much of it probably deposited by the Cochas earth flow. The slopes of the earth flow today provide prime agricultural land, and likely were cultivated in prehistory as well, perhaps increasing earth flow activity.

11 Of course, Marden et al. are dealing with Pinus radiata, which certainly has different root structure and depth than even the most substantial land cover—Polylepis—one might posit for the Chavin area. Nevertheless, the strong link between vegetative cover and earth flow activity is clear.
Moreover, increased pore pressure may result not just from precipitation—mediated by land cover or not—but also when a rapid rate of loading exceeds the rate of moisture removal by drainage and evapotranspiration. That is, while the system may be primarily driven by precipitation, stable moisture conditions may still see increases in pore pressure as a result of loading. This need not be anthropogenic—intrusion of landslide material onto slopes may increase loading or erosion of earth flow toes may decrease resistance to failure, for example—but human activity has significant potential to load slopes. In Chavín, the primary possibility for this sort of impact on earth flow behavior is excavation of the slopes and/or toes of earth flows as part of the site’s program of monumental construction and attendant landscape engineering (described fully in Chapter 6).

In the Andes as elsewhere, prehistoric human activity has substantial potential to affect earth flow activity. Both land cover and surface morphology are potentially heavily dependent on past human activity. Anthropogenic burns¹², pasturing, fuelwood gathering, and cultivation may all have substantial effects on land cover, and construction of drainage features and mass movement of earth may directly affect slope stability by impacting rates of soil saturation and creating situations of rapid loading. Assessment of these endogenous variables, then, is as critical—and of more direct interest, in assessing human-environment interaction—as understanding of the changes in exogenous variables (described in the previous chapter).

4.6.1 Geologic Hazards

Earth flow activity—particularly that of the Cochas earth flow—was only one of several geologic concerns for Chavín. More dramatic hazards than earth flow activity were also a reality for Chavín’s inhabitants; the site’s location in a steep highland valley probably made the presence of at least some substantial geologic hazards inevitable. Highland Ancash is generally steep, subject to high seasonal

¹² These may not have such a dramatic effect. The modern burns that one generally sees in the Chavín area tend to burn off loose, dry ichu (Stipa ichu) without killing plants or probably affecting slope stability too much. If the landcover consisted of Polylepis or other tree species rather than bunchgrasses burns presumably would have been more intense. For a general treatment of the impact of anthropogenic fire, see Pyne 1998.
variation in rainfall, glaciated, and seismically active (Blodgett, et al. 1998; see Cobbing, et al. 1996; Diessl 2004). There is a long and substantial documentary record of catastrophic geologic events in the region (e.g. Carey 2005; Dorbath, et al. 1990). Seismic hazards are magnified by a steep and landslide-prone landscape capable of producing catastrophic debris flows of astonishing speed and power (the Yungay debris avalanche had an estimated speed of 78 m/s (Plafker and Ericksen 1978)). The most infamous and best-documented such event was the earthquake-triggered debris flow which wiped out the Callejón de Huaylas town of Yungay in 1970 (Cluff 1971; Oliver-Smith 1986; Plafker, et al. 1971). While the magnitude of that disaster was both massive and tragic, it should not be thought of as otherwise remarkable—such debris flows (locally known as aluviónes) have occurred several times in the recent history of highland Ancash alone. A partial list of 20th century events includes Huaraz 1941, Chavin 1945, Ranrahirca 1962, as well as Yungay 1970 (see Carey 2005; Cluff 1971).

If natural hazards are inevitable in highland Ancash, however, not all areas are equally vulnerable. Around Chavin, the local geology creates a variety of hazards: earth flow activity, debris flow generated up the Wacheqsa drainage, flooding of the Mosna River, re-activation of the Mosna-damming earth flow and resultant flooding, and seismic events. Particularly noteworthy for archaeological purposes is the concentration of these hazards in the area in which the site of Chavin is situated, despite the ready availability of other locations on the valley floor with considerably less exposure to environmental risk—e.g. to the north of the Wacheqsa River, where the modern town is located. This area is out of aluvión danger, less subject to Mosna flooding, and out of the way of the earth flows in the valley, if subject to some risk of rockfall from the bedrock outcrop upslope to the west. Moreover, the architectural sequence of the site (see Kembel 2001) displays a pattern of expansion to the south and east, placing the expanding site more directly at risk from both the Mosna River and the Cochas earth flow.

The most dramatic of the geologic hazards in the immediate environs is that posed by debris flows traveling down the Wacheqsa drainage. One of these events—in 1945—is historically documented, and deposits in the quebrada of the Wacheqsa
suggest at least one other debris flow may have occurred in the Late Holocene (see Chapter 4, Section 4.6.1).

The 1945 event set archaeological work in the site back by decades—indeed, much of the site outside the cleared core of the monumental area remains covered by the *aluvión* deposit, which ranges up to nearly 4 m in thickness. The ubiquity and magnitude of the deposit suggest that any similar events from the Chavín period would be visible; the fact that none have been found in any excavation in or around the site is strong evidence that no such events took place during the use-life of the ceremonial center. Even in the absence of such an event in the Wacheqsa drainage during the millennium in which the site was active, however, it is reasonable to infer that local inhabitants were familiar with such catastrophic events in the region, given their frequency in the region.

Moreover, although debris flows are the most dramatic natural hazard in the region, they are not the only one. Our geomorphologic mapping in the valley around Chavín de Huántar, for instance, has identified other significant hazards: direct seismic damage, earth flow activity, and flooding are chief among them.

Flooding of the Mosna River was certainly more common than *aluviones*, if less catastrophic, as was the persistent activity of the earth flows comprising so much of the valley. Earth flow deposition at the toe of the Cochas earth flow in the post-Chavín period—visible in the stratigraphic exposure provided by the roadcut immediately southwest of Structure A—reaches 4 m in the last 2500 years. Furthermore, landslides regularly alter the course of both the Wacheqsa and the Mosna rivers, as is visible in the local topography (see Figure 4.10; the abandoned channel at left was flowing in the first half of the 20th century) and attested by the local history of the last century (see Tello 1945, discussed more fully in Chapter 6). Seismic hazards are also endemic to the region (see Degg and Chester 2005; see Dorbath, et al. 1990) and several faults run near Chavin (see Cobb, et al. 1996).
Figure 4.8: View east down the Wacheqsa River. Note abandoned river channel to left.
4.7 Field data and interpretations

The archaeological significance of the earth flows around Chavín is dependent on their periods of activity. Buried architecture visible in stratigraphic exposures clearly dates at least some earth flow activity as post-Chavín, while those same exposures also offer evidence of pre-Chavín earth flow activity as well (see, for instance, Figure 6.10-C). The 2005 excavations complicated the picture, however, by demonstrating that architecture is also often buried by deposits that are partly or wholly cultural, and that large-scale landscape modification formed a significant part of the monumental project at Chavín (see Chapter 6).

Nevertheless, the fundamental interpretation of the stratigraphic exposures stands: earth flow activity predates Chavín and has continued into the modern day. Given that the stratigraphy from which inferences about geomorphic activity are drawn is generally quite complex, however, the specific geomorphic activity contemporary with Chavín (landslides, fluvial processes, etc.) needs to be identified on an individual basis, with reference to particular evidence. As a concrete example of the timescale and type of geomorphic processes related to Chavín, I describe in detail here the geomorphology and archaeology of the western portion of the West Field. This serves both to demonstrate the methodology used for such reconstruction and as an exemplar of the frequency, type, and scale of geomorphic processes intertwined with Chavín-period cultural activity.

4.7.1 Geomorphology of the West Field

The area west of the monumental core of Chavín—here referred to as the West Field—has been recognized since at least Julio C. Tello’s visits to the site (beginning 1919) as containing Chavín-era construction. Two megalithic walls (apparently terrace facades), 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 Río Wacheqsa (see Figure 4.11). Until the construction of the road that currently separates the monumental core from the West Field in the 1970s, these east-west
terraces were also associated with a north-south wall that was largely destroyed by the road construction, suggesting a structure or structures in the West Field rather than simple megalithic terraces; this leads Diessl to describe a “West Temple” (Diessl 2004:510-516).
Figure 4.9: View of West Field (right), looking southeast. The two exposed terraces are visible, and the cut of the Wacheqsa River is just visible in the foreground, below the modern white wall marking the northern edge of the West Field.
Spurred by these surficially-visible remains and Tello’s maps, Hernan Amat excavated in the West Field between 1966 and 1973 (the exact dates of his work in the West Field are not clear). While the results of these investigations remain unpublished, Diessl provides a summary of the work (Diessl 2004:512-516), and the locations of the excavations remain visible on the surface; local oral history of excavation is extensive and includes these efforts. These excavations included the clearing of a West Field Gallery, similar in construction to the galleries known from the monumental core (see Diessl 2004:512-516). Exploratory Proyecto Stanford excavations carried out in 2000 and 2001 on the face of the visible terraces revealed deep Chavín deposits and suggested that the terrace walls continued downward for at least 4 meters below the modern ground surface (Lumbreras, et al. 2000). The parallel upper and lower walls, both east-west, are visible for stretches of 48 and 37 m, respectively. Fragments of complementary north-south walls are also visible; like the longer east-west segments, these share the monument’s architectural orientation (13° east of north; see Rick, et al. 1998:197). The combined implication of these observations may be that the constructions visible on the surface in the West Field are not simply terrace walls retaining slope sediments, but platform faces backed by cultural fill. This inference is supported by the sectional exposure provided by the cut of the Río Wacheqsa, where at least one wall of similar scale is visible in profile to significant depth (see Figure 4.12).
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 mapped first by Turner (Turner, et al. 1999:50) and later as part of the original geomorphologic mapping of the valley carried out by the author and David Keefer (see Figure 1.2). Both mapping projects were in agreement in depicting the area as a combination of earth flow, alluvial deposit, and bedrock thinly covered by colluvium.

Further data come from stratigraphy exposed by the cut of the Río Wacheqsa 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. As much as 8 meters of stratigraphy are often visible along the south bank of the river, exposing both natural and archaeological strata.

Characterization of this stratigraphy comes from multiple sources: documentation and description of visible features; correlation of visible strata with data...
from a 4x4 m excavation unit placed ~5 m south of the river cut, in the northwestern corner of the West Field (Unit CdH-WF-07); and a series of cleaned 1 m-wide profiles in the exposed cut (see Figure 4.11).

![West Field Excavations](Image)

**Figure 4.11: Stanford Project excavations in the West Field**

As Figure 4.12 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 strata, and that 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 does not display any corresponding architectural strata.
Figure 4.12: Stratigraphy of Units CdH-WF-10/10A and CdH-WF-11.
The reconstruction resulting from this stratigraphic evidence is necessarily both
ggeomorphologic and archaeological, although it spans only a time period beginning
perhaps as early as 2000 cal BC—a long archaeological timescale but short geologic
one.

The basement deposit (not basal in absolute terms, but the lowest visible 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 basement stratum is a diamicton resultant from a pre-Chavín
debris flow that descended the canyon of the Río Wacheqsa; 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 modest (~100 m wide at its toe
and ~60 in length (slope distance)) rotational landslide disturbed the West Field (see
Figure 4.13). The basal diamicton layer is offset downward from west to east at the
contact; the eastern edge of the landslide does not display such clear stratigraphic offset
but is visible nonetheless.
Excavation approximately 5 m south of the exposure revealed substantial and wholly intact architecture with a *terminus ante quem* date of ~850 cal BC\(^{13}\) (see Figure 4.14; also Contreras in preparation), 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 4.12)). 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 4.12). That fill is visible only to the west of the landslide deposit and does not cross the contact. Roughly contemporary with this construction was colluvial deposition on the landslide bench; perhaps instability led to the bench being deemed unsuitable as a foundation for construction.

\(^{13}\) 2712 +/-42 (AA 69447; charcoal; \(\delta^{13}C= -23.6\%\)). Other dates are consistent with this one (see Chapter 6, Section 6.2.2).
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 liberal estimate for the earliest monumental construction activity in Chavín (~1200 cal BC) thus suggests that the debris flow and landslide are unlikely to have occurred before ~1500 cal BC. The colluvial deposit atop the landslide bench, moreover, contains scattered ceramics, unfortunately largely non-diagnostic but attributable to the Chavín-period, at least (one characteristic Chavín neckless jar rim fragment was identifiable).

Further construction phases followed the initial leveling fill (see Figure 4.12), while the landslide bench began to accumulate first colluvial material bearing scattered cultural detritus and later fluvial deposits (see Figure 4.12). Both high- and low-energy fluvial deposits are visible (see Figure 4.15), accumulated to a total depth of ~2 m. The location of these deposits relative to the modern river level—which is ~6 m lower—was initially puzzling. The basement debris flow deposit evidences a smoothly dropping Wacheqsá channel not far—if at all—above the modern level of the river in
the mid-Holocene. By the time that the fluvial deposits described above were laid down, however, river level was some 6-8 m higher—apparently raised by the damming resulting from the rotational landslide (see Figure 4.16).

14 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 Chavin—and historically attested (see Tello 1945:775).
Downriver, ~80 m to the east, the fluvial deposits disappear from the stratigraphy of the visible cut (see Figure 4.17). Moreover, the level of the architectural fragments visible in the exposure above the river’s south bank drops to nearly the level of the modern river (see Figure 4.18). This dramatic offset in architecture, combined with the fluvial deposits described above, suggest that the rotational slide in the West Field (described above) dammed the Río Wacheqsa where the river-course is pinched by exposed bedrock fins to the north (Figure 4.19).
Figure 4.17: Fluvial deposits in cut on south side of the Wacheqsa River (outlined in white; landslide outlined in red). Units CdH-WF-10/10A and CdH-WF-11 are visible at right.
Figure 4.18: Canal outlet and associated architecture in the Wacheqsa cut. The path in the foreground is ~.5 m above the modern river level.
Figure 4.19: Quartzite fins north of the Wacheqa River; the most prominent of these mark the hypothesized location of the landslide dam. The West Field is visible at the lower right.

Ponding behind that damming deposit left the low-energy fluvial deposits; an ~6-8 m high waterfall would have served as the pond’s eastern outlet. This feature persisted into the post-Chavín period—no Chavín-period evidence is visible higher than the fluvial deposits described above—before the downcutting river fully eroded the dam and assumed its modern level.

Colluvial deposition continued following this alluvial downcutting, providing the series of uppermost deposits that span the disjunction between fluvial deposits to the west and the cultural deposits to the east (visible in WF-10/10A; see Figure 4.12). Those colluvial deposits are capped by the diamicton of the debris flow that descended the canyon of the Wacheqa in 1945, still high-energy enough in the West Field that
the deposit is generally only ~30 cm thick.\textsuperscript{15} The uppermost deposits are reworked 1945 diamicton, generally heavily disturbed by erosion and construction of the INC-constructed tapial (rammed-earth) wall that borders the West Field, marking it as part of the monument’s protected area.

This mixture of geomorphic and archaeological data both document the complex history of the West Field and have significant implications for the geomorphic history of the area generally. It is also clear that incorporating both archaeological and geomorphologic data is necessary to developing this interpretation.

The geomorphic history described above is significant for the compressed timescale within which it fits. The earliest stratum documented is unlikely to predate 1500 BC, while the uppermost of the Chavín-period strata—~2 m higher—predates 500 BC.\textsuperscript{16} 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 last 2500 years. The single radiocarbon date available suggests the timespan may be even more compressed: a sample from the colluvial strata in CdH-WF-11 (see Figure 4.12) yielded a date of ~900 cal BC.\textsuperscript{17} In other words, the 5 m of stratigraphy visible represents only approximately 3500 years of geologic history. Within that span, there is evidence of at least six significant geomorphologic events, and three cultural ones.

Furthermore, the clustering of the natural and cultural depositional events is suggestive. Given the high level of geologic 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 4.12). 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

\textsuperscript{15} Further east, in the monumental core where the aluvión was spreading laterally, losing energy, and depositing more material, deposits of up to 4 m have been documented (see Figure 4.20).

\textsuperscript{16} If the chronology in the West Field is consistent with that in the monumental core, where monumental construction ceases by 500 BC if not before (see Kembel and Rick 2004), that is. 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.

\textsuperscript{17} 2805 +/- 37 BP (AA75394; charcoal; $\delta^{13}$C=-25.4%).
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-II is surprisingly scant. Nevertheless, the frequency of geomorphic activity during LP-I and LP-III, as well as the ubiquity of LP-II landscape modification features at least partially practical in function, suggest the likelihood of geomorphic activity during LP-II.

Figure 4.20: West profile of Unit CdH-AS-02, demonstrating thickness of 1945 aluvión deposit.
The cumulative impact of the geomorphologic evidence here described is to emphasize the dynamism of the local landscape. Particularly important is the temporal scale of that dynamism—multiple lines of evidence demonstrate that the landscape has been active in the Late Holocene. Specifically, there is evidence of two substantial debris flow events in the Wacheqsa canyon, regular activity of the several earth flows in the valley, landslide-induced re-channeling of the Mosna and Wacheqsa rivers, and possibly of seismic activity as well.

This high rate of activity has created the problem of archaeological (in)visibility described in Chapters 1 and 4. Moreover, the frequency of landscape activity also suggests that landscape change and geologic risk were features of the local environment that Chavin’s inhabitants would have been unable to avoid. The ways in which they interacted with those features of their environment are the focus of the following chapters.
5.1 Overview

The immediate goals of the fieldwork carried out in Chavín from 2004-2006 were to collect data about prehistoric environmental (particularly earth flow and river) activity, human response to such activity, and anthropogenic changes (both intentional and incidental) to the environment. These aims of understanding process were coupled to a simpler goal of reconstructing the appearance and character of the landscape around the monumental core of Chavín during the periods before, during, and after the center’s florescence. In particular, fieldwork was directed toward establishing the degree to which that environment was anthropogenic and to what degree it was the result of natural processes. Reconstructions of both environmental activity and anthropogenic landscape modification, then, must be incorporated into the reconstruction of the archaeological landscape of Chavín.

In broader terms, the project of understanding the archaeological landscape is an attempt to rise to the challenge posed by archaeological and environmental reconstruction in an environment that has been heavily modified over a significant period of time. This challenge has often been noted by archaeologists working in the Andes (e.g. Kaulicke 1998; Moseley 1983; Rick 1988; Silverman 2004) but has remained difficult to address (but see Dillehay and Kolata 2004; Huckleberry and Billman 2003). The magnitude of the problem—grasping its ramifications, identifying relevant archaeological evidence, and gathering an adequate sample of such evidence—is daunting.

