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Abstract South American archaeologists use the term *landscape* to analyze a broad range of relationships. Examples include intensive agriculture and political power, myth and place, and climate change and cultural development. Landscape archaeology is necessarily spatial analysis, but scholars work at different scales and use different methods. This essay highlights the influence of geography, anthropology, and new methodologies on four definitions of landscape: ecological habitat, built environment, a stage for performance, and integrating subsistence and settlement. In a number of cases, landscape archaeologists, stakeholders, and researchers from different traditions work at different scales to meaningfully share information, clarify their differences, and compare their analyses and conclusions.

Keywords Landscape · South America · Built environment · Settlement patterns

Introduction

South American landscape archaeology has much to offer American archaeologists, scholars of landscape, and ethnographers of South America. Landscape archaeology has grown rapidly in the past decade, benefiting and suffering from the popularity of the term. On one hand, "landscape" is claimed by a large and growing number of archaeologists (David and Thomas 2008) who connect archaeology to cultural anthropology, history, architecture, geography, and geographic information science (GIS). This diversity makes it difficult to discern common assumptions or goals. In South America, landscape archaeology has a specific set of meanings because of three defining factors. First, indigenous South Americans had complex relationships

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with the places where they lived (as they do today). Social actors such as trees and burial mounds have relationships within several South American societies. A second factor is the disciplinary youth of South American archaeology and the low density of field projects. A multidisciplinary approach to landscape has a strong appeal where basic terms are contentious and limited archaeological data must be combined with historical, ethnohistorical, and ethnographic sources on the one hand, and data from ethnobotany, faunal analysis, and climate studies on the other. Third, the anthropology of South America has deep roots in cultural geography (Denevan 1989, 2001). Particularly as crystallized in the *Handbook of South American Indians*, South American archaeology always has struggled to relate cultural and environmental variation (Steward 1946).

What then is a landscape? Many definitions are in use and little consensus has been attempted or achieved. Patterson (2008) draws seven definitions of landscape from the history of American archaeology; South American archaeologists stay closer to some definitions than others. His explicitly historical perspective demonstrates that although they interact, these definitions derive from distinct philosophical, social, and national traditions. For my purpose, a landscape is the product of interactions between communities of people and nonhuman entities that is geographically defined and historically specific. I focus on four broad definitions, each of which has a meaningful recent history within South American archaeology. These include (1) landscape as an ecological habitat, (2) landscape as the built environment, (3) landscape as a stage for performance, drawing on archaeoastronomy and ethnohistory, and (4) landscape as the integration of subsistence and settlement, emerging from the definition of settlement pattern. Although many projects and authors touch on several different definitions of landscape, I mention only some of these points of overlap. Rather, I take a broad approach that discusses the highlights of these four traditions rather than focusing only on the literature from a single standpoint.

Landscape as an ecological habitat, a natural environment that affects or limits human societies, is an established view in South American archaeology, stemming from cultural geography. South American archaeologists and anthropologists have sought to connect societies to ecological settings for at least 60 years (Lathrap 1970, 1977; Meggers 1954, 1971; Steward 1946; Steward and Faron 1959). Today, archaeologists reexamine how societies altered those ecological settings, creating dialectics between culture and nature, or overturning that distinction entirely.

Studies of the landscape as a built or marked environment have been very productive. Archaeologists analyze agricultural features, geoglyphs, ring ditches, roads, trails, and rock art to study how South Americans inscribed meaning and power and invested labor across the entire continent. The scale of these built environments has been apparent since the 1500s, but their explicit incorporation into archaeological study is more recent. Their study overturns simple distinctions between nature and culture and reveals the magnitude of indigenous achievement.

To see landscapes as stages for performance is a transformative perspective. Building on analyses of pilgrimage and religious centers such as Pachacamac (Figs. 1 and 2), Chavín de Huántar (Fig. 2), and Tiwanaku (Fig. 3), Andeanists use this sense of landscape to ground empirical studies of architecture in a theoretical

