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# Landscapes of death: GIS-based analyses of chullpas in the western Lake Titicaca basin

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ABSTRACT

The western Lake Titicaca basin is marked by above-ground funerary towers, known as chullpas, located in a variety of geographical contexts and dating to the Late Intermediate Period, or LIP (AD 1100–1450), and Late Horizon (AD 1450–1532). Over the years, interpretations of these tombs have concentrated upon their roles as loci for ancestral veneration and their abilities to perpetuate memory, delineate social ties and territories, and demarcate access to resources. These views share the implicit or explicit assumption that these mortuary structures were intended to be highly visible. Yet this assumption has never been formally tested. By using GIS-based geospatial tools and statistical analysis, this paper investigates the extent to which chullpas surveyed in the western Lake Titicaca basin visually dominated the landscape. These tombs were not positioned in random locations; they exhibit a high degree of clustering and were built in highly visible areas that could be seen from sites of occupation and regions of economic importance such as Lake Umayo. This paper suggests that this landscape of death was deliberately constructed to have an enduring social impact.

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## 1. Introduction

The emergence and development of above-ground burial tombs known as chullpas remain critical research topics for understanding the socio-political climate of the Lake Titicaca basin during the Late Intermediate Period (Stanish, 2003). The collapse of the Tiwanaku around 1000 A.D. ushered in the first phase of the LIP (A.D. 1100–1275) characterized by the disintegration of social structures, economic activity, and political organization, and a gradual decline in Tiwanaku influence (Janusek, 2004). The second phase of the LIP is considered to be a turbulent period of political fragmentation and high levels of warfare that led social groups to settle in highly defensible areas. Chullpa construction, representing a new expression of mortuary behavior and signaling a major religious and cultural transformation, became widespread over many areas in south-central Peru during the LIP (Isbell, 1997).

Chullpas have been interpreted within the framework of well-documented Andean concepts of social organization, ancestral veneration, and territoriality (Isbell, 1997; Kesseli and Parssinen, 2005; Stanish, 2003); and since the majority of these tombs contained multiple individuals, they likely served as burial loci for corporate groups (Stanish, 2003). Isbell (1997) argues they were closely linked to the maintenance of *ayllus* (lineage-like units of Andean social organization) through rituals interacting with focal ancestors. Because these mummies served as sources of supernatural empowerment and fertility, they required significant facilities for protection, leading Isbell to claim that chullpas were used for preserving the ancestral mummies and their offerings and providing accessibility for veneration (Isbell, 1997). Kesseli and Parssinen (2005) add that these tombs functioned as symbols of ethnic identity and territorial markers demarcating social exclusivity. Rituals performed near these tombs would have renewed social ties and legitimized political claims, thereby fostering both social difference and cohesion.

Chullpas have also been viewed as land markers and memorials. Hyslop (1979) suggests the tombs served as markers indicating land controlled by family units, citing Bernabé Cobo's (a 17th century Spanish chronicler) assertion that chullpas in the Province of Caracollo (present-day Bolivia) were placed on family property and an unpublished document in the *Archivos de los Indios* describing Lupaca (a pre-Inca polity) lords using chullpas as boundary markers for the demarcation of territorial lands. Nielsen (2008) believes that chullpas' above-ground construction would have evoked collective memories and made them tangible for inhabitants. According to

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these views, chullpas were instrumental in promoting a shared sense of origin and memory and shaping collective identities.

These insights suggest a landscape approach to chullpas is appropriate. Landscapes are repositories for social meaning that reflect the relationship between people and the spaces that they occupy. Constructed landscapes refer to landscapes that have been artificially altered by the construction of buildings, monuments, and other structures (Ashmore and Knapp, 1999). They are not fixed backdrops but rather malleable containers of meaning that can be manipulated to articulate changing social structures and relationships. Analyzing the visibility of chullpas allows insight into the ways reformulated social structures during the Late Intermediate Period were expressed physically, and demonstrates that these expressions were indeed meant to be seen and remembered.

Here we investigate the extent to which chullpas surveyed in the western Lake Titicaca basin in the summer of 2009 visually dominated the landscape, using a Geographical Information Systems (GIS) based analysis. This geographical data along with random points generated within the landscape were then plotted on a DEM (Digital Elevation Model) and GIS analyses of visibility and spatial patterning were performed. Komologorov–Smirnov statistical tests conducted in SPSS 16.0 measured the statistical significance between the distributions of chullpas and random points. To put this analysis into a proper context, the Late Intermediate Period is first discussed.