It is a relatively straightforward task to imagine Chavín without structures. That is, to imagine Chavín as it appears today, but without the visible construction. However, a variety of processes combine to render this a wholly inadequate means of conceiving of either the landscape that Chavin’s builders encountered when they began construction or the landscape they left behind perhaps 700 years later. Apart from the substantial construction of the monumental complex, the modern landscape is different
in several particulars. Depositional events that have obscured the complex as well as its setting include landslide and earth flow activity and the major 1945 debris flow. Moreover, movement of river channels as a result of landslide activity is a prominent feature of the local geomorphology; such channel displacement not only constitutes a substantive landscape change but is also a major source of erosion.

In addition to these natural changes, the landscape engineering that accompanied the construction of the monumental core—less immediately visible than the major structures—also had a profound effect on the monument’s setting. These are discussed in detail in the following chapter; the most salient examples include instances of substantial landscape engineering. The expansion of the monument apparently involved the diversion of the Mosna River and the reclamation of the riparian corridor for construction. Remnants of walls that canalized the Mosna River are still visible today, and Tello’s pre-aluvión photos show similar wall fragments lining the Wacheqsa River. It is also now apparent, from multiple excavations and investigations of natural exposures, that much of the near periphery of the monumental core, which does not today appear to be part of the built complex, in fact consists of series of terraces and platforms that have been obscured by depositional activity.

To recapitulate, I have considered in Chapter 3 environmental variables that I have classified as endogenous (subject to modification—intentional or not—by human activity) and exogenous (outside of the reach of human activity) (see Table 5.1).

<table>
<thead>
<tr>
<th>Endogenous</th>
<th>Exogenous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land cover</td>
<td>Substrate</td>
</tr>
<tr>
<td>Surface morphology</td>
<td>Precipitation</td>
</tr>
<tr>
<td></td>
<td>Seismic activity</td>
</tr>
</tbody>
</table>

Table 5.1: Environmental Variables

Taking into consideration the exogenous and endogenous variables considered in Chapters 3 and 4, it is apparent that Chavín’s inhabitants were subject to the dynamic environment in which they lived. This in no way indicates, however, that they were passive subjects. As the several examples of anthropogenic landscape
modification make clear, Chavin’s local environment was subject to its inhabitants as well as they to it.

As a result, the identification of these variables and the synthesis of related data (see Chapters 3 and 4) are not sufficient to address the questions of human/environment interaction that are the goal of this research. Rather, they form the requisite background to interpreting the results of field investigation that resulted in evidence of both natural landscape activity and anthropogenic landscape change. In this chapter I describe the goals and methods of that field investigation and subsequent analysis. I address the methods of identifying and describing these natural changes as well as the anthropogenic ones, and discuss the process of reconstruction of the landscape of the ceremonial center.

The archaeological landscape project at Chavin has involved the documentation of geomorphologic issues at the site, development of a means of tackling the postdepositional challenges such documentation presents, and the ongoing project of reconstructing the Chavin period landscape, its antecedents, and reciprocal human-environment interactions in the area. The successful integration of archaeological and geomorphologic data has been key to the project; I describe here the development of a fieldwork strategy that reflects the input of both sorts of information. Also key has been the integration and management of different data streams in a site GIS, described in detail later in this chapter.

5.2 Chronology

For heuristic purposes I divide the area’s landscape history into several phases (see Table 5.2). These are correlated with the construction history of the monument, in many cases directly, as modification of the landscape formed part of the monumental project. Since Rowe’s ceramic seriation and proposal of an “Old” and “New” Temple, the period of monumental construction has been subdivided; Kembel’s recent work has emphatically shown that the period of Chavin’s florescence may be understood as one of almost constant construction that may be divided into several phases (see Kembel 2001). I here offer a much coarser periodization of landscape change at and around
Chavín, both including the monumental period and bracketing it. As a result I discuss three landscape phases: pre-monument (Landscape Phase I), monumental (Landscape Phase II), and post-monumental (Landscape Phase III).\(^1\)

The latter two phases have been subdivided. Chronological resolution is unfortunately not yet adequate to further subdivide LP-II, which is the phase of most interest. Even the sorting of landscape changes into LP-IIa and LP-IIb (pre-Black and White Stage and Black and White Stage, respectively) is difficult.\(^2\) The engineering of the Mosna channel, definitively tied to the Black and White Stage, serves as a referent. In the case of LP-III, the definitively dated aluvión of 1945 serves as referent; in the case of this phase its subdivision is less important for interpretive purposes—certainly such a long phase could be further subdivided, even with only the evidence at hand, but as it falls outside the temporal span of direct interest to Chavín it will be left largely unexamined.\(^3\)

<table>
<thead>
<tr>
<th>Period</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscape Phase I (LP-I)</td>
<td>Pre- monumental construction</td>
</tr>
<tr>
<td>Landscape Phase II (LP-II)</td>
<td>Monumental phase</td>
</tr>
<tr>
<td>LP-IIa</td>
<td>Pre- Black and White Stage</td>
</tr>
<tr>
<td>LP-IIb</td>
<td>Black and White Stage and subsequent monumental phases</td>
</tr>
<tr>
<td>Landscape Phase III (LP-III)</td>
<td>Post- monumental construction</td>
</tr>
<tr>
<td>LP-IIIa</td>
<td>Pre- 1945 aluvión</td>
</tr>
<tr>
<td>LP-IIIb</td>
<td>Post- 1945 aluvión</td>
</tr>
</tbody>
</table>

\(^1\) This is an artifact of limited evidence and coarse chronology rather than a statement about the nature of landscape change at Chavín, however—though landscape change was primarily indeed punctuated, this coarse periodization necessarily glosses over many such punctuations.

\(^2\) This difficulty is symptomatic of the larger problem of relating Kembel’s detailed relative architectural chronology to both absolute dates and other relative chronologies (e.g., the ceramic sequence) at the site.

\(^3\) Phase LP-III is of interest primarily for what it suggests about frequency of natural events and degree of post-Chavín landscape change; I have separated it around the 1945 aluvión only because that event so substantially and pervasively changed the landscape. The geomorphic and cultural processes that may be identified for LP-III are described in more detail in Section 6.2.3.
<table>
<thead>
<tr>
<th>Period</th>
<th>Approximate Dates</th>
<th>Kembel/Rick Chronology (Kembel 2001)</th>
<th>Burger Chronology (aligned with absolute dates rather than architectural sequence; from Burger 1984)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LP-I</td>
<td>1500-1200 BCE</td>
<td>Pre-monument</td>
<td></td>
</tr>
<tr>
<td>LP-IIa</td>
<td>1200-1000 BCE</td>
<td>Separate Mound, Expansion, and Consolidation Stages</td>
<td></td>
</tr>
<tr>
<td>LP-IIb</td>
<td>1000-550 BCE</td>
<td>Black and White Stage</td>
<td>Urabarriu Phase</td>
</tr>
<tr>
<td>LP-IIIa</td>
<td>550 BCE – 1945 CE</td>
<td>Support Construction Stage and Abandonment/Collapse/Reoccupation</td>
<td>Chakinani Phase, Janabarriu Phase, and post-Chavin</td>
</tr>
<tr>
<td>LP-IIIb</td>
<td>1945 CE - present</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.3  Fieldwork

Field data has been gathered from four sources: archaeological and geomorphologic survey, cleaning and documentation of modern stratigraphic exposures (both natural and anthropogenic), and excavation. The process has been iterative, stretching over three field seasons and tacking back and forth between archaeological and geomorphic inputs. Data gathered in the field have been augmented by the inclusion of other data from the Stanford Project (generated by fieldwork between 1996 and 2006) and other published sources.

5.3.1  Survey

In 2004, working with Dr. David Keefer (USGS), I documented exposures within roughly a 2 km radius of Chavin. Those consisted of cuts resultant from the Mosna and Wacheqsa rivers and smaller tributary drainages, road construction, and
footpaths (see Figure 5.1). The exposures were located with a handheld GPS, photographed, and the sediment stratigraphy described; where archaeological features or material were encountered, these were documented as well. This process also served to groundtruth the aerial photography that was used to identify local landforms. This work resulted in a geomorphic map of the local area, complementing that produced by Turner in 1999 but covering a broader area in more detail (see Turner, et al. 1999 and Figure 1.2).
I also undertook a fieldwalking survey in the area (see Figure 5.2) around Chavín in 2003, in order to attempt to identify any accessible paleosurfaces, record the
existence of anthropogenic landscape features, and document modern agricultural and land use practices. Archaeological material was not collected, and the survey was deliberately more extensive than intensive, but archaeological material was documented where encountered. The resultant data—largely negative evidence in terms of archaeological data, as surficial archaeological materials were almost completely absent—served to reinforce the conclusions drawn following the Stanford/INC 2003 salvage excavations: paleosurfaces and associated Formative Period remains are scarce at best in the Chavín area, due to substantial post-Chavín sediment deposition (see Chapter 1, Section 1.4, and Chapter 4, Section 4.1).
Figure 5.2: Area surveyed in 2004
The goals of the survey and documentation in 2004 were to assess 1) landscape change in and around the monument since the time of its occupation and use, 2) the impact of that change on modern visibility of archaeological remains, and 3) current geological hazards in the area. Most significantly for the current research, results included concrete evidence of buried archaeological materials in several areas of the monument’s near periphery, none of which offer surface evidence of prehistoric occupation. The findings of this preliminary work resulted in the addition of a fourth significant research focus: the investigation of anthropogenic landscape modification in and around the monument.

In order to cope with the inadequacies of archaeological surface survey while attempting to characterize the near periphery of the site, it was necessary to use the geomorphologic survey to inform archaeological excavation. The geomorphic map that resulted from the 2004 fieldwork was used to plan the 2005 excavation season. Areas with high probabilities of yielding both stratigraphic sequences of recent (late Holocene) geomorphologic activity and cultural material were selected. The exposures examined in detail in 2006 were selected on a similar basis.

5.3.2 Excavations

The geomorphologic survey identified areas where downslope deposition in the last 2-3 millenia was likely to have interred Chavín-period surfaces; these areas were the targets for subsurface sampling in the form of moderate-sized (ranging from 4 m\(^2\) to 16 m\(^2\)) excavation units. The excavations were intended to provide a relative chronology of earth movements; information about period and character of interred archaeological features; and a means of tying the relative chronology of geomorphic activity to both an absolutely and relatively dated cultural sequence derived from the whole corpus of Proyecto Stanford work as well as previous research at the site. The excavations were also located in areas deemed likely to provide a catalog of significant environmental perturbations—including, potentially, earthquakes, landslides, and catastrophic earth flows. Attempted landscape alteration was also a focus of investigation; the targeted locales included both areas known to have been subject to
anthropogenic modification and areas in which erosion control structures would have been a logical concern. Excavations were carried out in three sectors: the Area Sur, the West Field, and La Banda.4

5.3.2.1 The Area Sur

Surface survey and previous excavations to the west and south of the monumental center suggested that Chavín’s builders began at an unspecified date to either build immediately in the path of the Cochas earth flow5 or to cut back its toe in order to provide flat land for monument expansion. With this in mind, five excavations were located on or downslope from the toe of the earth flow, in the area immediately south of the monument. These excavations were located in the sector designated the Area Sur (AS), a rough triangle pointing south, bounded by Building E and Building A to the north, the Mosna River to the east, the southern extent of the INC-designated protected area to the south, and the modern road to the west (see Figure 5.3 and Table 5.4). The excavations were designated AS-01 through AS-05.6

4 There is a profusion of toponyms for these areas. The designations employed here reflect the site sectors used by the Stanford project (see Figure 5.3). The area east of the Mosna River is also referred to as Gaucho, after the community there. Similarly, the area west of the road that divides the monument was home to the community of Raku before its destruction by the 1945 aluvión, and is now bounded to the south by the community of La Florida.
5 The large earth flow upslope of the site to the southwest was termed the Cochas earth flow by Robert Turner (Turner et al. 1999), after the community of Cochas high on the slope. Lumbreras (1989) and Burger (1984) also refer to the slope, calling it Puca Orqo and Qoto Pukyo, respectively. I here use Turner’s nomenclature to refer specifically to the active earth flow, and Lumbreras’ for the slope in general.
6 Excavations followed the naming conventions established by the Stanford Project, resulting in unit designations of the form, “Site-Sector-Unit”. “CdH” designates Chavin de Huántar in the site prefix, followed by a two-letter sector designation. Previous work in the West Field and La Banda had established sector designations there; “WF” and “LB”, respectively. The South Area, in which the Stanford Project had not previously worked, was designated “AS”. Unit designations consisted of two-digit numbers in ascending order. Given that excavations were exploratory rather than areal, numbers were assigned on a chronological basis, following the order in which units were opened (in the case of areal excavations carried out by the Stanford Project, areas have been gridded and assigned letter-number designations indicating their positions in the grid). Units ranged in size from 1x1 m to 4x4 m; where it proved necessary to expand existing units expansions carried the designation of the original unit plus a letter indicating the relative chronological position (in the order of excavation) of the expansion (“A”, “B”, “C”, etc).
This area of the site has not been the subject of much archaeological attention, although the modern topography is testament to unpublished excavations (see Figure 5.3: Contreras’ 2005-2006 excavations and stratigraphic exposures)

147
Local oral history attributes the bulk of this work to Hernán Amat’s investigations in the late 1960s and early 1970s, but without much specificity. Slightly further to the south, where the valley widens again south of the toe of the Cochas earth flow, is the area labeled Ultapuquio by Richard Burger (Burger 1984:Map 1); he surface-collected the area. Burger’s units PAn6-18-D1/2/3 were uphill of the Area Sur, on the lower slopes of the Cochas earth flow.

Figure 5.4: Section of wall in the Area Sur exposed by undocumented excavation.

One major section of wall, running roughly N-S, is visible on the modern surface, exposed by an unidentified excavation. It begins ~85 m south of Building E (and somewhat further upslope) and continues for ~40 m to the south. The drystone wall is constructed predominantly of roughly rectilinear mid-size quartzite blocks, generally in the range of 80 cm wide by 50 cm high.

Unit AS-01 was placed with the intent of investigating the interaction of the active toe of the Cochas earth flow with Chavín architecture. Approximately 15 m to
the east of the excavation unit a drain outlet is visible above the bank of the Mosna, suggesting the presence of buried architecture upslope.

Unit AS-02, in contrast, was placed just south (~15 m) of Building E, in the projected course of the pre-Black and White Stage Río Mosna (Rick in press:Fig.6). The goal of the excavation was to test the hypothesis that the course of the Mosna River had been substantially further to the west in LP-I.

Units AS-03, AS-04, and AS-05 were placed against the face of (AS-03) and upslope of (AS-04 and 05) the wall described above, with the intent of determining its depth, construction date and purpose.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-01</td>
<td>3x3 m</td>
</tr>
<tr>
<td>AS-02</td>
<td>2x2 m</td>
</tr>
<tr>
<td>AS-03</td>
<td>2x2 m, expanded first to 2x3 m (03A) and then 2x4 m (03B) (long axis E-W)</td>
</tr>
<tr>
<td>AS-04</td>
<td>1x1 m</td>
</tr>
<tr>
<td>AS-05</td>
<td>1x2 m (long axis E-W)</td>
</tr>
</tbody>
</table>

5.3.2.2 The West Field

The sector designated the West Field, to the west of the monumental core, is a quadrilateral bounded by the Wacheqsa River to the north, the modern road that bisects the monument to the east, the community of La Florida and the steep slope of the Cochas earth flow to the south, and the steep colluvium and exposed quartzite bedrock of the Puca Orqo slope to the west (see Figure 5.3).

The West Field (WF) was chosen for excavation because of the potential of exposing interbedded geomorphologic and cultural strata, testified to by the stratigraphy visible in the cut of the Wacheqsa River at the north margin of the sector. (This cut was also the subject of cleaning and stratigraphic examination in 2006; see Section 5.3.3) Although significant amounts of overburden had to be removed in order to access cultural remains in this area, I hoped that the interdigitation of cultural and geomorphologic units would allow development of a precise chronology of the activity.
of the Cochases earth flow and the Wacheqsa River as well as the cultural response, if any, to that activity.

The West Field has been recognized since at least Julio C. Tello’s visits to the site (beginning 1919) as containing Chavin-era construction. Two megalithic walls (apparently terrace facades), constructed of quartzite blocks in a style and of a scale similar to that of the structures in the monumental core, are visible on the surface, as is one canal draining northward into the Río Wacheqsa (see Figure 4.10). Until the construction of the road that currently separates the monumental core from the West Field in the 1970s, these east-west terraces were also associated with a north-south wall that was largely destroyed by the road construction, suggesting a structure or structures in the West Field rather than simple megalithic terraces; the probability of such structures leads Diessl to describe a “West Temple” (Diessl 2004:510-516).

Spurred by these surficially-visible remains and Tello’s maps, Hernan Amat excavated in the West Field between 1966 and 1973 (the exact dates of his work in the West Field are not clear). While the results of these investigations remain unpublished, Diessl provides a summary of the work (Diessl 2004:512-516), and the locations of the excavations remain visible on the surface; local oral history of excavation is extensive and includes these efforts. These excavations included the clearing of a (since re-sealed) West Field Gallery, similar in construction to the galleries known from the monumental core.

Exploratory Stanford excavations carried out in 2000 and 2001 on the face of the visible terraces revealed deep Chavín-period deposits and demonstrated that the upper terrace wall continues downward for 3 meters below the modern ground surface (Lumbreras, et al. 2000). Detailed mapping demonstrated that the parallel upper and lower walls, both east-west, are visible for stretches of 48 and 37 m, respectively.

Excavations in 2005 consisted of three units, spaced roughly evenly across the sector from west to east (see Figure 5.3 and Table 5.5). Unit WF-07 was placed furthest to the west and nearest the steep cut of the Río Wacheqsa, which is only about 5 m north of the excavation. Deeply buried architecture visible in that river cut suggested that the location was one that should yield interdigitated natural and cultural strata.
Unit WF-08 was an exploratory unit, placed roughly in the center of the West Field in the area least known, while Unit WF-09 was placed furthest to the east, in an attempt to better define the structures to which the surficially-visible walls were thought to be linked (see Figure 5.3).