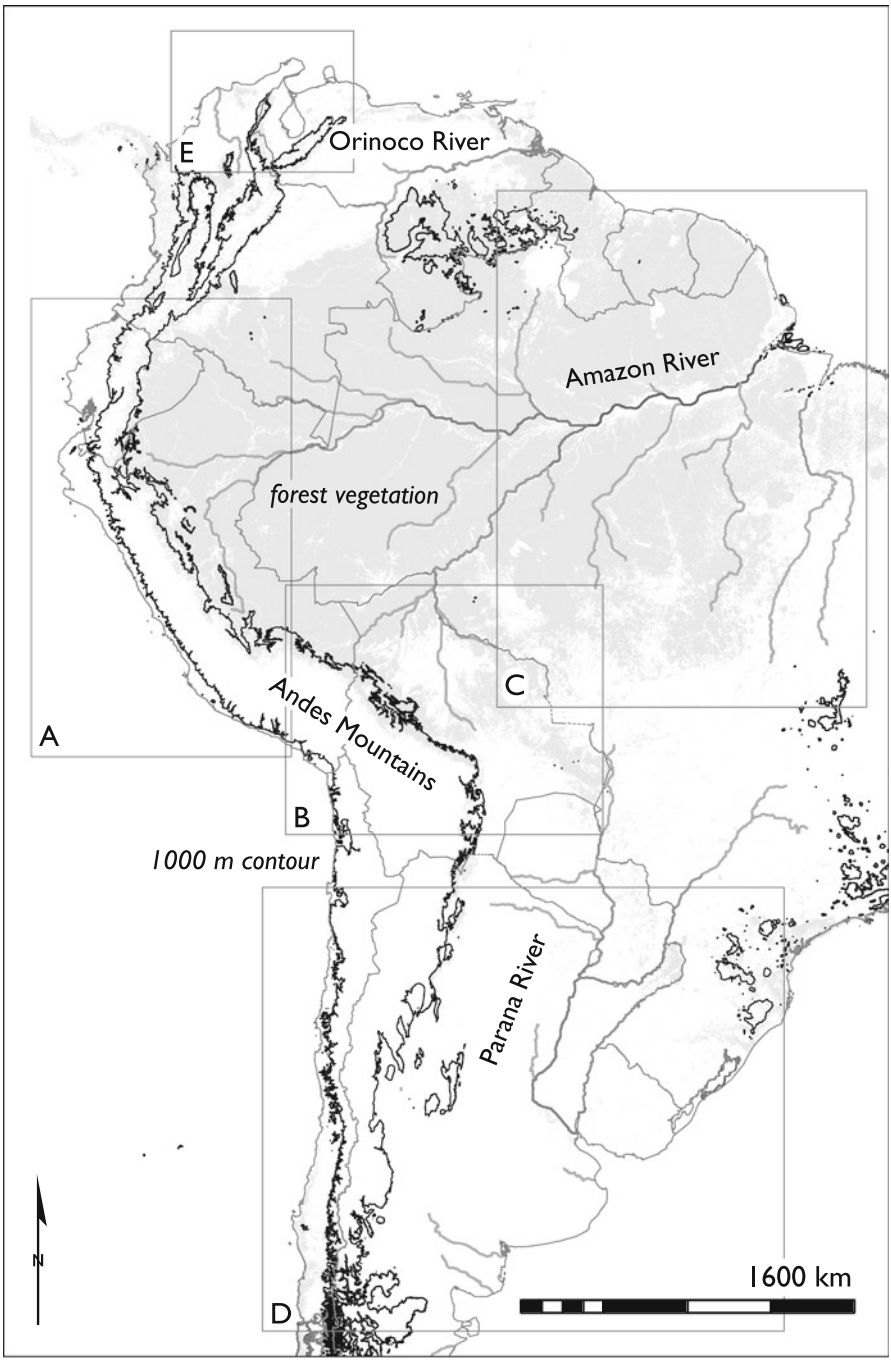

Fig. 1 Map of South America with areas above 1,000 m elevation, forested areas, and modern boundaries