### 1.1. The Late Intermediate Period

The early stages of the Late Intermediate Period experienced vast social, economic, political, and ideological changes (Janusek, 2004). Archaeological evidence suggests that populations lived in dispersed hamlets and villages, with a significant movement into hilltop, fortified sites known as *pukaras* (Arkush, 2011; Stanish, 2003). The marked decline of sunken courts, platform mounds, and stele coupled with the abandonment of prestigious craft traditions associated with the Tiwanaku suggest a discontinuity with previous ideologies of power and a decentralization of political power (Arkush, 2011; Stanish, 2003; Janusek, 2004). The productive raised-field agriculture practiced by the Tiwanaku shifted toward terrace agriculture and pastoralism (Stanish et al., 1997). The apparent political fission and dispersal of populations includes the use of some defensive settlements in the early LIP, suggesting that a degree of conflict between social groups was present in this post-collapse environment, perhaps prompted by competition over the limited supply of productive agricultural land and unpredictable fluctuations in climate (Arkush, 2008; Binford et al., 1997).

In the late LIP, the western part of the Lake Titicaca basin experienced a marked increase in centralization of power, settlement nucleation, and investment in defensive works (Arkush, 2011). Small refuges and *pukaras* consisting of limited defensive construction and modest domestic establishments dotted the landscape and probably served as defensive establishments where dispersed populations could congregate and protect themselves (Albarracin-Jordan, 1992; Arkush, 2011; Stanish, 2003). A limited number of major *pukaras* emerged onto the scene, containing massive defensive installations that enclosed cemeteries, domestic sectors, and sometimes pasture land (Stanish, 2003). Levels of war and conflict appear to have risen during the final two centuries of the LIP, leading to the development of autonomous, regional polities, manifested by these major *pukaras* that centralized political power and likely provided for the defense of populations under their control. An environment of intense conflict between communities and larger regional polities may have raised the stakes and created an increased need for people to visibly mark family land or territory, communal identity, and ethnicity on the landscape (Arkush and Plourde, 2010).

### 1.2. LIP mortuary patterns

Mortuary patterns in the Lake Titicaca basin during the LIP exhibit a shift from Middle Horizon burial practices of below ground subterranean cist tombs to include slab-cist tombs marked by a ring of erect stones on the surface, group burials in caves or grottos, and chullpas, above-ground funerary structures that visibly marked the constructed landscape (Albarracin-Jordan, 1992; Arkush, 2009; Stanish, 2003).

Chullpas represent the chief mortuary innovation of the LIP and are distributed throughout most of the Lake Titicaca basin (Albarracin-Jordan, 1992). Chullpas vary in construction material, shape, and size: they are built with small fieldstones, large fieldstones, cut stones, and/or adobe, are rectangular or circular in footprint, and exhibit varying heights between one and 5 m (Isbell, 1997; Stanish, 2003; Hyslop, 1979). The available evidence clearly indicates that they were associated with collective burials of individuals, in some cases amounting to as many as two hundred individuals (Stanish, 2003).

Although the reasons why chullpas became pervasive would undoubtedly benefit from continued field investigations, these tombs represent a new cultural expression and highlight an intention on behalf of LIP populations to alter the character of the landscape in an effort to accommodate changing social, political, and economic conditions. A constructed landscape of death emerged. Determining the exact location to build these tombs must have been a matter of importance, given the rich Andean tradition of attributing natural locations with a sense of power and religious prominence (Williams and Nash, 2006).

### 1.3. The importance of visibility

Visibility serves as one of the main features of constructed landscapes and has increasingly been viewed as an important factor in recent archaeological approaches to the study of landscape. The visual appearance of a monument or place is, in most cultures and for most people, the most significant impact it has upon any individual's senses (Wheatley and Gillings, 2002). It is the visual characteristics that are most frequently remembered and referred to because vision allows for the perception of various characteristics including shape, color, and spatial location simultaneously (Llobera, 2007). Visibility is not the only sense that plays a role in human experience, perception, and site location, but it is one that plays a primary role in creating a sense of place and explaining why, in this case, chullpas are located where they are.

Visibility is emphasized in the Andes in a variety of ways. Lambers and Sauerbier (2006) find from a GIS analysis that there is a clear tendency for Nazca geoglyphs to be within each other's line of sight, possibly meaning that geoglyph rituals were performed simultaneously with others within view. Williams and Nash (2006) demonstrate that *apus* (sacred mountain peaks) are within sight of various architectural complexes on Cerro Baúl in the Moquegua Valley of Peru. Arkush (2011) discovers from a GIS analysis that *pukaras* in the Lake Titicaca basin are preferentially located within good views of each other. Though visibility does not always carry meaning, examples abound of past Andean societies deliberately altering landscapes to emphasize or capitalize on features' visual characteristics.

### 1.4. Geographical background

This study draws on information collected in a full-coverage pedestrian survey in 2009 under the direction of Dr. Elizabeth Arkush. The 80 $km^2$ survey area (see Fig. 1) is located west of Lake Titicaca and southwest of Lake Umayo, Sillustani (an important

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