### Table 5.5: West Field Excavations

<table>
<thead>
<tr>
<th>Unit</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>WF-07</td>
<td>4x4 m, expanded northwards (WF-07A) in a 2.5 x .85 m block (long axis E-W)</td>
</tr>
<tr>
<td>WF-08</td>
<td>3x3 m</td>
</tr>
<tr>
<td>WF-09</td>
<td>2x3 m (long axis E-W)</td>
</tr>
</tbody>
</table>

#### 5.3.2.3 La Banda

Across the Mosna River from the monumental core is the sector designated La Banda (LB). On a raised terrace that gives it a panoramic view of the monumental core, the area is bounded by the Mosna River to the west, the downhill fringe of the community of Gaucho to the north, a steep slope of colluvium and exposed bedrock to the east, and a small landslide to the south.

Archaeological interest in the area has been prompted by the visible terraces, a perpendicular line of megalithic standing stones (*huancas*), local accounts of the presence archaeological materials there, and relatively brief mentions of the area in the literature (e.g. Burger 1984; e.g. Rowe 1967).

In the La Banda area, two megalithic terrace walls were carefully documented beginning in 2000, and areal excavations were undertaken by both the Proyecto Stanford for research purposes (in 2000, 2002, and 2005; see Lumbreras, et al. 2000; Rick and Mesia 2002, 2005) and by the Proyecto Stanford and the Instituto Nacional de Cultura as part of rescue operations necessitated by road construction (in 2003; see Rick, et al. 2004; Rick and Mesia 2003). The uppermost of these walls, set some 90 m back from the Río Mosna and ~20 m above river level at the eastern edge of a modern agricultural field, is approximately 2 m high (although, as excavations in 2001 indicated, it continues downward below the modern ground surface, and may have had
upper courses that have been destroyed) and stretches for ~8 m in a roughly N-S orientation. The lower wall is of greater height (2 m from modern ground surface to preserved wall top and nearly 4 m from base to existing top), but located just at river level; its north end in fact extends into the modern river course (see Figure 1.8). Fragments of wall are visible under slopewashed sediments as much as 40 m to the north. Both features are drystone walls of rectilinear quartzite blocks, predominantly very large (exposed block faces range up to 140 cm wide by 80 cm high).

The 2005 excavations were in two areas, one against the outer face of the lower of these two terrace walls and one inside the inner face, in the modern agricultural field to the east (see Figure 5.3 and Table 5.6). The broad agricultural terrace present today (above this wall), upon which rescue excavations in 2003 uncovered widespread, dense, and deep Chavín period settlement (Rick 2004; Rick, et al. 2004), is very much the product of this millennia-old anthropogenic feature. This excavation was designed to obtain a construction date for the wall, to determine the scale of the construction involved, and to examine in detail the character and purpose of the construction.

**Table 5.6: La Banda Excavations**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>LB-20</td>
<td>1x1 m (excavated in 2003)</td>
</tr>
<tr>
<td>LB-21</td>
<td>1x2 m (long axis E-W), expanded a further 1x2 m to the south (LB-21A)</td>
</tr>
<tr>
<td>LB-22</td>
<td>1.5x1.5 m, adjacent to LB-21A to the south</td>
</tr>
<tr>
<td>LB-23</td>
<td>2x2 m</td>
</tr>
</tbody>
</table>

5.3.3 Examination of existing stratigraphic exposures

These 2005 excavations provided archaeological and geomorphologic data that was used to plan a further season of work, in 2006. The goal of the 2006 season was to clarify the stratigraphy that had been documented in 2005 by expanding the sample and adding pre-occupation strata to the database. Given the depth of anthropogenic strata
established by the 2005 research (sometimes exceeding 6 m), an alternative means of accessing deeply-buried deposits was necessary for reasons of both cost and time.

Two substantial existing exposures or cuts—one the Wacheqsa River north and west of the monument and the other created by road construction southwest of the monumental core in the 1970s—were the key to this effort. Work on these exposures focused on describing the depositional histories of natural and cultural activity around the monument. Using a minimally invasive technique, 1 m-wide sections of these exposures were scraped with trowel and handpick to remove slopewashed sediments that obscured the stratigraphic details. These sections varied in height, depending on the available exposure, from 4 to 8 m; work proceeded from top to bottom following the visible stratigraphy. Where necessary for slope stability, the exposures were stepped; the goal was to penetrate less than 10 cm into the face whenever possible and to maintain vertical faces for ease of spatial documentation.

The stratigraphy thus exposed was used to amplify and improve both archaeological and geomorphologic reconstructions of the West Field and the Cochas earth flow. These operations included one exposure on the western edge of the Area Sur (AS-06) and three on the northern edge of the West Field (WF-10/10A, WF-11, and WF-12) (see Figure 5.3). All were treated, in terms of spatial registration of sedimentary and archaeological stratigraphy and handling of materials, as if they were full-scale excavations. Stratigraphy was drawn, photographed, registered with total station, and described; materials were collected by stratigraphic unit and processed in the laboratory.

5.3.4 Data Collection

Stratigraphic data from both the excavations and the cleaned exposures was recorded spatially with a total station, photographed, and thoroughly drawn and described. Cultural deposits, in both excavations and cleaned exposures, were carefully excavated following single-context excavation procedures.
All of the excavations undertaken by this project were of relatively small areas (generally 1 m² to 4 m²; the largest was 16 m², but rapidly was limited to a roughly 9 m² area by standing architecture) and thus were rarely horizontally subdivided. Vertical subdivision was on the basis of natural or cultural stratigraphic units; where natural levels exceeded thicknesses of ~30 cm they were generally broken into artificial levels. The chief exception to this rule was the deposit from the 1945 *aluvión*, which in some cases reached thicknesses of nearly 4 m but was both readily identifiable and internally undifferentiated (this deposit was also screen-tested—one bucket in every ten—rather than completely screened).

In general excavation was by hand-pick and trowel, and material was screened using ¼” mesh. Bucket counts were kept for ease of volumetric estimates. Soil samples—10 liters—were separated from every excavated context below the 1945 *aluvión* deposit for macrobotanical and phytolith analysis.7

Data was recorded in the field for each excavated context, including narrative description, completion of level and feature forms with descriptive data, photographs, drawings, and recording of spatial coordinates (either relative to an excavation datum that had been located with a total station or with the total station directly). Data recorded from natural sediments included grain size, sorting, and alignment as well as color (described with a Munsell soil color chart) of matrices and size, sorting, and alignment of clasts. Stratigraphic units were drawn and photographed where visible in profile.

Recovered cultural material generally fell into one of the three primary categories of ceramic, bone, and lithic. All material was sorted, weighed, and counted in the laboratory. Decorated and diagnostic ceramics were separated for photography and detailed attribute description; decorated rim sherds were also drawn. Obsidian and carbon samples were exported for analysis; all other materials were inventoried and remain in storage in Chavín.

5.3.5 Other Data Sources

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7 These analyses form part of Matthew Sayre’s dissertation research.
In addition to data collected in the field from 2004-2006, I have made use of an array of relevant information from published and unpublished sources. These primarily include other Stanford Project survey and excavations (1996-2006). In particular, I have used data from excavations carried out by John Rick in the monumental core and La Banda from 1996-2006, by John Wolf in La Banda in 2000, 2001, and 2003, by Christian Mesia in the Wacheqsa Sector in 2004 and 2005, and by Matt Sayre in La Banda in 2005 (Lumbreras, et al. 2000, 2001; Rick and Mesia 2002, 2003, 2004, 2005, 2006). In addition, the published excavation data from Tello (1960), Lumbreras (1977; Lumbreras 1989, 1993), and Burger (1984), as well as Diessl’s synthetic publication (2004) have provided useful data. Select photographs and notes from the Tello Archive at the M.N.A.A.H. have also proved useful. These sources have provided both direct evidence of anthropogenic landscape change—in the case of the Tello material, much of it evidence that was subsequently destroyed by the 1945 aluvión—and valuable reference points for the project of landscape reconstruction described below.

5.4 Data Management

My participation in the Proyecto Stanford Chavín de Huántar began in 1998, after the first phase of mapping by total station (focused primarily on architecture) was largely complete (see Rick, et al. 1998). In that year a GPS component was added to the mapping project (see Poe 1999), and documentation of the area outside of the monumental core began as well (see Turner, et al. 1999). The latter effort continued in subsequent years, adding documentation of the trans-Cordillera Blanca trail to Chavín (Rohr 2001), the surrounding agricultural land (Contreras 2004), and archaeological features of the monument’s near periphery (Rick, et al. 2004); this occurred even as the heart of the project continued to be the investigation of the architectural history of the monumental core (Kembel 2001; Kembel, et al. 2005; Kembel and Rick 2004; Rick 2004, in press). The landscape history data generated by this project were added to this corpus beginning in 2004. In addition, published data from the sources described above (see Section 5.3.5) have been digitized and incorporated. The purpose of this
section is to describe the still-evolving methods of integrating and managing the data involved.

The tool that I have used to integrate and manage Chavín’s data is ESRI’s ArcGIS. The data sources used to create the site GIS are diverse, and one of the primary challenges has been integrating data from a variety of scales and formats into an analytically useful and manageable system. That goal drove selection of GIS as the appropriate management tool. It is difficult to think of a single datum from Chavín that does not have a spatial component—information about the site is almost inherently locational, even if the accuracy and/or precision of that location is highly variable, and often poor (see Rick, et al. 1998:182-184). Moreover, the spatial component of data may be explicit—some system of \( x, y, z \) coordinates—or implicit—written description, approximate location relative to a recognizable feature, or visual representation (drawing or photograph). All of these encode locational data, albeit in different ways and with variable accuracy and precision. Relating the spatial components to one another thereby enables integration of the data—a conceptual step prompted by the layered data structure of any GIS (see Figure 5.5).

![Figure 5.5: A sample of the Chavin GIS, showing various data layers.](image-url)
The difficulty that follows, then, is one of organization: how to unify data, all of it somehow spatial, in a coherent system? Although data collection at Chavín is overwhelmingly carried out with a total station, using a local, Cartesian coordinate system, those data are now being integrated in the site GIS, with the other site data, in UTM coordinates. The choice of the UTM system as dominant was driven by the potential of combining Chavín data with larger scale, regional datasets—e.g. satellite imagery and other remotely-sensed data, regional survey, and published map data. Previously published excavation data, invariably local in its spatial referents, has also been georeferenced and included.

A full listing of the data, means of acquisition, and spatial referents is contained in Table 5.7. As Table 5.7 demonstrates, the data incorporated into the GIS are from diverse sources. Moreover, they are of varying resolutions and precision; ranging from densely collected, sub-cm precision of total station data within the monumental core to the low-resolution detail of INGEMMET geologic data and the highly variable accuracy and precision of published descriptions of prior excavations. This need not imply incompatibility, but care needs to be taken to not impute inappropriate precision to coarse-grained datasets.

Table 5.7: Sources of Spatial Data

<table>
<thead>
<tr>
<th>Data</th>
<th>Acquisition</th>
<th>Spatial Referents</th>
<th>Projection and Datum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topography</td>
<td>Carta Nacional 1:100,000, Instituto Geográfico Nacional</td>
<td>UTM coordinates</td>
<td>Universal Transverse Mercator; Provisional La Canoa 1956 (Venezuela)</td>
</tr>
<tr>
<td>Topography</td>
<td>Total station</td>
<td>Proyecto Stanford local grid</td>
<td>Proyecto Stanford Site Datum</td>
</tr>
<tr>
<td>Topography</td>
<td>Differential GPS</td>
<td>Proyecto Stanford local grid</td>
<td>Proyecto Stanford Site Datum</td>
</tr>
<tr>
<td>Imagery</td>
<td>IKONOS</td>
<td>Georeferenced to UTM</td>
<td>Universal Transverse Mercator; PSAD 1956</td>
</tr>
<tr>
<td>Imagery</td>
<td>Aerial photographs (SAN 1956 and 1998)</td>
<td>Visual</td>
<td></td>
</tr>
</tbody>
</table>

8 Data had been converted to local site grid, and had to be back-converted to UTM coordinates for integration into the site GIS.
### 5.5 Landscape Reconstruction

The dataset has, in part, been created opportunistically, although the points derived from my 2005 and 2006 work result from investigations designed to produce data for this project. Nevertheless, the diverse goals of the various excavations whose data I incorporate here, and the vagaries of naturally-occurring exposures, mean that data is dense in some areas and sparse in others.

Generally speaking, the data points employed in the landscape reconstruction are the results of excavation (either my work, other excavations carried out by the Stanford Project between 1996 and 2006, or published data from earlier excavations) and documentation of existing exposures (primarily the cuts of the Wacheqsa River and the road that bisects the monument). Where the interface of cultural material with sterile natural deposit is known, the sterile natural surface has been taken to represent a natural pre-monumental construction ground surface.\(^9\) In the most common cases that surface is bedrock, in others alluvial fan, and in others stranded river terrace (see Table

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\(^9\) At some risk of ignoring areas that might have been excavated prior to construction. However, in none of the cases considered here was there any apparent evidence of substantial modification of the sterile surface (excavation, cutting of bedrock, etc). The risk certainly affects the precision of the landscape reconstruction, but the value of the reconstructed model does not lie in its local precision so much as its overall accuracy.
5.8). In a limited number of cases (where excavations did not reach sterile soil) points known to be above the original ground surface, but significantly below modern ground surface, have been used as a proxy for the LP-I surface. Although they are not exact representations of pre-construction ground surface, they serve to constrain the interpolated surface so that it more closely approximates that pre-construction landscape.

Table 5.8: Datapoints used in landscape reconstruction

<table>
<thead>
<tr>
<th>Point</th>
<th>E</th>
<th>N</th>
<th>H</th>
<th>Notes</th>
<th>Unit</th>
<th>Data Source</th>
<th>Landscape Phase</th>
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<td>CdH-WF-10/10A/12 and surroundings</td>
<td>2006 exposure cleaning and cut mapping</td>
<td>LP-1</td>
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<td>3181.916</td>
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<td>CdH-WF-10/10A/12 and surroundings</td>
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<td>CdH-WF-10/10A/12 and surroundings</td>
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<td>base of &quot;muro denticulado&quot;</td>
<td>roadcut north of AS-06</td>
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<td>86</td>
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<td>3178.759</td>
<td>base of probable drainage feature</td>
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<tr>
<td>87</td>
<td>8938965</td>
<td>3177.750</td>
<td>megalith (&quot;huanca&quot;) foundation deposit, or possibly sterile</td>
<td>CdH-LB-02</td>
<td>2000 Excavation (JW)</td>
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<tr>
<td>88</td>
<td>8938966</td>
<td>3177.984</td>
<td>possibly sterile; possibly slope deposits over deeply buried Chavin deposits</td>
<td>CdH-LB-03</td>
<td>2000 Excavation (JW)</td>
<td>??</td>
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<tr>
<td>89</td>
<td>8938912</td>
<td>3184.398</td>
<td>possibly sterile, on face up upper LB terrace wall</td>
<td>CdH-LB-10</td>
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<td>90</td>
<td>8939113</td>
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<tr>
<td>91</td>
<td>8939131</td>
<td>3175.362</td>
<td>possible sterile; below Mito-style hearth, anyway</td>
<td>CdH-LB-19</td>
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<td>92</td>
<td>8939067</td>
<td>3175.820</td>
<td>sterile--fluvial deposits</td>
<td>CdH-LB-SM-L11/M11</td>
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<td>8939069</td>
<td>3175.928</td>
<td>sterile--fluvial deposits</td>
<td>CdH-LB-SM-M12</td>
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<td>8939181</td>
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<td>Preceramic</td>
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<td>CdH-WF-08</td>
<td>2006 Excavation (DC)</td>
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<td>8939156</td>
<td>3183.232</td>
<td>fill--not sterile</td>
<td>CdH-WF-09</td>
<td>2006 Excavation (DC)</td>
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<td>3190.280</td>
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<td>3183.640</td>
<td>Mito structure floor</td>
<td>CdH-WF-07/07A</td>
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<td>8939106</td>
<td>3223.000</td>
<td>placeholer (Pt 70484)</td>
<td>TheoDatapre1998 (road)</td>
<td>LP-1/2/3</td>
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<td>109</td>
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<td>3223.000</td>
<td>placeholer (Pt 70484)</td>
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<td>LP-1/2/3</td>
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<td>893852</td>
<td>3221.937</td>
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<td>placeholer (Pt 70945)</td>
<td>TheoDatapre1998 (topooints)</td>
<td>LP-1/2/3</td>
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The data described in Table 5.8 were synthesized into a landscape reconstruction by using the results of the geomorphologic and archaeological investigations to create a set of known data points on the landscape; the remnant unknown areas have been inferred either by extrapolation (in the case of archaeological features) or interpolation (in the case of the landscape). The array of known points from a given time period provides the skeleton of the archaeological landscape, which may then be fleshed out using a variety of methods of interpolation. Modern PC processors allow computationally intense interpolations with a minimum of difficulty; as this computational step is routinized, however, that much more emphasis should be placed on the decisions that go into creating the dataset from which the interpolated reconstruction is calculated, as well as selecting the appropriate method of interpolation. The relative ease of calculation, combined with the relatively few (~100) points from which these interpolations are being calculated, also allow some trial-and-error; that is, various methods may be tested and the results compared.

The creation of a topographically realistic digital elevation model—that is, a raster dataset with resolution adequate to capture topographic detail relevant at a human scale—from point data typically has several requirements. The method should be a) exact (pass through known points), b) continuous (without abrupt changes in slope), and c) constrained (results should fall within a relatively small expected range of values) (Wheatley and Gillings 2002). It is also important, in dealing with topographic data of this sort, that the river courses be considered as breaklines, to avoid averaging surfaces over these channels.

Exploratory interpolations were carried out in Surfer 8.0 and ArcGIS 9.2; the most successful results came from the Geostatistical Analyst extension in ArcGIS 9.2. The surfaces employed here (see Chapter 6) were generated using a Kriging function in
Geostatistical Analyst (for discussion of interpolation methods, see Wheatley and Gillings 2002:Ch.9).

The interpolated surface and the nature of the subsurface points that were used to calculate it allow some key interpretations, discussed in Chapter 6. Primarily, the interpolated surface allows a comparison of the LP-1 landscape with the modern landscape, enabling quantification of the scale of landscape change (and, in particular, of the amount of anthropogenic fill). This approximation of the pre-monument topography, in combination with the information we have about paleosurfaces, also allows some reconstruction of the local geomorphology in LP-1 (see Chapter 6, Section 6.3).
In this chapter I detail the archaeological evidence—provenient from both my fieldwork and that of previous investigators—for anthropogenic and geomorphic landscape change at Chavín. I divide this evidence by type, considering first archaeological and geomorphologic evidence of landscape change and then examining the results of the GIS-based landscape reconstruction first discussed in the previous chapter.