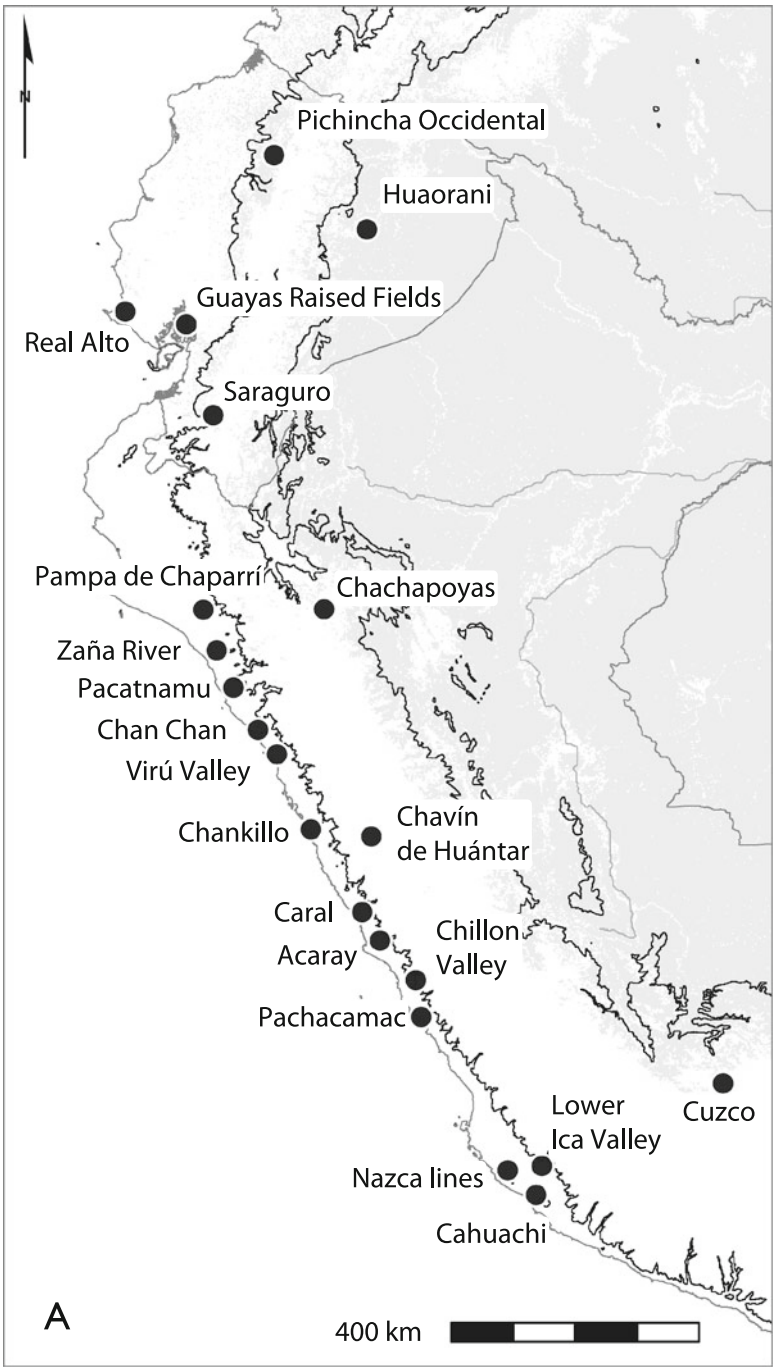

Fig. 2 Area map with locations mentioned in the text in Ecuador and Peru

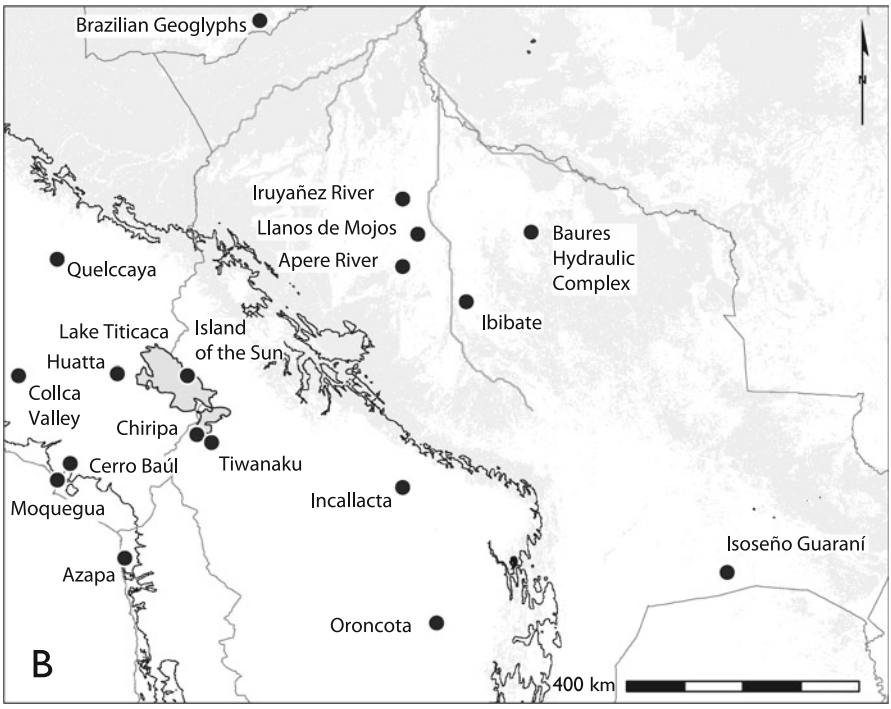

Fig. 3 Area map with locations mentioned in the text in Bolivia and Peru

perspective that integrates archaeology and cultural anthropology. Landscape as a stage is related to the study of archaeoastronomy and worldview. South American archaeologists, archaeoastronomers, and cultural anthropologists have long studied landscape as an Andean way to mediate earth and sky. Drawing on a long tradition of ethnohistoric research, Andeanists have used this perspective to unravel the threads that bind the Inca state to local communities across western South America.

