Fields of conflict: A political ecology approach to land and social transformation in the colonial Andes (Cuzco, Peru)

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ABSTRACT

This paper presents a political ecological framework for Geographic Information Systems (GIS) analysis to examine changes in agricultural land in ancient and early historical contexts. It raises several issues pertinent to archaeological epistemology and science, with a particular focus on the limitations of using fixed data categories to examine fluid environmental processes and ecological relationships. The paper draws on political ecological theories that define land as a social process, moving beyond economic conceptions of agricultural land that rest on productive capacity and phenomenological theories that examine the physical environment in terms of cultural perception. It combines qualitative (archival) and quantitative (archaeological) data in a GIS methodology to address how linked changes in physical land attributes and labor routines can affect regional ecologies and foment social conflict. In empirical terms, the paper traces changes from maize to wheat fields during Spanish colonization (ca. 1533-1670) in Ollantaytambo, Peru, a monumental Inca town near the capital of their empire. It reveals how ecological transformations that occurred during this century—widespread deaths throughout, abandonment of Inca fields, and introduction of European biota—in part framed conflicts between Andean people and the colonial regime, and also empowered local farmers to claim land in previously undeveloped areas.

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1. Introduction

Archaeologists have taken markedly different approaches in their analyses of land use and social change. Political economic approaches trace the development of social complexity by documenting the varying strategies by which past people managed or adapted to resources such as rich soils, valleys, fisheries, or pastures (e.g., Algaze, 1993; Balkansky et al., 2000; Sanders et al., 1979; Spencer and Redmond, 2001). Phenomenological and hermeneutic perspectives seek to understand changes and continuities in how past people constructed the semiotic meaning or cultural significance of environmental features such as boulders, seascapes, or mountain peaks (e.g., Bender, 1993; Knappett, 2005; Tilley, 1994, 2004, 2010). Despite theoretical differences, researchers who apply these approaches often analyze land in similar ways, by classifying modern environmental types (e.g., topological variance, soil variation) and then investigating changes in the distribution of social variables (e.g., settlements) relative to those types (Dincauze, 2000:

30—34). In consequence, the physical environment is frequently cast as an independent variable or stable state, and history is rendered as change from one settlement pattern or perceptual framework to another.

Recent literature in political ecology and landscape archaeology offers an alternative approach, defining land as an active but not determining process that contributes to human social and political life (e.g., Bauer, 2015; Bauer and Kosiba 2016; Blaikie and Brookfield, 1987; Erickson, 2006; Hecht et al., 2014; Morrison, 1995, 2006, 2009). Hence, land is a generalizing term that describes a physical composite of microbes, soils, flora, terraces, and canals, which can act in particular ways and affect politics because of how they are entrained in an ecological and social context (Bauer and Kosiba, 2016). For instance, political ecologists have argued that processes of soil erosion and degradation are closely linked to social circumstances, such as inequalities in property distribution that influence farmers to continually cultivate fields without fallow seasons, and therefore exacerbate the impoverishment of both fields and people (Blaikie, 1985). By implication, soil degradation and social marginalization are inseparable aspects of the same historical process. To understand history, then, is to inquire into

how changes in the land influence such social circumstances and the political actions they provoke (Bauer, 2015).

This paper develops an epistemological framework and methodology for understanding how land played a role in politics throughout the first century of Spanish colonization (1533—1650 CE) in Ollantaytambo, Peru, a monumental town and agricultural complex in the heartland of the Inca Empire. Several notable socio-ecological transformations occurred in Ollantaytambo and its surroundings during this time frame, including: depopulation, infrastructural failure, the introduction of European biota, a decrease in temperature, forced resettlement (*reducción*), and the establishment of individual property (Chepstow-Lusty et al., 1997; Covey and Quave, 2017; Glave and Remy, 1983; Wightman, 1990). Using the relational database capacities of Geographic Information Systems (GIS), the paper offers insights into how the shifting politics and ecology of maize (*Zea mays*) and wheat (*Triticum aestivum*) production in Ollantaytambo engendered social conflicts during these transformations. It argues that changes in fields and cultivable lands in part precipitated the social differences—between landholders, tribute payers, and workers—that both defined colonial governance and empowered Andean people.

2. Background: land and colonization in the Andes

The aforementioned issues with theories of the environment pervade many historical accounts of social and ecological transformation. Scholarship on the early colonial Andes, for instance, often suggests a vast gulf between Inca and Spanish visions of social and ecological order (e.g., Mayer, 2002; Murra, 1980; Ramírez, 1996; Stern, 1993), suggesting radically different cultural and economic frameworks for perceiving or valuing the environment. The Incas are cast as the imperial outgrowth of a long-established tradition of Andean land tenure rooted in a communitarian and environmental ethos whereby fields were allotted to farmers, and agricultural harvests were shared among members of a vast kin network (Murra, 1980). During Inca rule, these lands could not be exchanged and remained dedicated to a community or imperial institution, even though imperial officials annually redrew field plots (*topos*) based on changes in household sizes (Diez de San Miguel, 1964[1567]: 31—39; Kolata, 2013). This communitarian or state-mandated Andean environmental ethos, and its apparent disdain for individually-held land wealth, is often contrasted with an Iberian economic mindset driven by the notion that land is a commodity with exchange value (Mayer, 2002; Murra, 1980; Ramírez, 1996).