The coarse periodization of landscape change introduced in the previous chapter is also employed here—that is, landscape changes are considered over two primary transitions, from pre-monument→monumental florescence and from monumental florescence→post-monument. The landscape phases that result—LP-I through LP-III—are subdivided where possible (see Chapter 5, Section 5.2).

The evidence presented here is a spatially and chronologically ordered catalog of Late Holocene landscape change at and around Chavín. As I have discussed, that change has both anthropogenic and geomorphologic aspects—that is, some of the changes in Chavín’s landscape were intentional and engineered, while others resulted from unpredictable (at least in their specifics) geologic events that altered the landscape independently of human agency. The GIS-based landscape reconstruction discussed in the final section of this chapter synthesizes the cumulative evidence of landscape change in order to model the landscape as it would have existed before, during, and after the site’s apogee.

6.1 Evidence of Landscape Change

6.1.1 Anthropogenic Change

A wide array of archaeological evidence demonstrates that pervasive anthropogenic alteration of the landscape formed part of the monumental project that was Chavin de Huántar. Such engineering efforts have been recognized since Tello’s
work at the site, and it was he that first suggested that one of the motivating factors was pervasive environmental/geologic risk:

…es tambien muy cierto que en tiempos mas antiguos, el Templo de Chavin haya sufrido alguna otra invasion de masas aluviönicas, por cuya causa los habitantes de entonces trataron de proteger el edificio mediante muros ciclopeos de contension o desviamiento de los rios Pukcha o Mosna y Wacheksa, cuyos restos hasta la vispera del ultimo aluvion se hallaban a la vista del publico.¹ (Tello 1945:775) [typographic errors in original]

The pervasiveness of landscape engineering at and around Chavín, and its location in risky locales, suggests that landscape modification associated with the site was much more than a civil engineering concern. This is a theme that I consider in Chapter 7.

This intentional landscape modification was accompanied, we must presume, by increasing collateral impacts on the local environment as the population and wealth of the community associated with the developing ceremonial center grew.² This growth would have been accompanied by intensification and extensification of local agriculture—the landscape engineering efforts discussed in detail below are testament to the technological capacity for terrace construction and irrigation as necessary, though no purely agricultural examples of either technology have been documented to date.

The evidence I consider here comes from my 2004-2006 work, from other Stanford Project research (excavations and survey between 1996 and 2006), from the published data of other investigators (Burger 1984; Lumbreras 1989; and Tello 1960 are particularly useful in this regard), and from Tello’s notes and photographs archived in the Archivo Tello at Peru’s Museo Nacional de Arqueología, Antropología, e Historia. Other early published material (descriptions and photographs)

¹ “…it is also very certain that in previous times the Temple of Chavin suffered some other invasion of debris flows, as a result of which the then inhabitants tried to protect the structure with cyclopean walls of retention or diversion of the Pukcha or Mosna and Wacheksa rivers, whose remains, until the eve of the last aluvion, were found in public view.” (My translation).

² This growth remains still largely speculative, given the limited number of domestic contexts that have been excavated and the erratic sampling of the valley that they represent. Burger (1984:246-250) estimated a community of 2-3000 persons spread over 42 hectares in the Janabarriu Phase, but his calculations could not take into account the implications of the large, dense domestic area excavated by the INC and the Stanford Project in 2003.
understandably tended to focus on the impressive structures and sculpture of the monumental core, and thus offers little information about the surrounding and underlying landscape. Occasional bits of information can be gleaned from the backgrounds, however (the photographs in Kinzl and Scheider 1950; and Roosevelt 1935, in particular, are useful).

I will consider here archaeological evidence of several types of landscape modification: alteration of river channels (of both the Mosna and the Wacheqsa rivers), placement of massive fills, and construction of retaining walls. Taken as a whole, these pieces suggest that a substantial transformation of the local landscape formed part of the monumental project at Chavín. Although the fills and retaining walls form something of a smooth continuum with the construction of the monumental core itself, inasmuch as possible I have separated the creation of architectural space from the alteration of the local landscape. This separation has a practical function: 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 highlights Chavín’s relationship with its dynamic environment, as well as shedding light on a previously under-reported aspect of the site and suggesting that Chavín is significantly larger in scale than is commonly portrayed.

6.1.1.1 The Mosna River

Rick has argued (Kembel and Rick 2004; Rick 2004) 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 (Units CdH-15/16/17/18/19/20) carried out in 2001 in the center of the Square Plaza, which exposed a massive boulder fill atop “a probable river-edge deposit.” (Rick in press:15). The basal deposit was a “very dark, sterile, water saturated” (Rick in press:15), and characterized by Rick as consisting of overbank sediments. The fill consisted of
massive, multiple-ton quartzite boulders, shaped where necessary for close fit (see Kembel and Rick 2004:Fig. 4.4; Rick in press:19-20). 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 stark terms, “Even the course of the adjacent Mosna River seems to have been altered to accommodate the growth of the later monumental construction stages.” (Rick 2004:80; see Figure 6.1)
Figure 6.1: Reconstructed LP-1 Mosna River course

One of the excavations carried out in 2005 was placed in order to test this hypothesis regarding the Mosna River. Unit AS-02 was located approximately 15 m to the south of Structure E, directly in the projected pre-monumental expansion Mosna River channel (see Figure 6.2). 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.
Figure 6.2: Relation of Stanford excavations and surface features to hypothesized Mosna course.

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 between 1925 and 1940. 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 (see Figure 4.20). 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 basal portion (~80 cm) was preserved (see Figure 6.3). 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 specifically for that purpose (see description of fill types below; also Rick in press:18-19). The few associated ceramics are Chavín-period, but not adequately diagnostic to more specifically date the deposit. If the fills are contemporary with the construction of the Square Plaza—which would make overall construction sense, given the needs of the reclamation project—then these fills too date to the Black-and-White Stage.

3 The destruction wrought by the Mosna was a source of common concern to Chavin’s early excavators. In addition to Tello’s brief description of it in his 1943 article, the Archivo Tello in the MNAAH contains a series of detailed notes on the subject (Tello 1945). Tello’s 1960 book (Chavin: Cultura Matriz de la Civilización Andina) maps the Mosna River at its point of greatest intrusion into the site (Tello 1960:Fig.4), and includes two of Cornelius von Roosevelt’s 1934 photos of Structure E with the river lapping against it (Tello 1960:Figuras XIV and XV). Bennett also mentions the damage caused by the Mosna (Bennett 1946).
Figure 6.3: Cut drawing (E-W) of Unit CdH-AS-02.

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
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 BC; see Kembel in press). What remains less clear is the exact location of the LP-IIb (Chavín-period) river channel.

Tello’s notes on the incursion of the Mosna River into the eastern portion of the monument beginning in 1925 are instructive in this regard. He describes a landslide coming down off of the slope on the east side of the Mosna, diverting the river westward (back, that is, towards its pre-Chavín channel) in a geomorphic process common to the valley (see Chapter 4, Section 4.5). Tello’s notes read:

...en la estacion lluviosa de 1925, las tierras denominadas Yana-allpa que significa “tierra negra” que se hallan en la banda o margen derecha del rio Pukcha, frente a las ruinas, descendieron bruscamente hasta el cauce del rio, haciendolo desviar de su primitivo lecho.4 (Tello 1945:775) [typographical errors in original]

He goes on to describe a flood event of the Mosna River in 1930, caused by the formation and subsequent breach of a temporary natural dam approximately 15 km upstream from Chavín. That flood, coming down the new westerly course of the Mosna River, was what so severely damaged Structure E (see, for instance, Tello 1960:Lámina XIV).

What does this imply for the course of the Chavín-period Mosna River? There are multiple answers. The pre- and early-Chavín (LP-IIa) Mosna apparently took a much more westerly course, running through the area now occupied by Structure E and the Square Plaza. Outcrops of bedrock north of the Square Plaza provide evidence that the river course would have hooked back to the east between the center of the Square Plaza and the northern extreme of Structure H (see Figure 6.2). While none of the excavations in the Mosna Sector (Rick and Mesia 2006), to the north and east of

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4 “…in the rainy season of 1925, the sediments called Yana-allpa, which means “dark earth”, that are found on the right side, or margin, of the Pukcha river, across from the ruins, rapidly descended to the river, diverting it from its primitive bed.” (My translation).
Structure H, encountered fluvial sediments, they did not penetrate deep enough to provide any definitive answer about the presence or absence of a paleochannel in that area (see Figure 1.3).

The LP-IIb Mosna was dramatically different, its course altered to the east to accommodate the construction of the Square Plaza, Structure E, and the platform area that Tello labels “c” (Tello 1960:Fig.4). This course presumably closely resembled that which the river kept until the landslide of 1925, as is attested by the series of canalization structures that attempted to dictate that course. It is these that Tello references when he describes “cyclopean walls”; they are both visible in his photographs (Tello 1960:Lámina XLVI) and evident today, even after the damage inflicted by the 1945 aluvión (see Figure 6.4).
Figure 6.4: Megalithic wall on east side of the Mosna River, visible in the modern river (at right) and under excavation (at left, in Units CdH-LB-21/22).
Two major walls remain visible on the east side of the Mosna River today. The upper is set well above the river and is clearly a retaining wall; it is discussed briefly in the section on ‘Massive Fills’, below. The lower wall is at river level, and at its southern end extends into the modern course of the Mosna. How much of the wall has thus been destroyed by the river is unclear, although Tello’s photo (Tello 1960:Lámina XLVI) offers some clue that, due to the action of the Mosna and the impact of the 1945 aluvión, much of the wall is gone and that the river course has moved a few meters further to east. No date is given for the photo, but if it is consistent with the others published in the 1960 volume it would have been taken between the mid-1930s and early 1940s, which would suggest that it shows the river course after the landslide displacement of the river course to the west (the slide itself occurred ~100 m upriver of the area photographed).

The remnants of this megalithic wall were the focus of one of the 2005 excavations, which was intended to investigate the construction date and purpose of the wall. With regard to the latter, the deceptively simple question was whether the wall was intended to serve primarily as a retaining wall or a river-canalization structure, if not both. The excavation in question was an expansion of a small test pit (LB-20) dug in 2003, which was expanded as LB-21/22 (see Figure 6.2).

The primary result of these excavations was the demonstration of the true scale of this wall. Even measuring only from the uppermost of the preserved courses (presumably some have been lost) the wall is ~4 m from top to bottom, stepping 1.2 m out to the west ~2 m above the base (see Figure 6.5). It consists almost exclusively of the large (commonly approximately 140 x 80 x 150 cm) rectilinear quartzite blocks that are common in the site’s monumental architecture; these are likely selected from local outcrops where the bedded quartzite breaks off in slabs and would require fairly minimal modification to create blocks suitable for construction. The wall’s height, as well as the stepped construction, makes clear that this was never a freestanding wall, but rather a retaining wall, which served both to create and maintain the flat terrace to the east and to prevent fluvial erosion. Flood deposits against the lower portions of the wall suggest that the wall was not built in the river proper but was exposed to flooding
when waters rose, or perhaps exposed to fluvial activity when the river-course was pushed to the east (see Figure 6.6).
Figure 6.5: Mosna-containment wall as exposed by Unit CdH-LB-21/22, with cut drawing.
Unfortunately chronological resolution is not yet adequate to definitively assess the relative timing of the Square Plaza reclamation project and the construction of this megalithic wall. That is, the wall may belong to either LP-IIa or LP-IIb. The wall seems to be primarily designed for terrace construction, and its end-on exposure to the river may argue for its precedence with regard to the river-rerouting. A wall closer to parallel to the river-course would seem to make more sense if the wall had been constructed with the containment of the LP-IIb (more easterly, later) river-course in mind.

In any case, the remnant wall segments along the Mosna collectively suggest a strong concern with controlling the channel of the Mosna River. It is entirely possible that these substantial efforts at channel management spanned the episode of river rerouting.
6.1.1.2 The Wacheqsa River

The lower portion of the Wacheqsa River, immediately north of the monumental core, was apparently also confined in its existing channel by megalithic walls, though none of those survived the 1945 aluvión. Tello’s pre-aluvión photos, however, document their existence and give an idea of their scale (e.g. Tello 1960:Lámina XLV); they appear to have been more modest than the walls associated with the Mosna, at least in part due to the relatively lower land bordering the Wacheqsa (that is, there was no high terrace in need of protection from erosion).

Further up the course of the Wacheqsa (west of the modern bridge and directly north of the West Field sector) (see Figure 4.12) are several features of interest. Most prominent among these is the southern footing of the stone bridge (rumi chaka, in Ancashino Quechua, and so known locally) that spanned the Wacheqsa River until its destruction by the 1945 aluvión. This bridge has been discussed and illustrated by several researchers (e.g. Burger 1992:Fig.157; Diesll 2004:517-525; Espejo Nuñez 1958; Tello 1960:Lámina XLVII), and the massive granite beams of which it was constructed caught the attention of early Western visitors to Chavín (e.g. Middendorf 1974(1895); Wiener 1880). Significant debate (Diesll 2004:517) has continued about the antiquity of the bridge; the scale of the worked granite involved in its construction suggests that the materials, at least, date to the Chavín period. This suggests an ante quem date as well; Rick argues that granite is only incorporated into construction in the monumental core during the Black-and-White Stage (Rick, personal communication), but the granite beams of the bridge may well have been re-used stone beams scavenged from the monumental core (specifically, suggest Diesll and others, from the Escalinata Middendorf).

The antiquity of the preserved portion of bridge footing on the south bank of the Wacheqsa (see Figure 4.12) is similarly hazy. The widespread Chavín-period remains north of the Wacheqsa (and for that matter, those east of the Mosna) suggest regular traffic across both rivers, but if the rumi chaka does not date to the Chavin period then the location of the bridges that presumably handled that traffic remains unknown. The importance of maintaining river crossings, as well as the integrity of
riverside structures, was probably an impetus—though likely not the only one—for efforts at controlling the river channels.

Also visible in the south side of the Wacheqsa cut is extensive construction associated with the architecture of the West Field. This includes a substantial canal outlet, and multiple walls (and probably fills) visible in cross-section (see Figures 4.10 and 4.18). The visibility of these features is testament to substantial fluvial erosion caused by wander of the river channel in the post-Chavín period.

The stratigraphy exposed in this river cut also provides evidence of substantial geomorphologic activity, including an aluvión and landslide in LP-1 as well as significant changes in river level throughout the last three millenia. These are discussed in detail elsewhere (see Chapter 4, Section 4.6.1).

Although the Wacheqsa River does not bear the imprint of such substantial channel management as the Mosna, nevertheless it is clear that the channel was at least partially confined and controlled. The presence of substantial Chavín-period remains on the north side of the river (see Burger 1984; Diessl 2004) is presumably indicative of regular traffic across the river. If heavily enough canalized and routinely crossed, in fact, the Wacheqsa might have formed part of the site as much as it did a barrier. Unfortunately, the remains known immediately north of the river are poorly published (excepting Burger’s work), the area was heavily damaged by the 1945 aluvión, and has recently been heavily developed (beginning in the summer of 2006).

6.1.1.3 Massive fills and associated walls

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 (an estimated 315000 m³). 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 (construction of large mounds on the Peruvian coast begins as early as 3000 BC). 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. La Galgada, Kotosh, Cerro Lampay (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 (non-architectural space). Rick 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 the landscape on top of which the center sits.” (Rick in press:19) 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 observation that “Andean people created built environments encompassing the non-architectural space as well as buildings per se.” (Silverman 2004:4) (See Figure 6.7).
Figure 6.7: Map of fills, walls, and Stanford excavations. Fills do not include directly architectural elements (i.e. fill of documented structures). The areal extent of these landscape fills is generally unknown; only rough estimates are marked here. Excavations discussed in Section 6.1.1.3 are shown.
The widespread fills are not uniform in either construction or function, however. Their character appears to have been of particular concern in the monumental core. As the eroding portions of several of the major structures attest, the fills that constitute those structures consist of orderly layers of angular rock in a wholly sterile matrix (this is particularly evident in Structures A and E; see Figure 6.8). Similar fills have been excavated in several areas of the monumental core, notably beneath the floor of the Circular Plaza (Units CdH-5 and CdH-CP-F4, excavated in 1998 and 2002 respectively) and the atrium of the Square Plaza (Units CdH-PM-50 and CdH-PM-51, excavated in 2005) (see Rick in press:18-19; also Figure 6.7).

Figure 6.8: East side of Structure A. Note exposed fills above the Black-and-White Portal.

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 nor prepared with such care. Earlier excavations also reported a variety of fills. In these cases of fills outside the monumental core, the stones contained in the fill are less uniform, not deposited in clear layers, and are 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.

In several areas where fills themselves are not exposed, wall segments that suggest the presence of cultural fills are visible. It is generally not clear from surface inspection whether these walls represent retaining structures containing slope sediments or platform facades. Test excavations consistently reveal, however, that material behind (upslope of) these walls is cultural fill. The investigated wall areas comprise the fill behind wall segments in La Banda, the Area Sur, the West Field, and the Wacheqsa Sector (see Figure 6.9).
Figure 6.9: Wall fragments retaining investigated fills. La Banda (A), Wacheqsa (B), Area Sur (C), and the West Field (D).

Wall segments which retain sediments or fill as yet uninvestigated 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 roadcut southwest of Structure A (see Figures 6.7 and 6.10).
Figure 6.10: Wall fragments retaining as yet uninvestigated sediments and/or fills. A) La Banda (wall visible at lower right of photo), B) Mosna (large blocks visible at center, behind open excavation), and C) wall fragments (center) visible in roadcut southwest of Structure A. (Photo A courtesy of John Wolf).
In the West Field, fragments of north-south walls complementary to the long east-west segments are also visible; like the longer segments, these share the monument’s architectural orientation (13° east of north; see Rick, et al. 1998:197). The Area Sur similarly displays wall fragments perpendicular to one another. Excavations (CdH-WF-1/4, 2/3, and 9) suggest that the constructions visible on the surface in the West Field are not simply terrace walls retaining slope sediments, but platform faces retaining cultural fill (Diessl agrees, describing them as comprising a “West Temple” (Diessl 2004:516)). This inference is supported by the sectional exposure provided by the cut of the Rio Wacheqsa, where at least one wall of similar scale is visible in profile to significant depth (see Figure 4.16). Stanford excavations against the face of the lower of the two walls in 2000 (Units CdH-WF-01/04) demonstrated that the walls extend down approximately 2 m and are associated with further construction (a canal running perpendicular to, and under, the wall). The upper terrace, excavations (Units CdH-WF-2/3) showed, is ~4 m high (Lumbreras, et al. 2000). In addition, the construction of the road that runs just west of the monumental core destroyed a further associated wall, also running north-south (see Diessl 2004:510-514). Unpublished excavations by Hernán Amat on the upper terrace, approximately 40 m east of WF-09, indicated the presence of at least one gallery in the area (Diessl 2004:512-515).