In settlement pattern studies, South American archaeologists have also played a foundational role. Willey (1953) worked in the Virú Valley on the Peruvian coast (Fig. 2) and built an understanding of the large-scale relationship between society and landscape based on sites and the spatial patterns between them. This perspective and the development of associated methodologies continue today, while areas covered by archaeological survey have expanded rapidly in the past decade. A smaller number of South American scholars define landscape as a settlement-subsistence system and question the "site" as a fundamental archaeological unit.

Excellent review articles and chapters chart a number of related and overlapping literatures. They include an incisive review of settlement archaeology from around the world (Kowalewski 2008); comprehensive reviews of household archaeology in the Andes (Nash 2009), the Late Intermediate period in the Andes (Covey 2008), landscape and environment in the central Andes (Contreras 2010), and archaeo-astronomy in the Americas (Aveni 2003); and a seminal essay on landscape archaeology (Anschuetz et al. 2001). GIS in archaeology has been well analyzed in

textbook format (Conolly and Lake 2006), and the use of spatial technology in archaeology has been recently reviewed (McCoy and Ladefoged 2009). A useful handbook on satellite imagery is now available (Parcak 2009). The large and burgeoning literature on landscape in other parts of the world is not covered here (Ashmore and Knapp 1999; Johnson 2007). Together, the recent *Handbook of Landscape Archaeology* (David and Thomas 2008) and *Handbook of South American Archaeology* (Silverman and Isbell 2008) place the studies highlighted here in broader regional and theoretical contexts.

As noted in many recent bibliographic reviews, digital publication of both new and old sources has changed library research. This is reflected in two ways. First, literature from South America is increasingly and more widely available through North American and European libraries and subscription services (although the reverse is too rarely the case). Second, many social science and humanities dissertations with original data are now available at low or no cost. Although my essay is rooted in the North American literature, I have attempted to include both kinds of sources. The text is accompanied by a basic set of maps, and the reader is strongly encouraged to access an interactive satellite map, available from several sources online. Many locations that I discuss can be viewed in considerable detail using public-domain imagery.

I focus my review on sources published between 2000 and 2010, although some earlier publications are included, both for background and to document particularly productive discussions. South America is defined as the continent proper, although some comparative cases from Central America and the Caribbean are cited. I have selected and reviewed sources to make the case that the deepest divisions in landscape archaeology today are reflections of creative tensions within the field. A unified landscape archaeology is neither possible nor desirable, but sustaining landscape archaeologies depend on open communication about practices and goals. I conclude my review by speculating on how landscape archaeology might be expected to change in the near future. The bibliographies mark a narrow path through the literature from which further explorations can be made.

Landscape as a habitat

Many South American archaeologists interpret the environment as a setting or backdrop that affects, limits, or determines cultural forms. In the Andes, where much archaeological research has taken place, the environment is taken as a mosaic of distinct habitats or environmental niches, arranged in a sequence from the Pacific Ocean to the peaks of the Andes and down to the tropical forest (Troll 1966). Cultural achievement is framed as adaptation to difficult or unpredictable environmental conditions, often in an explicitly evolutionary framework (Meggers 1954, 1979). Andean environments have been presented as dynamic, combining volcanism, landslides, earthquakes, and El Niño events. South American cultures were unique because of their adaptation to this distinctive combination of steep topography and tropical climate (Murra 1980). To study the environment was to interpret the conditions that affect or determine the course of social evolution.

Significant trends in ecology are beginning to affect archaeological interpretation, as models of ecological equilibria, representing repeating places in universal cycles, are replaced by the "discordant harmonies" of ecological systems that have meaningful, individual histories (Botkin 1990; Zimmerer 1994). Archaeological studies incorporating environmental reconstructions have multiplied into a variety of forms with divergent understandings of the relationship between environment and society in the pre-Columbian past (Hayashida 2005), many of which mesh with built environment perspectives. Reformulations of archaeology as the long-term study of systemic relationships between societies and the environment improve upon previous interpretations and signal an opportunity for archaeology to make a unique contribution to policy debates over conservation, land tenure, and land use. They focus on smaller scales, and historical ecology is at the center of this effort (Balée 2006; Balée and Erickson 2006; Crumley 1994; Crumley and Marquardt 1990; Hornborg and Crumley 2007).