Though there is certainly evidence of colonial-era ecological and economic imperialism (e.g., Burns, 1999: 54—55), dichotomies between Iberian and Andean land use principles can overgeneralize colonization in terms of contrasting value systems imposed on the land (cf. Wernke, 2013). A focus on only the top-down enforcement of market principles and property rights can obscure understanding of the complicated situated processes of negotiation and conflict that, at times extended Andean or Inca ecological practices, and at other times yielded new ways of conceptualizing and working with the land (Mumford, 2012; VanValkenburgh, 2012; Wernke, 2010, 2013). These processes of negotiation and conflict would have greatly differed throughout the Andes, depending on the extent of preexisting Inca colonization and landscape modification in a particular area, and on the interests of the social actors involved, whether they were ecclesiastical authorities, former Incas, itinerant workers (*forasteros*), children of Iberian-Andean parents (*mestizos*), representatives of the Crown, etc (Wernke, 2013). Herein, we develop methods designed to throw light on the fluid socio-ecological processes that

framed these colonial negotiations and conflicts. After all, the material constituents and capacities of the land also shifted during colonial times.

3. GIS epistemology and ecology

GIS is well-suited to analyze the interrelated materials, practices, and contexts that constitute land. GIS and similar databases are organized according to relational epistemologies that have the analytical potential to both combine and query data types at various temporal and spatial scales (Bria and DeTore, 2016). These databases can develop a framework of analysis that represents objects, loci, and fields in terms of their attributes; the assemblages of which they were parts; and the social and political processes to which they contributed. GIS studies oriented toward theory building (*sensu* Gillings, 2012) can therefore move beyond static fixed environmental data layers, and begin to inquire into the dynamic processes and entanglements that defined land and land use in the past (cf. Sturt, 2006; Wickstead, 2009).

Some archaeologists have implicitly taken steps toward such a GIS epistemology by constructing their data and objects of analysis in terms of relationships rather than attributes. This approach has long been essential to GIS predictive modeling, which distinguishes archaeological sites in terms of their land characteristics (Alexakis et al., 2010; Carrer, 2013; Ebert, 2000, 2004; Kvamme, 1992), whether soils (Fry et al., 2004), water access (Barton et al., 2010), or agricultural potential (Bolten et al., 2006). Similarly, archaeologists classify remote sensing imagery (e.g., LANDSAT) to create Normalized Difference Vegetation Indexes (NDVI), which reveal current green biomass data and can be used to extrapolate or retrodict past land conditions relative to archaeological settlement patterns (Hammer, 2014; Ullah, 2011). These approaches have been critiqued for their assumption that settlement location in the past was driven by a rational logic or adaptive strategy. But they also provide examples of how archaeologists might see beyond "the site" and its social "attributes" (e.g., size, artifact density, built features), and instead define areas of human activity in terms of interconnected socio-ecological grounds and relationships, both in and across specific spaces (see Erickson, 2006).

Other archaeologists have more explicitly sought to use GIS in an effort to build relational epistemologies for environmental analyses (Gillings, 1998, 2012, 2015, in press; Llobera, 1996, 2017). In particular, some have drawn on J.J. Gibson's (1979: 127—138) theory of affordances, which considers how the constraints and attributes of specific environments afford possibilities for action and evocations of meaning, for particular kinds of people at particular times. In applying this approach, these archaeologists seek to understand how environmental features such as stone monuments might accomodate and influence kinds of practices, experiences, and perceptions (Gillings, 2009, 2012; Jonietz and Timpf, 2015; Llobera, 1996; Preston and Wilson, 2014). In this view, the physical environment is not a definable and stable state that precedes human perception (see Gillings, 2012: 606—607; also Chemero, 2003: 182—183; Ingold, 1992; cf. Webster, 1999). Rather it is an assemblage of "relational capacities" (DeLanda, 2013: 66—67) that is constituted in situated interactions between people, things, and the land. Hence, an area with rich soils, sunlight, and water can only become "good farmland" if it is defined and physically produced as such by particular people under particular social and historical circumstances.

Drawing on these advances in archaeological GIS, the objective here is to develop a GIS epistemology to examine the human and non-human interactions that framed political action and social change in the past. Such an objective is consistent with political