One of the excavations carried out in 2005 (WF-09) investigated the hypothesized West Field platforms by examining the area south (uphill) of the upper of the two visible walls. This 2x3 m excavation reached a depth of more than 6 m without reaching sterile strata, suggesting the substantial degree of landscape change in the West Field during LP-II and LP-III. Below the deposit of the 1945 aluvión, the excavation encountered a series of post-Chavín (associated exclusively with late ceramics) construction fills and associated walls, to a depth of ~3.5 m. These overlay damaged Chavin-period construction—a large tumbled cut-stone block, and below that a well-constructed wall fragment of cut stone (see Figure 6.11). A carbon-rich layer postdating that wall, associated with Janabarriu-style ceramics, yielded a date of ~900 cal BC. 5 Twenty meters to the north the excavation placed against the face of the

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5 2748 +/-41 BP (AA 69450; charcoal; \( \delta^{13}C \) = -22.5%).
A visible wall (Unit WF-2/3, excavated in 2000) encountered the base of the wall ~70 cm below the point at which WF-09 stopped, corroborating the evidence from WF-09.

Other West Field excavations—CdH-WF-07 and CdH-WF-08 (see Figure 4.11)—suggest that this pattern of substantial post-Chavin deposition (both anthropogenic and geomorphic) is common throughout the West Field. The post-
Chavín fills are generally quite informal, in contrast to the prepared fills associated with Chavín construction. A unique example was documented in Unit CdH-WF-07, where a completely sterile fill nearly 1 m in depth was used to seal a Mito-style structure before construction of a series of apparently domestic terraces were built on the site (see Contreras in preparation). That fill, whose uniformity suggests its careful preparation, was distinct in color (grey-green rather than pink) and texture (much less consolidated) from the construction fills of the monumental core.

Multiple walls have also been exposed by undocumented excavations in the Area Sur (see Figures 5.4 and 6.9). In response to these visible traces, excavations in this area in 2005 were designed in part to determine whether these were the remnants of retaining walls intended to control the effects of the Cochas earth flow. 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 two major walls now documented are platform facades rather than retaining walls (see Figure 6.7). 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, but they are so substantial that this is unlikely to have been their only function.

Unit AS-01, located ~80 m south of Structure E and ~25 m upslope west of the Mosna River, encountered a massive and relatively orderly fill of large angular rock in a compact clayey matrix. While not deposited in the neat layers characteristic of the monumental core, this fill was similarly sterile, the matrix apparently a prepared mixture and the stones laid in place with relatively regular spacing and orientation rather than simply dumped (see Figure 6.12).
Figure 6.12: East profile of Unit CdH-AS-01.

The fill—excavated over a 3x3 m area—had a depth of nearly 3 m. It suggests the presence of destroyed or buried retaining walls or platform facades to the east and south, though none are evident on the surface. Moreover, this fill (particularly coupled with the other features excavated in the Area Sur (Units CdH-AS-03/03A/03B, CdH-AS-04, and CdH-AS-05) argues that the Area Sur is in fact built space. The near-total absence of cultural material from the fill makes directly dating it difficult, but the overlying slope deposit contained Janabarriu-style ceramics and a single small (29 cm x 27 cm x 10 cm) stone plaque carved with Chavin-style iconography (see Figure 6.13).
Upslope from Unit AS-01 is a major N-S wall, exposed by undocumented excavation. The ~40 m exposed run roughly perpendicular to the slope; they have been exposed to a depth of ~70 cm (see Figure 6.9-C). Units AS-03/04/05 were placed in 2005 to investigate this wall and the sediments behind it.

The results of those excavations were consistent with the findings from AS-01. That is, they demonstrated the apparently natural landscape to be a built one. We were unable to investigate the base of the wall, as a series of platforms abut its face (see Figures 6.14 and 6.15).
Figure 6.14: Units CdH-AS-03/03A/03B, AS-04, and AS-05.
Ceramics associated with these platforms are Janabarriu-style (see Figure 6.16; also Section 6.2.2).⁶

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⁶ While cultural material incorporated into fill is a notoriously problematic method of dating architecture, the absence of any later material in the fill and the apparently undisturbed contexts make a general attribution to the Janabarriu Phase secure. Interestingly, it is uncharacteristic to find ceramics in architectural fills at Chavin, perhaps further distinguishing this area from the monumental core.
Figure 6.16: Sample of decorated ceramics recovered from platform fill (below) and duct sealed by fill (above) in Unit CdH-AS-03/03A/03B.

Excavations just upslope of the wall to the west encountered a series of intentional fills, demonstrating the wall to be a platform façade rather than a wall retaining natural sediments (see Figure 6.17).
Figure 6.17: South profile of Unit CdH-AS-04.

The platforms that step down to the east perhaps imply that much of the area was similarly artificial in character. 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 (with the exception of AS-02) 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. This reinforces the message of the 2003 La Banda salvage excavations; in Chavín absence of evidence is not evidence of absence (see Figure 6.18).

Figure 6.18: The Area Sur in 2004, pre-excavation. Note the absence of visible architecture.

In addition to the agglutinated domestic structures excavated in La Banda in 2003 and 2005 (Rick and Mesia 2003; 2005; see also Chapter 4, Section 4.1), there is also evidence in La Banda of large-scale landscape engineering. In La Banda, the megalithic river-control wall described above (in the ‘Mosna River’ section) also served to contain a massive fill. The 2005 excavations included Unit LB-23, a 2x2 m excavation immediately east of the wall (see Figure 6.7). The intent of this unit was to examine the sediments contained behind the wall, particularly in light of the question of assessing the wall’s purpose. Although the unit could only be pursued downward ~3.5 m due to unstable sediments, it is clear that to that depth at least the terrace east of the megalithic wall is composed of artificial fill. The entire area may have been
constructed, or an uneven surface may have been leveled to create a flat terrace; further sampling would be necessary to resolve that question.

The fill excavated was a loose, matrix-supported mix of cobbles and angular rock, ranging in size from ~10 cm to ~70 cm on their long axes. This fill began relatively close to the modern surface, and extends, minimally, ~2.5 m down (see Figure 6.19).

![CdH-LB-23 North Profile](image)

**Figure 6.19: North profile of Unit CdH-LB-23.**

Scattered cultural material included primarily a handful of Chavin-period ceramics and scattered fragments of obsidian. In comparison with the fills of the monumental core,
as well as the West Field and the Area Sur, this fill is the least formal; it is the sort of fill deposit that would result from the dumping of whatever stone was available into the space to be filled rather than the result of a carefully planned construction project. Nevertheless, the deposit is clearly artificial: the stones are a mixture of colluvially and alluvially derived (angular rock and cobbles), in an almost soil-free clast-supported deposit indicative of rapid deposition.

This fill is contained to the west (downslope) by the megalithic wall described in the ‘Mosna River’ section, above. That wall has a counterpart, approximately 90 m upslope and 100 m upriver to the south. The material upslope of this upper wall has not been investigated, but the wall itself is comparable in scale and construction to the lower one (see Figure 6.10-A). The outer face of this wall was the subject of archaeological investigation in 2000, when Unit CdH-LB-6/10 was located there to clarify the scale and dating of the wall. That excavation was able to establish that the wall continued at least 1 m below the modern surface, but was forced to halt by the high local water table. The wall straddles a small drainage that dissects the slopes above La Banda; its original functions may have included the control of sediment descending that drainage.

Excavations in 2003 in La Banda, ~100 m northeast of the lower megalithic wall also gave indications of the substantial (up to 4 m) depth of archaeological deposit in the area, further emphasizing the artificiality of the modern landscape (LB-Sector 3; see Rick and Mesia 2003). Similarly, excavations in 2005 and 2006 in the Wacheqsa and Mosna sectors emphasized the importance of platform fills and associated walls in those areas (Rick and Mesia 2005, 2006).

In the Wacheqsa sector, Unit CdH-WQ-05, excavated in 2005, was set against the base of the east-west running terrace wall that demarcates the southern edge of the Wacheqsa sector (see Figure 6.7). The interior of that wall remains unexcavated, but WQ-05 demonstrated that the wall itself is built atop an artificial fill of loose cobbles (see Figure 6.20) (Rick and Mesia 2005).
Figure 6.20: Unit CdH-WQ-05, placed against the north face of the wall that marks the south edge of the Wacheqsa Sector. Note the loose cobble fill beneath the wall. (Photo courtesy Christian Mesia).

The Mosna sector, subject of Stanford excavations in 2006, is bounded to the west by a steep scarp. That scarp is probably the result of a previous channel of the Mosna (see Turner, et al. 1999:53). It is likely that much of it is underlain by bedrock, judging by the existing outcrops (see Figure 6.2). This pre-existing scarp was incorporated into the building program of the monumental core, creating a linear feature consisting at least partly of megalithic terrace wall (see Figure 6.10-B), and probably partially backed by fill used to level the platform thus created.
Other major fills have been reported in previous excavations. Tello mapped the site—with the benefit of a pre-1945 aluvión landscape—as consisting of multiple (eight labeled, with seven others apparently indicated by dotted and/or solid lines but not labeled separately) platforms, in addition to the six structures commonly recognized (Tello 1960:Fig.4). Burger’s investigations around the perimeter of the monumental area uncovered multiple platform constructions (e.g. PAN6-18-D1/D2, PAN6-18-B5/6/7; see Burger 1984; also Figure 3.9). The Stanford Project has excavated enough fills to prompt Rick to conclude, “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 the landscape on top of which the center sits.”(Rick in press:19)

6.1.2 Geomorphic Change

Several generalized landscape processes can be distinguished as active on a human timescale around Chavín. These include landslide activity, colluvial deposition, flooding, landslide-driven river channel wander, and periodic debris flows. Such processes, and their structuring factors (several subject to anthropogenic influence) are discussed in detail in Chapter 4. Here I briefly summarize the most salient geomorphic activity directly related to the archaeological and modern landscape of Chavín. Evidence of such activity is spatially widespread and present across various landscape phases.

In LP-I, several significant geomorphic events heavily shaped the pre-Chavín landscape. The notably flat expanse of valley floor on which the modern town is situated is the result of a substantial (covering perhaps 70 hectares) paleolake, formed when the Mosna River was dammed by a major rotational landslide on the east side of the valley (see Chapter 4, Section 4.4; also Turner, et al. 1999). Unfortunately the creation and later draining of that lake remains undated, although it is clearly LP-I at the latest. The fields north of the modern town contain multiple examples of surviving

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7 Anthropogenic and geomorphic change certainly overlap; the distinction is a somewhat artificial one (as emphasized in Chapter 2) made for heuristic purposes.
surficial Chavín-period architecture (see Figure 4.6), and the rescue excavations in the Plaza de Armas in 2006 uncovered Preceramic Period occupation at depths of ~6 m, without any overlying lake sediments (Rick and Mesia 2006).

The LP-I landscape was also significantly affected by a substantial debris flow, the diamicton of which is visible in the cut on the south side of the Wacheqsa (see Chapter 4, Section 4.6.1, and Figure 4.12). Also visible in the West Field is the evidence of an LP-I landslide (see Chapter 4, Section 4.6.1, and Figure 4.13).

Direct evidence of landscape activity during LP-II is surprisingly scant. The frequency of landscape activity during LP-I and LP-III, as well as the ubiquity of LP-II landscape modification features at least partially practical in function, suggest the likelihood of geomorphic activity during LP-II. However, while evidence of anthropogenic landscape change during LP-II is abundant, only one piece of direct evidence attests to LP-II geomorphic activity. Along the upper course of the Wacheqsa, the strata of colluvium immediately above the LP-I aluvión deposit contain Chavín-period ceramics (visible in Unit CdH-WF-11; see Figure 4.15), demonstrating active slope processes contemporary with Chavin occupation of the West Field. This raises the possibility of upslope erosion control and/or cleaning of slope deposits (see Chapter 4, Section 4.6.1). Given the high frequency of geomorphic activity in the area and the location of the temple complex in an area subject to slope and fluvial processes, the general absence of geologic deposits contemporary with Chavin architecture may suggest either regular cleaning of the temple precinct or upslope control of depositional processes.

In LP-III, both measures of overall post-Chavín deposition and evidence of specific events demonstrate the geomorphic dynamism of the landscape. The exposure cleaned as Unit CdH-AS-06 revealed ~4 m of LP-III deposition by the Cochas earth flow. Moreover, the burial of structures in the Area Sur and the West Field, as well the accumulation of (at least) 5.5 m of sediment against the southwest corner of Structure A, testifies to the extent of deposition by the Cochas earth flow. Similarly, Burger encountered earth flow deposits burying Chavin-period platform construction on the lower slopes of the Cochas earth flow in PAn-18-D1/2/3 (Burger 1984:22). Less dramatic colluvial and alluvial deposition is also evident in the burial of LP-II
archaeological features in La Banda (see Chapter 4, Section 4.1). The historically-attested landslide-prompted channel wander of the Mosna and Wacheqsa rivers, as well as the 1945 aluvión (see Chapter 4, Sections 4.4 and 4.5), provide examples of the sorts of processes active in the area.

In sum, these pieces of evidence serve to emphasize that the dynamism of the Chavín landscape is eminently relevant to human occupants of the area. That is, Chavín’s landscape is not one that was formed in deep time, that human occupants encountered as a static arena for their activity, but rather one that continued (and continues) to evolve around its human occupants, in response to their activity in some ways and independently of it in others.

6.2 Landscape Reconstruction

What does this array of evidence suggest about the Chavín landscape? I address this question through a GIS-based reconstruction of that landscape. Before turning to the landscape reconstructions, however, I provide some narrative description of the Chavín landscape during those phases.

6.2.1 LP-I

I have defined LP-I (see Chapter 5) as that phase immediately before the construction of the monumental ceremonial center began. While that founding date is ill-defined (see Chapter 3, Section 3.2.3), a rough estimate might place this as early as 1200 BC, making LP-I the period immediately before 1200 BC, extending as far back as the—yet undated—draining of the paleolake that once covered what is now the plain on which the modern town of Chavín is situated. We have no direct evidence for human impacts on the landscape in LP-I or before, although activity associated with human settlement of the valley (which dates to as early as the 3000 BC if not earlier) may have included substantial alteration of the local flora (by land clearing and/or agriculture, in particular), with associated impacts on the erosive regimes (see discussion of this issue in Chapters 3 and 4). To date we lack evidence with which to
directly address this question; the LP-I landscape, then, is here discussed without thorough assessment of its structuring factors.

Another significant and as yet unanswered question is the date by which the Mosna River had cut down through the valley-damming slide located 2 km north of the site core. That Mosna-damming slide was the single most dominant landscape-forming event of the pre-Chavín period, effectively creating the valley as we know it today (and as Chavín knew it) (see Chapter 4, Section 4.4, and Turner, et al. 1999). It is clear from the elements of Chavín architecture documented on and/or near the modern surface, however, that by the beginning of LP-II the plain north of the modern town was exposed much as it is today (see Figure 4.6).

Between that plain and the monumental core, the 2006 Stanford excavations in the Plaza de Armas of the modern town of Chavín (Rick and Mesia 2006) and Burger’s Units PAn6-18-B5/6/7 (Burger 1984) suggest that there has been significant post-LP-I deposition (up to 3 m under the modern town). This seems to represent primarily accumulation of cultural material, but is evidence that the LP-I surface was lower.

Similarly, the area where the monument is located (including the West Field and the Area Sur), without the construction and associated massive fills of the ceremonial center, was substantially (as much as 18 m) lower, consisting of the juncture of the alluvial fan of the Wacheqsa, the Cochas earth flow, and colluvial deposits from Puca Orqo/Qoto Pukyo. A notable exception to this may be the toe of the Cochas earth flow, whose slope suggests that material may have been removed from the earth flow toe to allow the final southward expansion of Structure A in the Black-and-White Stage (see Figure 6.21).
La Banda, too, without the massive fills associated with monumental construction, exhibited gentler slopes dropping westward to the Mosna and probably a heterogeneous landscape composed of stranded river terraces, alluvial deposits from the small drainages dissecting the valley’s eastern slopes, colluvial deposits, and outcropping bedrock.

The Wacheqsa River was at least partially dammed by the diamicton of an aluvión and by a West Field landslide (see Chapter 4, Section 4.6.1). As a result, the level of the Wacheqsa River was significantly (6-8 m; see Chapter 4, Section 4.6.1) higher and probably diverted several meters to the north through the upper portion of its course, pouring over a waterfall located roughly where the vertical quartzite fins north of the river intersect the river-course (see Figure 4.16). The lower Wacheqsa—below this waterfall—was apparently little different from its modern course.

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8 A significantly higher level of the upper Wacheqsa has important implications for human habitation—raised river level here would make diversion of water for irrigation or use in temple hydraulic structures much easier than today, when to generate comparable hydraulic pressure one would have to draw water off the river far up the quebrada (as is done to irrigate the fields east and north of town); this entails running a canal high on the quebrada wall, through very steep terrain, and the modern example is able to
The second landscape phase is defined as beginning with the earliest monumental construction at Chavín, estimated here at 1200 BC. This phase is subdivided around the period of architectural expansion that is identified with one of the clearest examples of anthropogenic landscape modification at Chavín. I refer to the eastward and southward expansion of the monumental core during the Black-and-White Stage (Kembel 2001), approximately dated to between 1000-550 BC. LP-IIa comprises the pre-Black-and-White Stage landscape, and LP-IIb the landscape from the Black-and-White Stage.\(^9\)

As I discuss elsewhere (see Chapter 3, Section 3.2.3), construction of the monumental core at Chavín began perhaps as early as 1200 BC, but the earliest stages of Chavín construction are incompletely known and difficult to date (Kembel 2001:252-253). With regard to architecture, these early stages are those that Kembel describes as the Separate Mound, Expansion, and Consolidation Stages, all predating ~750 BC but relatively ill-defined in terms of absolute dates (Kembel 2001). Associating these with specific transient landscape features and/or processes or modifications—that is, differentiating the LP-IIa landscape from that of LP-I—is difficult for similar reasons. Like the early stages of construction, the LP-II landscape is buried under subsequent phases. Moreover, where locating the LP-I landscape may be (cautiously) taken to be a matter of locating sterile strata, differentiating strata associated with LP-IIa and LP-IIb demands a fineness of chronological control that we often lack.

accomplish this only by tunneling through hard rock on the north side of the river. This would explain the source of water for the extensive network of canals and drains in the monument (see Chapter 1, Section 1.3)—there are far more of these than required for practical purposes of draining the complex, and moreover, as Lumbreras et al. argue (1976), water served important ceremonial functions within the temple complex, and its regular deployment within that complex was probably a necessary feature of ritual practice.

\(^9\) The Black-and-White Stage, admittedly, did not come into being as a whole; in reality what I am considering to be LP-IIb here is the landscape from the late—complete, in terms of construction—Black-and-White Stage. To some extent this sort of caveat is applicable to all of the landscape phases I define—I am of necessity describing temporal slices, from the apogee of each phase, and do not have the chronological control to describe process per se.
However, it is possible to associate considerable evidence of landscape modification with the Black-and-White Stage, and thus (definitionally) LP-IIb. The most salient change in the LP-IIb landscape was the engineering project that shifted the course of the Mosna River eastward (see discussion in ‘The Mosna River’ section, above), reclaiming a portion of the riparian corridor for the construction of the Square Plaza and Mound E (and possibly the eastern portion of the North Flanking Mound as well). While the canalization of the Mosna and Wacheqsa rivers may have preceded this effort, it was certainly in place by the time the project was completed.

Multiple monumental fills may also be associated with the Black-and-White Stage, and thus pertain to LP-IIb—though there is a possibility that they belong instead to LPIIa. The ideal means of linking many of the landscape features to the architectural sequence would of course be absolute dating. Unfortunately, dates for landscape features are few, and the architectural sequence itself is only loosely constrained by radiocarbon dates.\(^{10}\) As a result, associations of material culture—namely ceramics—are often the best means available of tying landscape features to the architectural sequence. As the LP-IIa/IIb distinction is here defined, this is a critical linkage.

Specifically, the Black-and-White Stage may be tied (contra Kembel and Rick 2004) to the complex of ceramics that have been grouped under the label “Janabarriu” by Burger (1984). An important distinction must be made here between Janabarriu-style ceramics, for which I follow Burger’s definition, and the associated dates of the Janabarriu Phase. Burger (1981; Burger 1984) dates the phase to 390-200 BC; those dates lead Rick and Kembel to suggest that the Janabarriu Phase—and, by implication, its associated ceramics—postdated monumental construction at the site (Kembel and Rick 2004:62-63). In so arguing they also drew on Lumbereras’ excavations in the Circular Plaza, in which he described a post-monument stratum (Capa H) containing Janabarriu-style ceramics (Lumbereras 1977:9-11).

This separation of the Black-and-White Stage from Janabarriu-style ceramics is an artifact of competing chronologies rather than archaeological reality. Increasing

\(^{10}\) This issue is the subject of Silvia Kembel’s current research—the Chavín Archaeological Dating Project (see Kembel et al. 2005).
numbers of excavations at Chavin are dramatically expanding the sample of Janabarriu-style ceramics, and more and more of those are from well-dated and intact contexts. The result is a substantial and still-growing body of evidence arguing for substantially greater time depth for Janabarriu-style ceramics. This evidence is detailed elsewhere (Rick, et al. in preparation); I here offer two dates from Unit CdH-WF-07 by way of example. Both are from carbon samples recovered from contexts atop packed-earth floors; these deposits comprised domestic debris apparently dating to the abandonment and collapse of these structures. While not ideal floor deposits, both contexts in question were well-sealed and associated with exclusively Janabarriu-style ceramics (see Figure 6.22). These yielded consistent dates falling in the 800-500 cal BC range.\footnote{The dating of Janabarriu-style ceramics remains an open—and messy—question. While radiocarbon-dated contexts like those described here associate them with the Black-and-White Stage, in some contexts they appear also to postdate the Black-and-White Stage and their use to extend into post-monumental periods (e.g. “Capa H” in the Circular Plaza (Lumbreras 1977)). The absolute dates that Burger associates with these ceramics are also significantly later (390-200 BC), although he associates these dates with the “New Temple”, while according to Kembel and Rick’s chronology such a timespan would be post-monumental.} \footnote{2506±43 BP (AA 69448; charcoal; δ\textsuperscript{13}C=-23.9%) and 2567±42 BP (AA 69449; charcoal; δ\textsuperscript{13}C=-22.1%)}
Figure 6.22: Sample of Janabarriu-style ceramics from Unit CdH-WF-07.

This linkage of Janabarriu-style ceramics to the Black-and-White Stage, if not the ideal dating method, provides a means of chronologically locating several landscape modification features. These include most saliently the reclamation project that involved the rechanneling of the Mosna River necessary for the construction of the Square Plaza, the construction of major platforms in the Area Sur, and deposition of at least some of the construction fills that raised the overall level of the West Field by
several meters. The expansion of Structure A to the south in the Black-and-White Stage, pushing it ever closer to the toe of the Cochas earth flow, was apparently accompanied by the construction of the *muro denticulado* that Burger (1984:241-242) and Diesl (2004:525) describe; Burger reported its association with Janabarriu-style ceramics. Its function was likely the control of slope-derived sediments. The megalithic river-canalization wall on the La Banda side of the Mosna may also be associated with this period of construction, or it may be earlier (see Section 6.1.1.1).

6.2.3 *LP-III*

The post-Chavín phase is dominated by the burial of Chavín-period architecture by earth flow, colluvial, and fluvial deposition, as well as its erosion by fluvial processes. Moreover, the impact of human settlement and agriculture on the area’s landscape should not go unrecognized. The pervasive, and relatively well-documented, effect of the 1945 *aluvión* allows the separation of LP-III into pre- and post-*aluvión* phases (LP-IIIa and LP-IIIb). The pre-*aluvión* landscape is documented primarily by Tello’s work (e.g. Tello 1960:Fig.4) and the photographic records found in Tello (1960, and in the Archivo Tello in the MNAAH), Bennett (1944), Kinzl (Kinzl and Scheider 1950), and Roosevelt (1935). Two Peruvian geologists who visited Chavín in the days following the disaster described the event itself shortly after the fact (Indacochea G. and Iberico M. 1947), and a further study occurred eleven months later (Spann 1947).

While most of the modern landscape bears the signature of the 1945 *aluvión* in the form of a characteristic dark grey diamicton, its thickness varying between a few centimeters and four meters, the *aluvión’s* passage also effaced several features from the landscape. Most prominent among these were the *rumi chaka*, and the community of Raku, which had occupied the West Field, and the “Capilla de la Cruz”, atop Mound C, where Tello had stored much of the stone sculpture that he had recovered. Presumably other features in the direct path of the *aluvión* were also swept away, but the pre-*aluvión* documentation is not adequate to specifically identify these (see Diesl 2004:Fig.Cha243 for a sketch reconstruction of the pre-*aluvión* landscape).
The LP-IIIa landscape that the 1945 *aluvión* irreversibly altered was already quite different from the LP-IIb landscape that had surrounded the functioning ceremonial center of Chavín. This evolution owes as much to cultural processes as to natural ones. Beginning by about 500 B.C., the ceremonial center fell out of ritual use (see Rick 2004:73-74), and subsequent casual re-occupation seems to have begun without too much of a hiatus. This post-Chavín occupation continued up through the 20th century; Tello describes much of the site as planted in maize during his 1919 visit (Tello 1960). Much of the earlier occupation was more residential than agricultural in character; the Circular Plaza, for instance, filled with small domestic structures (Rick 2004:Fig.5.7). The majority of the material remains dating to this period throughout the site date to the Huaraz (White-on-Red) Period; perhaps 200 BC – 200 AD; a subsequent Recuay occupation (perhaps 200 – 600 AD) left a more substantial imprint on the east side of the Mosna than in the monumental core. Both of these occupations—as well as later ones—engaged in platform as well as wall construction, substantially altering the landscape with massive fills, if on a smaller scale than during the Chavín period. These late fills are particularly well-documented in the East Atrium of the Circular Plaza (following Stanford Project excavations in 2005 and 2006 (Rick and Mesia 2005, 2006)) and in the West Field (following Stanford Project excavations in 2005 (Rick and Mesia 2005)).

Natural deposition has included fluvial deposition by the Mosna (*e.g.* LB-20/21/22), earth flow deposition from the Cochas earth flow (*e.g.* AS-06, CdH-7), colluvial deposition (*e.g.* WF-07/07A, WF-10/10A, WF-11, WF-12), and most recently and dramatically the diamicton deposited by the 1945 *aluvión*. Conversely, the intrusion of the Mosna River into the southern area of the monument in the 1920s caused significant erosion of Structure E and the nearby (constructed) landscape (see Section 6.1.1.1). A further dramatic instance of erosive change was the downcutting of the Wacheqsa River, which cut down to its modern level along the upper course of the river only in LP-III (see Chapter 4, Section 4.6.1).

LP-IIIb—the post-aluvión period—is of interest primarily for the level of detail with which we can characterize geomorphic and anthropogenic landscape processes, and assess the degree to which they have transformed the preexisting landscape.
Geomorphic processes include the downcutting of the Wacheqsa and Mosna rivers through the deposit of the 1945 aluvión (apparently accomplished fairly rapidly), and one episode of landslide-induced movement of the Wacheqsa river channel (see Figure 4.9). The incursion of the Mosna River into the site was similarly landslide-induced (see Section 6.1.1.1).

Anthropogenic processes are many, having multiplied in variety and scale with the increasing use of industrial equipment in the valley. These include, for example, the cutting of the monument-bisecting and La Banda roads, the appearance of small communities like La Florida on the skirts of the Cochas earth flow, the expansion of the modern town (particularly road and drain construction).

6.3 Interpolation of Prehistoric Surfaces Using GIS

The outstanding corpus of three-dimensional mapping data produced by the Stanford Chavín Project since 1995 provides the basis for modeling Chavín’s landscape. As discussed in Chapter 5, that data is derived primarily from field mapping with a total station, supplemented by data from other sources. It includes both modern topographic data and data on past surfaces generated from excavations and existing exposures. The methods of interpolation have been discussed already (see Chapter 5, Section 5.5); here I focus on the results and implications of the interpolated landscapes. To begin with, I describe the clusters of known datapoints 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-monument deposition and superposed monumental construction. Amongst the earliest of these were the small but deep excavations on the west side of Structure A, designed to clarify the construction sequence of that structure. While even the deepest of these could not reach sterile soil (due to a rocky matrix), Units CdH-7 and CdH-11 nonetheless demonstrated that the base of Structure A is minimally 5.5 m below current ground surface. Similarly, Unit CdH-CP-F4, in the Circular Plaza, demonstrated that superposed fills extend to a depth of approximately
1.4 m below the plaza surface. 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 Rucas Gallery (see Figure 6.23).
Figure 6.23: Datapoints used in the landscape reconstruction.
A further series of Stanford excavations, located in the near periphery of the monument, have 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-1/4, set against the face of the lower terrace in the West Field, demonstrated the wall height to be minimally 2 m, rather than the <1 m visible on the surface, while against the face of the upper terrace CdH-WF-2/3 demonstrated a wall height of ~4 m.

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 6.24—that the LP-1 surface was substantially different than both the LP-2 and modern landscapes. The combination of architecture and built landscape required an estimated net fill of 450 000 m$^3$ within the ~20 hectare area of the monumental core and its near periphery. This figure is approximately triple that for architectural fill only, suggesting concomitantly greater labor investment and need for planning and management (discussed further in Chapter 7).
Figure 6.24: Raster representation of cumulative landscape change since LP-1. Lighter areas represent addition of fill (white area at upper left is an artifact of the reconstruction). The figure is derived by comparing the interpolated LP-1 landscape (see Chapter 5, Section 5.5) to the modern landscape (mapped in detail by the Stanford Project; see Chapter 5, Section 5.4).
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. Key examples are the fluvial sediments excavated in CdH-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. These data have been used to infer the surficial geomorphology of the area in LP-1 as well (see Figure 6.25; Unit Qyal includes—and likely underestimates—the pre-LP-1 debris flow documented in WF-10/11/12).
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 merit a brief discrete mention. The several substantial projects (e.g. river canalization and megalithic terracing; see Section 6.1.1) 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 (see Chapter 5, Section 5.5 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 (see Figures 6.24 and 6.26).

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. This relationship is explored in more depth in Chapters 4 and 7. It is noteworthy here, however, as a reminder of the combination of processes that have produced the modern landscape in Chavín, and that contribute to the contrast between that modern landscape and the pre-Chavín (LP-1) one (see Figure 6.26).
Figure 6.26: Perspective view of landscape change. A) Reconstructed LP-1 landscape. B) Cumulative landscape change since LP-1. As in Figure 6.23, light areas represent deposition of material.

Two lessons stand out from this exercise in landscape reconstruction: 1) the dynamism of the physical environment, and 2) the ubiquity and scale of anthropogenic
landscape modification. Each of these has the potential to shed light on the sociopolitical processes that underlay Chavín’s florescence, and additionally suggest the need to for a distinct theoretical approach to human-environment interactions in the Andes. These larger issues are the focus of the following chapter.
CHAPTER 7
CONCLUSIONS

The evidence presented here demonstrates that a considerable portion—in terms of labor investment and planning—of the project of monumental construction at Chavín de Huántar was made up of modification of the local landscape. I have also detailed the considerable evidence that the landscape around Chavín is (and was) a dynamic one. In this final chapter I examine the relationship of Chavín’s setting—a geomorphically dynamic and anthropogenically modified landscape—to the hypothesized increasing sociopolitical inequality at the site.

Reconstructing the LP-I landscape provides a baseline—pre-ceremonial center, though not pre-human nor even necessarily pre-huaca—against which the scale and character of the multi-century project that was Chavín can be measured. Comparison of the LP-I landscape with the LP-IIb landscape (the ceremonial center at its apogee) highlights several types of anthropogenic landscape modification. The overall LP-I to LP-III evolution, meanwhile, provides a measure of the frequency and magnitude of geomorphic activity in the valley under environmental conditions that appear to have been relatively stable during the last three millennia, though anthropogenic effects have certainly varied (see Chapter 3).

The modern landscape is thus a palimpsest resulting from anthropogenic and geomorphic processes, each of which is of critical interest in understanding how and why Chavín’s builders constructed the extensive ceremonial center and its sociopolitical infrastructure. Indeed, interpreting that palimpsest is integral even to understanding just what they constructed. Such interpretation is made possible by the reconstruction of the LP-I landscape from the scattered data provided by excavations and stratigraphic exposures in the monumental core and its near periphery (see Chapters 5 and 6). The result is an increasingly broad picture of a project consisting simultaneously of architecture (best detailed in Kembel 2001) and landscape engineering (see Chapter 6). This revision of exactly what constitutes the monumental project of Chavín is one of scale, and also one of type.
In terms of scale, adding an engineered landscape—a built setting—to the traditionally conceived architectural project changes the scale of construction we must consider in modeling the number of baskets of stone and earth moved. Certainly at Chavín it has always been the quality of craftsmanship at least as much as the man-hours of labor that has impressed upon observers the organizational and motivational capacities of the minds behind Chavín. However, understanding the sheer mass of construction as 450000 m³ (estimated volume of fill including landscape features) rather than 315000 m³ (estimated volume of architectural fill) has a significant effect on the amount of labor implied. Moreover, this shift is not simply scalar but also typological. The evidence presented here makes it apparent that Silverman’s observation that, “Andean people created built environments encompassing the non-architectural space as well as buildings per se,” (Silverman 2004:4) is eminently applicable to the case of Chavín. That labor was mobilized to engineer the local landscape as well as to construct monuments has, I argue here, significant implications.

That is, landscape modification at Chavín has important implications for the significance of setting at Chavín, which should be understood in the context of sacred landscapes in the prehispanic Andes as well as in context of local geomorphologic dynamism. Moreover, the manipulation of the landscape at Chavín also must figure in our interpretations of the development of sociopolitical inequality at Chavín. The emergence of authority at Chavín was accompanied by substantial modification of the landscape as well as architectural development. Understanding landscape modification in these terms, in turn, suggests that environment/landscape/setting has a critical role to play in our understandings of the interplay of humans and their environments in the prehispanic Andes.

7.1 The Importance of Landscape at Chavín

Chavín’s surroundings, in light of the evidence presented here, are important not just because they may have housed Chavín’s staff and adherents, but because they were apparently integral to the project of impressing (both humans and supernaturals) that was central to Chavín. The degree of investment in modifying and even creating
setting is testament to its perceived importance—perceived, that is, by Chavin’s
designers as well as modern social theorists. As noted above, labor investment at
Chavin includes a substantial outlay on landscape modification as well as architectural
elaboration.

The significance of landscape setting generally has been the subject of
considerable archaeological attention (see Chapter 2). As Ashmore and Knapp
emphasize, a site’s environment may be conceived in multiple domains, and its
significance may crosscut those domains: “What we propose here are three interpretive
descriptors—constructed, conceptualized, ideational—for thinking about meaning-
laden landscapes. …landscape is essentially all of these things at all times.” (Ashmore
and Knapp 1999:9-10) At Chavin, the area of the site has been discussed as resource
endowment (Miller and Burger 1995), sacred backdrop (Reinhard 1985a), and
crossroads of trade routes (Burger 1992). What is brought into sharper focus here is
the very local environment—the near periphery of the monumental core. As I have
detailed (see Chapter 6), that near periphery consists of a built landscape in spite of
(and in fact probably in part because of) the geomorphologic dynamism characteristic
of the valley.

In the case of Chavin there seems to be substantial investment in the creation of
areas of flat land. Such land appears to be important domestically, probably
symbolically, and possibly agriculturally as well. We do not have adequate data to
assess the relative roles of those three components—but they certainly overlap. As
Goodman-Elgar points out, in the well-documented case of Inca terraces these are
much more than “just” agricultural. Rather, they are simultaneously arenas for ritual
activity, inscriptions of land tenure and symbolic power on the landscape, even
monuments unto themselves (Goodman-Elgar in press).

A similarly multivalent role for Chavin’s built landscape is suggested by the
routine/regular construction of terraces, platforms, etc. to specifications that exceed
what would be necessary for simple persistence. Rather than erecting casual,
pragmatic fieldstone walls to capture slope sediments and manage erosion (as local
agriculturalists do today), Chavin’s builders constructed large filled platforms and
walls of massive, often partly shaped, stone blocks.
With similar ambition, the Mosna and Wacheqsa rivers were elaborately canalized, and water apparently drawn off of the Upper Wacheqsa to provide flow for the elaborate system of sub- and intra-monument canals. Water management within the monument itself was both a practical imperative and ritually significant. Drainage of the sunken plazas and the interior galleries remains a conservation issue today, while the intricate network of canals and drains far exceeds simple necessity. Lumbreras has suggested that in at least one specific case (the Lanzón Gallery) water was used for acoustic effect (Lumbreras, et al. 1976).

In addition, construction was not apparently risk-averse.¹ While we cannot assume that modern definitions of geologic risk are applicable to Chavín, the activity of Chavín’s inhabitants argues for some analogous understanding of local environmental hazards. It is clear that rather than building in areas least vulnerable to fluvial erosion, Chavín’s builders canalized both the Mosna and Wacheqsa rivers, altering the course of the former. The very location of the monument within the valley may speak to this issue as well; the ceremonial center was sited in an area conspicuously more vulnerable to flooding and landslides than other options north of the Wacheqsa or east of the Mosna (see Rick and Contreras 2006). Moreover, the expansion of the monument to the south and east in the Black-and-White Stage placed it more directly in harm’s way. Both the flood risk from the Mosna and the landslide risk from the looming Cochas earth flow were exacerbated at this time.

The possible motivations for this embrace of environmental risk are several, and distinguishing critically between them on more than a purely speculative basis is difficult. I mention some of the key possibilities here, and return to these in Chavín’s sociopolitical context below (see Sections 7.3 and 7.4). One primary possibility, of course, is simple ignorance. Given the ubiquity and frequency of geomorphic activity and the long uselife of the site, however, this seems unlikely. If we accept the premise that Chavín’s builders were, at least in some sense, aware of the area’s environmental hazards, the possible motivations for the location of the site in a hazardous locale multiply. The presence of manifest natural power suggests scenarios of supplication,

¹ Though this of course raises questions of perception and cultural construction of risk, a subject of considerable anthropological attention (see Chapter 2, Section 2.6).
alignment with, or challenge to that power (see Rick and Contreras 2006). Moreover, the possibility of simple path dependence—based on the importance of place, or of a particular huaca—cannot be ignored. That is, the site might have been established without awareness of geologic hazard, and subsequently the importance of the place itself may have been such—whether due to sacred significance or accumulated investment—that relocation was not an option.

7.2 Sacred Landscapes in the Andes

While the evidence presented here detailing the significance of and preoccupation with landscape at Chavín is new, the concept of the importance of landscape in Andean contexts is not. As I discuss in Chapter 2, Andean landscapes have been the focus of substantial scholarly attention, as both environmental and sacred settings. As environmental settings, landscapes have been of interest for their productive capacities and constraints, predictability and risk, and amenability to anthropogenic modification. As sacred settings, they have been the focus of attention to ritual practices, hypothesized indigenous orderings and prioritizings of landscape features, and productions and reproductions of the social order. Much of this has been based on ethnohistoric analogy to comparatively well-documented Inca sacred landscapes (see Glowacki and Malpass 2003; Gose 1993; Reinhard 1985b). As Moore emphasizes, such material must be used circumspectly, but is nevertheless invaluable (Moore 2005:218).

Most common among these analogies has been the projection into the pre-Incaic past of the concept of the huaca. The term is understood from Spanish colonial attempts to extirpate indigenous religious practice to encompass sacred features of various sorts, both natural and manmade (see Duviols 1984). These were generally treated as shrines, whether left unmodified or incorporated into built space. The result, Silverman writes, was that “the Andean world was animistic: it was populated with supernatural beings, sacralized mountains, lakes, springs, irrigation canals, boulders and caves, numina-lodging objects, and anthropomorphized forces of nature. It was a world of huacas.” (Silverman 2004:5) The concept of the huaca has been used
extensively by Andean archaeologists to explain pre-Inca material remains and spatial organization (e.g. Farrington 1992; Glowacki and Malpass 2003; Schreiber 2005; see also Chapter 2, Section 2.5)

More generalized sacred elements than the often eminently local *huacas* were also recognized by both the Inca and earlier Andean peoples. Water and mountain peaks provide two well-documented—and exceedingly relevant—examples. Gose describes the ritual importance of water (even in the highlands, where its practical importance was not so transcendent as on the coast): “an almost obsessive concern for the ritual control of water emerged in this highland context of attenuated functional necessity.” (Gose 1993:482) In other words, while irrigation agriculture provided an obvious and immediate rationale for concern with adequate provision of water on the coast, similar concern is apparent in the highlands in spite of the less apparent worry over supply. Elaborate ritual manipulation of water is well-documented in sites spanning the geography and chronology of the Central Andes (e.g. Wari (Isbell and McEwan 1991), Tiwanaku (Kolata 1993), and Kuntur Wasi (Onuki 1995)). This is of course matched at Chavín (see above).

Mountain peaks, ever-present in the Andes, were also cosmologically significant. Known as *apus* by the Inca, these were seen as potent deities and sources of water (Reinhard 1985a). As such, they served as foci of ritual attention. Reinhard has documented this extensively for the Inca case (e.g. Reinhard 1985b; Reinhard and Ceruti 2005) and suggested its applicability to earlier Andean peoples (Reinhard 1985a). Benson notes that “Mountains are still sacred in the Andes, still personified, sacralized, deified, still the homes of ancestors.” (Benson 2001:13)

Glowacki and Malpass argue for a similar semiotic continuity in chronological as well as spatial terms. Drawing carefully on analogies to the Inca, they describe the Central Andes as comprising for the Wari, “a vast sacred landscape—a patchwork of natural phenomena, human construction, and associated objects.” (Glowacki and Malpass 2003:443) Though yet further removed in time from the Inca, Chavín and its setting, I suggest, should be similarly conceived—and, significantly, the lines dividing those categories (phenomena, constructions, and objects) are in Chavín’s case particularly (and probably deliberately) blurry.
In sum, it is clear that sacred landscape features in the Andes were foci of ritual activity and construction. Moreover, they were so simultaneously for apotropaic purposes and for sociopolitical purposes. That is, ritual focused on environmental elements both had overt practical ends—the effecting of phenomena associated with the animate landscape—and served, as any ritual practice, as an arena for the statement, reproduction, and/or contestation of the sociopolitical order. Benson highlights the practical role of ritual in her discussion of sacrifice in the Andes, arguing that the goal of ritual sacrifice was to establish “contact and contract” with supernatural powers (Benson 2001:11). The sociopolitical role of ritual, conversely, is the focus of Duviols’ discussion of Inca practice of capacocha (child sacrifice). He argues that, “la capacocha constituía un sistema de control social y cultural en manos del Estado centralizador, especialmente útil para contener las tendencias independentistas y garantizar la unidad imperial.”2 (Duviols 1976:29)

The importance—necessity, even—of ritual was highlighted by the activity of the environmental elements of power that were often the focus of ritual. These were, as discussed above, regarded as sources of sacred power throughout Andean prehistory, and proximity to such elements has often been used to explain the location of Andean monumental centers (e.g. Reinhard 1985a). Recent Andean history, which includes several natural disasters of frightening scope (e.g. the aluvión that destroyed Yungay in 1970; see Section 4.5) demonstrates that such natural elements are not simply symbolically potent, but also powerful—and threatening—in very concrete ways (see Rick and Contreras 2006).

What does the evidence from Chavín contribute to this discussion? Obviously it serves as beneficiary rather than source of ethnohistoric material for understanding human-environment relationships in the prehispanic Andes. Nevertheless, the substantial body of physical evidence from such a regionally significant early center provides an important reference point. While Chavín cannot be taken as representative of contemporary Andean beliefs and practices with regard to the environment, its success at the regional level suggests that the ideology materialized in Chavín’s

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2 “the capacocha constituted a system of social and cultural control in the hands of the centralizing State, especially useful for containing independent tendencies and guaranteeing imperial unity.” (My translation).
material culture, architecture, and setting was intelligible and appealing within a common Central Andean cultural idiom. The way(s) in which Chavin conspicuously interacted with its environment were apparently logical, sensible, and even impressive within the worldview(s) of the Formative Period Central Andes.

The landscape context of ritual architecture in Andean societies has often been seen as a significant factor in the location and ritual activities of major prehistoric ceremonial centers (e.g. Kolata 1993; Reinhard 1985a). As I discuss above, major environmental elements such as mountains, rivers, springs, and rocks were invested with ritual significance, acting as ritual architecture in their own right. Chavin and its setting suggest, furthermore, that Andean environments not only inspired awe and respect in the form of apotropaic ritual, but also by their very physically apparent power and activity provided a potential path to naturalized sociopolitical inequality. The possibility of influence or even control over such apparent sources of power—or at least the claim and/or advertisement of such—seems to have been both a potent lure for Andean peoples generally and a hook which nascent and aspiring elites might exploit.

7.3 Implications of a Dynamic Landscape

In the case of Chavin, the ceremonial center is situated in a landscape that, in addition to presumably being populated with named and sacred features, is also dynamic and fraught with environmental hazards. This is significant in several ways. As Moore emphasizes, prehispanic landscape settings were important not just for their built characteristics: “the ancient experience of place was not limited to the built environment.” (Moore 2005:14). At Chavin, the non-built aspects of the place thus

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3 This is not to suggest that the appeal was necessarily universal. The sociopolitical—or perhaps economic—dynamics behind the spread of Chavin-associated material culture remain poorly understood (see Burger 1993). Neither the means and motives of transfers of material culture nor the segments of society involved are well defined. The latter remains little addressed (though Kembel and Rick (2004) propose that local elites are the relevant actors); for the former a variety of animating motives have been proposed. Tello suggested that the spread of Chavin-style material was the correlate of a religious cult (Tello 1943), and was followed in this interpretation by a series of eminent scholars (e.g. Willey 1951, Patterson 1971). Richard Burger is to be credited more than anyone else with problematizing this interpretation, even while accepting its basic tenets (e.g. Burger 1988, 1993). To religious cult have been added elements of socioeconomic network (Burger 1992, 1993), interaction sphere and world system (Burger and Matos 2002), and competitive peer polities (Kembel and Rick 2004). See Section 1.3 for a more detailed discussion.
experienced would have included not just the impressive—steep valley walls, running rivers, towering *apus*—but also the dynamic—landsides, floods, debris flows, and even earthquakes.

As I have detailed (see Chapters 4 and 6), Chavín’s surroundings have been consistently active on a humanly-relevant timescale throughout the Late Holocene. That activity has included—and continues to include today—earth flow movement and landslide activity more generally, wander of river channels, and catastrophic debris flows.

The degree to which this landscape activity was coupled to human activity is difficult to establish precisely, but several linkages are likely. Most notably, the construction and expansion of the Chavín complex may have exacerbated landslide problems. As Structure A was expanded, primarily to the south, it certainly would have come yet more directly under the looming mass of the Cochas earth flow; its construction may even have involved removal of material from the earth flow toe in order to create sufficient space for construction (see Chapter 6, Section 6.2.1 and Figure 6.21). Landscape engineering at such a scale was certainly within the abilities of Chavin’s builders. In this case, however, any such activity would have increased shear stresses within the earth flow by removing support from its base, making earth flow activity more likely and endangering the monument (see Cruden and Varnes 1996:69-70 on landslide causes). Such anthropogenic contribution to increased landslide risk may have been augmented by devegetation/burning/cultivation on the slope itself, which would have both decreased slope cohesion with the removal of root structures and reduced evapotranspiration, increasing pore pressure in the slide (see Chapter 4).

Similarly, the reclamation of the riparian corridor necessary for the construction of the Square Plaza—in fact, any manipulation of the river channels—might have destabilized the surrounding slopes and caused landslides. These in turn would have had the effect of altering river channels, as in the 20th Century cases of channel wander in La Banda and the West Field (see Chapter 4).

Whether landscape activity was causally linked to human activity or not—and a further issue is whether (and how) Chavin’s inhabitants would have perceived such
links—the existence and location of the center seems to have been related to the active landscape. In addition to the visible markers of power that Reinhard (1985a) highlights—e.g. the *apus* and the convergence of rivers—Chavín was surrounded by a landscape that was manifestly powerful. Salient hazards—occurring with some frequency in the region if not the immediate environs of the site—included landslide, flooding, debris flows, and earthquakes. The landscape, being dynamic, was *evidently* powerful. As such, it may have served as an impetus for coordinated action, focus of apotropaic ritual, and source of social power (see Rick and Contreras 2006). Perhaps most notably—and incontrovertibly—the geomorphologic dynamism in no way prevented the construction of the ceremonial core and an abundantly constructed landscape.

Risk—or, more accurately, perception thereof (see Chapter 2, Section 2.6)—would have had practical consequences, and perhaps also cosmological significance. This is perhaps somewhat analogous to the case of El Niño on the coast, which may also have played a significant cosmological—as well as obvious practical—role (see Bourget 2001; Burger 2003; Lumbreras 1993; Sandweiss, et al. 2001). Here the link between the cosmological and the sociopolitical becomes explicit. Lumbreras, for instance, suggests that specialist knowledge of environmental phenomena served as a means to power for an emergent theocratic elite (Lumbreras 1993), while Bourget proposes that Moche sacrificial practices at Huaca de la Luna were directly linked to the occurrence of El Niño events (Bourget 2001:115).

The link between risk and ritual practice, in combination with a conspicuously *built* landscape, makes the questions that Moore poses about Formative Period architecture in the Andes equally applicable to the landscape: “How is ritual practice encoded or shaped by ceremonial architecture? How is religious authority conceived, and how is it reflected in the built environment?” (Moore 2005:52)

7.4 Emergent Inequality

One of the chief research questions at Chavín remains the nature and degree of sociopolitical authority represented by the extensive and impressive ceremonial
architecture (see Chapter 1). Early monumental architecture in the Andes inevitably raises the question of how the coordinated action that led to such construction arose and was maintained. Moore has recently defined this problem neatly:

Archaeologists infer that these mounds [at Formative Period centers in the Andes] were religious constructions based on their placement and prominence, the imposing art styles and ritual artifacts associated with the mounds, and the presence of unique architectural features such as sunken circular courts, prepared altars, and carefully plastered stairways. There is broad consensus on this point, but debate centers on the nature of authority represented by these constructions. (Moore 2005:220; my emphasis)

In the case of Chavín, the question is complicated by the fact that the construction in question is not simply a series of mounds of earth and rubble, implying a substantial number of man-hours. Rather, Chavin is a complex of well-built and massive stone-faced structures and plazas (set, as I have argued, in a heavily engineered landscape).

What is implied by the construction of the monument, and more particularly in this case by the associated engineering of the landscape? To reframe Moore’s question slightly, if we take it as axiomatic that the community doing the constructing was internally diverse in terms of class, gender, etc, why did they—or at least enough of them to (apparently) mobilize the community—buy into this project?

Various researchers have proposed divergent models in answer to this question. Burger (e.g. 1992) and Rick (e.g. 2004) have addressed it most explicitly. In proposing that the site’s monumental construction resulted from the cumulative and relatively independent actions of a weakly-centralized community, Burger in effect posits that collective action in fact served the interests of the entire community. In contrast, Rick’s emphasis on elite planning and activity suggests that the majority of the community were convinced (through liberal application of ideology) that such action served their interests, when in fact it may not have.

The extensive evidence of site- and structure-level planning and continuity now available (as a result of Kembel’s work; see Kembel 2001) supports the latter argument. As Moore has pointed out, continuity and planning are features likely correlated with the presence of established, canonical authority (Moore 2005:122).
The distinction that Moore draws between shamanistically- and canonically-derived authority is essentially one between charismatic, temporary, bounded leadership and institutionalized, generalized hierarchy.

Burger does see sociopolitical inequality arising in the later (Janabarriu) phase at Chavín: “one of the features of Chavin ideology may have been its rationalization of the hierarchically arrayed social statuses that were emerging and the conflicts they must have produced.” (Burger 1993:72) He does not associate such social hierarchy with the initial construction of the monument, however (see Burger 1984:Ch.8), but rather with its expansion and elaboration. Kembel and Rick have also focused on the relationship of the site’s monumental architecture to social complexity and inequality (e.g. 2004). The question that concerns me most here, however, is that of why the surrounding landscape was incorporated into the construction project of the ceremonial center. What can the extensive modification of the landscape tell us about processes of emergent sociopolitical inequality?

The argument for a trajectory towards increased sociopolitical inequality and the evidence that suggests strategic elite action intended to encourage that trajectory is only a starting point. My use of this argument, moreover, is not intended to suggest that strategic elite action was sufficient to create or maintain that trajectory. A strong argument for such action can be made (see Rick 2004), however, and at Chavín the data to address popular behavior are largely lacking as yet. My focus on elite action and intent here, I emphasize, is a function of the available evidence and not a programmatic theoretical statement.

Rick and Kembel, focusing primarily on the monumental core of the site, have argued for a model of “built authority” at Chavín—a vision of monumental construction and ritual practice at the site as part of a carefully designed elite project of naturalizing social inequality and institutionalizing authority (see Kembel and Rick 2004; Rick 2004). Their preeminent argument for the existence of developing sociopolitical authority at Chavín is that of design. That is, they argue that the extensive evidence of continuity in architecture and apparent centralized planning are
evidence of a directed rather than collective construction effort. Moore’s assessment of Chavín’s ceremonial architecture in its broadly Andean context offers further support for this argument. Moore—Independently of Rick and Kembel—concludes that the permanence, continuity, and regional significance of Chavín’s architecture argue for the presence of canonically-based authority. That is, where ceremonial architecture is generational or multi-generational in permanence, is found at the regional or interregional level, is large-scale, and incorporates public-far and public-distant spaces, religious authority will not be based on ecstatic shamanism… [it] will be characterized by canonism or another class of authority will be involved, such as kin-based political leaders. (Moore 2005:121)

The scale and coherence of the landscape engineering in Chavín’s near periphery (see Chapter 6) suggest a similar designing hand; the two lines of evidence complement one another well. The built environment, then, provides insight into the design intentions of Chavín’s planners.

This leads directly to the question of audience. Silverman notes, in general terms, that “Through the act of physical construction…the landscape was made to target an audience: the members of the construction group, others of the same society, others outside the society, both groups, different groups within a society, and so on.” (Silverman 2004:5) While this may be broadly true, the significance of individual landscapes and monuments lies in their specific audiences rather than the broadness of their multiple appeals. In other words, if Chavín is at least in part a project designed to impress, at whom is it aimed? Local peasants seem an unlikely primary audience. The scale of and investment in the site is out of proportion with the potential benefits of winning over such an audience, and the emphasis on replication of Chavín iconography in expensive media (lithic art, fine ceramics, metals, textiles) throughout the network of interacting sites suggests a significant (though not necessarily exclusive) elite component (though obviously producers and craft specialists were involved, and somehow motivated, as well). Kembel and Rick argue that visiting elites from other peer polities were the primary audience (Kembel and Rick 2004). A case might also be

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4 There is also an abundance of evidence for sociopolitical inequality at Chavín. This includes differentiation in domestic architecture in La Banda (Rick 2004:72), highly elaborated craft production (involving lithic art, ceramics, and bone- and metal-work), imports of exotic goods, and extensive labor mobilization (see Burger 1993).
made for the site as attempt to impress deities-supernaturals themselves—and here it is important to think of ritual activity as apotropaic; perceived as efficacious action (see Benson 2001 among many; ritual activity need not necessarily be construed as impractical and is almost certainly multivalent, having multiple purposes and simultaneously affecting distinct elements of society differently).

The issue of audience—and, implicitly, performer—at Chavín offers a potent reminder that a landscape replete with huacas and apus is a landscape of power in two senses. It is full of Eliade’s “irruptions of the numinous” (characterized by Burger and Salazar-Burger (1985:114) as apt metaphors for prehispanic Andean understandings of the sacred landscape) on the one hand—founts of the sacred, visible to all. All, that is, who share the requisite ideology—and precisely here we find the landscape of power in the second sense. Can all identify those sacred features, much less access them? As Tilley notes, landscapes are marked by differential access to and through their features, by unevenly distributed ability to interpret and even modify them: “The experience of these places [locales and landscapes] is unlikely to be equally shared and experienced by all, and the understanding and use of them can be controlled and exploited in systems of domination.” (Tilley 1994:26)

The potential for such use of landscape is also implicit in social historian William Sewell’s discussion of the importance of resources—and differential power to use them—in structure/agency dynamics. He writes, “Any array of resources is capable of being interpreted in varying ways and, therefore, of empowering different actors and teaching different schemas.” (Sewell 1992:19) This emphasizes the importance of laying claim to a landscape by modifying it—such materialization of ideology through engineering is in effect a claim on the legitimate, canonical interpretation of the landscape. This process may be seen as analogous to the materialization of ideology in artifacts (see DeMarrais, et al. 1996). Those able to modify the landscape (ability determined by both physical and economic as well as social and political means) inscribe their ideology upon it, rendering it (to those able and willing to interpret it, I would add) more visible, reified, naturalized. The latter is a particularly apt term, perhaps, given the blurring of culture and nature so explicit in anthropogenic landscape modification.
This enmeshing of the dynamic landscape in evolving sociopolitical relationships at Chavín—and vice versa—emphasizes the need to consider humans and their environments as mutually constitutive. Environment or landscape is rarely considered in this structuring context (as author rather than text) without generating accusations of environmental determinism, or at best vulgar Marxism. As environmental historian Ted Steinberg points out, however, it need not be so:

Historians have embraced race, class, and gender as categories of analysis, but also as axes on which power operates. It is in the latter sense that I think nature, viewed as yet another axis, is worth taking into consideration… although there is little question that nature is different from other categories of social organization such as class, race, and gender, it does share with these concepts the ability to shed light on both the causes and consequences of historical phenomena. (Steinberg 2002:802)

There are echoes here of Tilley’s call to understand landscapes as arenas of social power, but with an added dimension. Steinberg would have historians focus also on what is outside the ambit of social construction: “Taking into account the independent world of nature should cause us to rethink the meaning of human agency. We need, in short, a less anthropocentric and less arrogant view of the concept.” (Steinberg 2002:819)

In this light, it is critical that Chavín’s physical setting is both abundantly constructed and geomorphically dynamic. I have demonstrated here the pervasiveness of landscape modification at Chavín, and considered also the background of environmental activity. What remain particularly difficult, however, are the questions of how to read meaning from the text of landscape and how to characterize the effect of a dynamic environment on sociopolitical developments at Chavín. Additionally, what light can this archaeological and geomorphologic evidence shed on Chavín’s practices related to and conceptions of its environment?
Such questions are, as Steinberg emphasizes, generally important to understanding sociopolitical as well as geomorphologic trajectories. The prehistoric Andean emphasis on sacred landscapes makes this that much more the case. Silverman’s call-to-arms with regard to the Andes is apropos: “ancient people culturally constructed and physically modified the given tangible properties of their world in significant ways, the meaning of which must be elucidated if we are to understand the society to which they corresponded.” (2004:4) Once the ways in which landscape is constructed (in every sense) are understood, in other words, we may hope to use those constructions as guides to the societies involved. While Silverman is articulate in emphasizing the multiple facets of landscape construction, however, she offers little practical advice as to how we may use landscapes to understand the societies that constructed them. I here explore this question, seeking both theoretical underpinnings for such an undertaking and ways of proceeding to read Chavín’s landscape.

I begin with a question parallel to that posed by Moore, above (Moore 2005:52, quoted on p.232). We might replace Moore’s “religious authority” with the term “nature”, and ask, in light of Chavín’s location and engineered setting, how nature is conceived, and how that conception is reflected in the built environment. This of course begs the more fundamental question of whether the term “nature” is appropriate. Its implication of a basic nature/culture divide, and of a mythical, virginal setting for human activity, after all, is so problematic that I have avoided the term throughout, preferring “environment”. Even if environments are not wholly nor necessarily anthropogenic formations—see Chapter 2—“nature” is definitionally a cultural creation. A wealth of literature has discussed and critiqued the Cartesian division of culture from nature as a Modern, Western construct (e.g. Ingold 2000; Worster 1985). The basic separation has been challenged as unsustainable—how can culture be apart from, rather than of, an encompassing category of nature?—and the effects of the binary opposition decried as pernicious.

Why, then, do I raise the question of Chavín’s conception of “nature”? I do not propose the uncritical projection of this Cartesian divide onto Andean prehistory.
However, a means of articulating modern anthropological literature on risk and conceptions of the environment with archaeological understandings of landscape and environment is needed. Such articulation can provide a means of approaching the relationships and interactions between humans and their environment at Chavín.

Specifically, I use the evidence of Chavín’s landscape practices to situate Chavín within the “myths of nature” model of modern conceptions of nature and risk (proposed by Schwarz and Thompson (1990), following Holling (1979); I here follow primarily Adams’ (1995:33-38) characterization of this work (see also Buck 1988)).

This typology sets out to characterize modern conceptions of nature and correlate those conceptions with different behaviors, particularly with regard to environmental risk. The suggested categories are “nature ephemeral”, “nature capricious”, “nature perverse”, and “nature benign” (see Table 7.1). These arise originally from Holling’s characterization of the assumptions about nature’s general behavior upon which managers fall back when forced to make decisions with less data than they might like. “Nature ephemeral” suggests a generalized conception of nature as fragile, and in danger of harm from human activity; it leads to a behavioral prescription of extreme care. The idea that nature’s behavior is beyond the scope of human influence characterized as the myth of “nature capricious”, which suggests that nature’s activity is chaotic and unpredictable. This dissolution of causal links between human activity and the natural world suggests that no human behavior has meaningful consequences with regard to the natural world, and that regulation (of self or other) is pointless. “Nature perverse and/or tolerant” describes a myth of basic stability, in which nature is predictable and benign until a tipping point is reached, beyond which the system falls apart. Careful regulation of human activity is the logically implied corollary of such a conception. In contrast, the myth of “nature benign” suggests a natural world that is plentiful and forgiving, requiring no particular self-restraint on the part of its inhabitants.
Table 7.1: Myths of Nature (after Adams 1995:Fig 3.1)

<table>
<thead>
<tr>
<th>Myth</th>
<th>Characterization of nature</th>
<th>Implied/resulting practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature ephemeral</td>
<td>“fragile, precarious, unforgiving”</td>
<td>Precautionary principle</td>
</tr>
<tr>
<td>Nature capricious</td>
<td>“unpredictable”</td>
<td>Fatalist</td>
</tr>
<tr>
<td>Nature perverse/tolerant</td>
<td>Predictable within limits</td>
<td>Regulatory</td>
</tr>
<tr>
<td>Nature benign</td>
<td>“predictable, bountiful, robust, stable”</td>
<td>Laissez-faire</td>
</tr>
</tbody>
</table>

Certainly using such a typology requires that we remain alert to the possibility that these categories may not adequately encompass the range of conceptions of the environment of prehispanic Andean peoples. Nevertheless, they provide a means of at least addressing the issue, and perhaps a means also of assessing whether in fact Andean conceptions of nature fall inside or outside of this typology. This is, of course, properly an ethnographic and ethnohistoric question—but at the same time assessing Chavín’s material traces in this light is itself heuristically worthwhile.

This requires inverting the relationship proposed by Adams and his predecessors. Where they documented ideas about nature and proposed related practices, in Chavín’s case we must necessarily instead infer conceptions from practices, and practices themselves from material remains.

This problem of inferring practice and conception from Chavín’s landscape, whether with regard to myths of nature or other issues, is theoretically and practically difficult. The inescapable fact that the landscape palimpsest reflects human agency is, at first glance, little help. As palimpsest, it (definitionally) presents a tangle of the signatures of a myriad activities. It becomes more promising, however, if we consider whose intent Chavín’s landscape most prominently reflects. As I discuss above (see Section 7.4), the engineered environment in which Chavín is embedded seems primarily to reflect the design of local elites (who might be construed as Lumbreras’ theocrats, Rick’s Machiavellian schemers, Moore’s canonists, etc). These elites are obliged, however—and it’s very much in their interest—to utilize a broadly intelligible idiom. In fact, if the target audience was, as many suggest, not just locals but also regional elites, then that idiom had to be broadly intelligible spatially as well as socially (given that the long lifespan and extensive regional linkages of the site suggest...
its successful communication). Moreover, the project of monument and landscape
construction necessarily involved inscribing—materializing—that idiom in the
architecture of the monument and in its landscape setting.

That inscription of Chavín’s ideology in the landscape should not be
understood, however, as the molding of a wholly malleable tableau. Not only did
Chavín’s environment have preexisting characteristics, it continued to be dynamic
throughout the uselife of the ceremonial center. This existence of the landscape as at
once external to any given inhabitant and simultaneously culturally constructed, in fact,
formed a key part of the power and utility of the landscape as ideological tool.

The concept of simultaneity of cultural construction and independent existence
is critical to the project of reading Chavín’s landscape. Moore, in his treatment of
Andean cultural landscapes (2005), characterizes experience of place—after Cosgrove
(1984)—as socially created and maintained. This “collective investment of meaning”
(Moore 2005:216) has two effects. Humans, in the inevitable amalgam of socially
structured individual agency, ascribe meaning to their surroundings, culturally order
and define them, and even physically alter them. At the same time, and in interplay
with that process, those environments affect their inhabitants, in the obvious physical
ways as well as in more subtle cognitive ones—for inasmuch as the meaning and
significance ascribed to landscapes is socially, collectively created and maintained, no
individual has control over it. Rather, the landscape, at once physical and cognitive,
forms part of the extra-agent structure. Moreover, as Tilley points out (see above), the
ability to invest the landscape with meaning is not equally distributed. Nor, I would
add, is it for anyone complete—no single party can wholly create or fully control the
significance of the landscape.

Here the relationship of landscape to structure is critical. Sewell defines
structure as consisting of schema—the ways in which humans order and understand
their surroundings—and resources. However, contra Giddens, he argues that resources
are at least in part material. I would argue, however, that Sewell doesn’t go far
enough—he considers things but not environments. The critical element here,
however, is Sewell’s contention that, “Nonhuman resources have a material existence
that is not reducible to rules or schemas, but the activation of material things as
resources, the determination of their value and social power, is dependent on the cultural schemas that inform their social use.” (Sewell 1992:12) If we broaden his conception of resources to include environments as well as material things, deliberately modified environments become particularly interesting inasmuch as they constitute not only an extra-schematic resource suite but also a material embodiment of schemas that “activated” those environments. Sewell’s observation that “Resources…are read like texts, to recover the cultural schemas they instantiate,” (Sewell 1992:13) suggests that elements of Chavín’s cultural schema might be read from its constructed landscape.

This is of course no simple task, and it is complicated further by a diachronic perspective. Implicit in Sewell’s discussion is an understanding of resources as material givens—that is, they are preexisting and static in their materiality; only the schemas that order them are dynamic. This is problematic even for objects, but all the more so for environments, particularly over timespans of generations. I have emphasized here the dynamism of Chavin’s landscape, and the way that—to co-opt Sewell’s terms—landscape and schema were mutually constitutive and both dynamic. Sewell approaches this, though not referring specifically to environments, when he writes, “Sets of schemas and resources may properly be said to constitute structures only when they mutually imply and sustain each other over time.” (Sewell 1992:13)

Certainly a built landscape fits this definition. As such, we may claim theoretical grounds for reading Chavin’s schema—at least those of the designers whose intent is materialized in the built landscape—from its engineered environment. When considered in tandem with the evidence for strategic elite behavior and emergent sociopolitical inequality, the engineered landscape at Chavín suggests that recognition of the structuring effect of landscape—what Moore describes as the way in which “places reflect human experience and, in turn, create it” (Moore 2005:217)—may underlie the extensive landscape modification documented at Chavín. Rick and Kembel have posited that the long sequence of construction of ceremonial architecture at Chavín reflects strategic intent on the part of aspiring elites (see Kembel and Rick 2004; Rick 2004). The landscape modification here described—built to specifications beyond the simply pragmatic as it is—may represent part of that same strategic program. The logic of Moore’s contention that permanence and continuity of
ceremonial architecture is generally correlated with canonically-based religious authority is similarly applicable to landscape engineering, and the element of strategic planning of construction that Rick and Kembel emphasize is also evident in the landscape engineering described here.

One aspect of the schema legible from the landscape, then, is the political and ritual significance of the environment. As Smith claims landscapes as “constitutive elements of political life,” (Smith 2003:77) so apparently were they recognized by strategically-minded elites seeking to create, legitimize, and maintain political authority. The recognition of this role for landscape led to the use of landscape as a forum for materialized ideology, with environment rather than object serving the communicative role suggested by DeMarrais (1996).

That materialized ideology—the intentional inscription on the landscape—and its less deliberate concomitants provide a means of addressing the myths of nature described above. The practices evidenced in the modern landscape testify that Chavín was neither cautious nor passive with regard to its risk-fraught environment. The precautionary principle associated with the myth of “nature ephemeral”, apparently, did not characterize Chavin’s conception of its environment; the extensive modification of the environment is testament to a facility and ease with environmental modification. Moreover, the passivity associated with the myth of “nature capricious” may also be ruled out. Chavín was certainly not passive, actively trying to influence the course of environmental events and not refraining from activity in fear of environmental consequences. Such activity took the form of the engineering efforts here described and probably also involved at least some of the ritual activity of the ceremonial center.

What about the remaining two myths of nature? Is there evidence that Chavín conceived of its environment as either benign or perverse? Two lines of evidence argue against a conception of “nature benign”. Primarily, I have argued that the nature of landscape engineering at Chavín and the frequency of geomorphologic activity in the region suggest a consciousness of environmental hazard. Such hazard-awareness would likely be incompatible with a conception of nature as benign. Moreover, the level of engineering effort and ritual activity both suggest a perceived need for activity directed toward influencing the environment.
We are left, then, with the model of “nature perverse/tolerant”, which suggests that nature is predictable within limits but may behave unexpectedly. This model fits the material evidence of Chavín’s landscape practices, and moreover seems quite compatible with the generally accepted contention that Andean peoples traditionally conceived of the landscape as animate. It also seems well-suited to the Andean environmental reality of quasi-periodic fluctuations like El Niño.

The limits of that predictability, however, may have been critical to Chavín. Its apparent location with deliberate regard for dialogue with environmental sources of power, and a concept of “nature perverse”, place great significance upon the efficacy of ritual. Rick has suggested in this regard that a severe earthquake (for which there is suggestive archaeological evidence between the Black-and-White Stage and the Support Construction Stage Rick in press:20-21) would thus have damaged Chavín’s ideological foundations as much as its physical ones (Rick and Contreras 2006). This echoes Sewell: “Structures, then, are sets of mutually sustaining schemas and resources that empower and constrain social action and that tend to be reproduced by that social action. But their reproduction is never automatic. Structures are at risk, at least to some extent, in all of the social encounters they shape.” (Sewell 1992:19) Certainly schema-challenging changes in resources can be conceived as a powerful source of such risk to structures.

Public ritual activity is clearly a key motivator in the construction of Chavín—but as I discuss above, ritual activity may be multivalent. In the case of Chavín, the ritual structures and landscape suggest that ritual at Chavín served both strategic purposes (i.e. the legitimation of authority; see Rick 2004) and apotropaic purposes (i.e. dialogue and relationship with supernaturals/deities). Ritual, in this context, may also be understood as a rational response to situation in a risky environment—or, more specifically, to a conception of nature as perverse.

The landscape itself, as well as the architecture within it, was thus an important medium of communication, whether the target of that communication was elites, commoners, or supernaturals (or all of those simultaneously). The abundance of evidence (see Chapter 6) demonstrating that the project of monument- and authority-
building at Chavín included massive modification of the local landscape testifies to the fact that Chavín’s builders understood the landscape as an important component of their project. The activity of that landscape itself—the geomorphic processes common to the valley—also apparently played an important role, providing a visible reminder of (super)natural power and a motivator for coordinated action.

The case of Chavín emphasizes the scale and ubiquity of prehispanic landscape footprint. In this, it strongly supports the various arguments of the last few decades that the myth of the “ecological Indian” is largely fictional. Chavín’s setting is testament to the ability of natives of the Andes to alter their environments in profound, and often wholly intentional, ways. While it thus dismisses the notion of the native as “noble savage”, however, it also provides compelling evidence of environmental dynamism. Thus, where some arguments against the myth of the ecological Indian have promulgated instead an image of the environment as *tabula rasa*, Chavín provides evidence that even as indigenous Andeans were profoundly altering their environments—intentionally and collaterally—they were still also shaped by them. Recognition of the former, Chavín emphasizes, need not imply the negation of the latter.
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