Climate and geology

Climate data have been central to the debate over Andean economies, particularly how they changed in the third millennium BC on the Peruvian coast and at the end of the first millennium AD in the highlands. On the coast, environmental reconstruction includes several independent lines of evidence. The relationship between environment and society was first analyzed from a landscape perspective in the 1980s (Richardson 1981) as a reflection of the relationship between events outside human control and how societies reacted to them (Moseley 1975). Models of the El Niño/Southern Oscillation (ENSO) phenomenon have improved (Haas and Dillon 2003; Sandweiss and Quilter 2009), and Sandweiss and colleagues have applied these data to the reconstruction of specific landscape histories along the coast, including climatic shifts, resource availability, and the horizontal stratigraphy of beach ridges produced by cycles of strong El Niño events (Sandweiss 1986; Sandweiss et al. 2004, 2009; Sandweiss and Richardson 2008). Based on horizontal stratigraphy of the Moquegua Valley, about 80% of the floodplain is younger than 550 years old (Fig. 2) (Manners et al. 2007). This renders any assumption about the relationship between current and past settlement patterns problematic to say the least. Climatic and environmental change is at the center of debates over resource availability, maritime adaptation, and agricultural systems (Sandweiss and Richardson 2008). Recent research suggests that overexploitation of *algarrobo* forests, and not only climatic changes, led to the collapse of agricultural systems (Beresford-Jones et al. 2009). Across the Andes, indigenous people understand, predict, and react to large-scale patterns in climate (documented through the study of ethnoclimatology) as well as dramatic climatic events (Orlove et al. 2002). Andean peoples were not (and are not) passive victims of environmental disasters but have complex, culturally mediated strategies for living within a constantly changing environment (Dillehay and Kolata 2004). Pre-Columbian climate change, as a long-term and large-scale process, was likewise part of distinctive Andean ways of life rather than an abstract, inflexible parameter defining human adaptation.

For the Amazonian lowlands, Meggers continues to champion a complex line of argument that began in the 1950s, maintaining that the environment did not and could never sustain permanent settlements, that ethnohistoric accounts of large settlement and complex society are unreliable, and that Amazonians did not significantly modify the environment. In recent years, the argument has changed to include the Amazonian refugia hypothesis and the ENSO (Meggers 1994). This argument has revolved around the interpretation of seriation at individual sites (DeBoer et al. 1996, 2001) and settlement patterns along the central Amazon and the Xingu (Fig. 4) (Heckenberger et al. 1999, 2001). Meggers' positions now appear to be those of a determined minority; an emerging consensus incorporates a more dialectic concept of humans and the environment (Balée 2006; Stahl 2004). Arguments based in environmental and geographic determinism remain influential, however, especially outside of anthropology (Diamond 2009; see also McAnany and Yoffee 2010). Indigenous South Americans did (and do) have impressive, encyclopedic knowledge of local environments, climates, and plant and animal populations. The ways in which communities use local knowledge are defined by indigenous priorities and are not easily described by theory that dwells on the largest scales.

Remote sensing

Studies of modern environments using satellite imagery and GIS analysis are of great relevance to landscape archaeology (Brondízio et al. 1994; Brondízio and Siquiera 1997). Such studies proceed at several different scales and move analysis quickly and easily between them. They generate powerful maps and documents and provide context for policy debates at national, departmental, and local levels. In many cases they reveal the extent of landscape modification. As satellite imagery accumulates, greater time depth will show the importance of history, as has already been demonstrated in sub-Saharan Africa, where forest expanded at the expense of savanna (Fairhead and Leach 1996). Near the mouth of the Amazon, remote-sensing analysis, in combination with the local history of landscape modification, shows the tremendous effect a small construction can have on a large area (Raffles and WinklerPrins 2003). The changes to the Río Guariba (Fig. 4) produced by the opening of a channel 2 m wide and 1 m deep alongside a waterfall have widened the river mouth from 25 to 600 m, connecting a seasonal savanna to the tidal flows of the lower Amazon. The availability of remote-sensing imagery through Google Earth and other widely available sources makes this research more accessible to scholars throughout the Americas.

Anthropogenic soils

The line between archaeology and soil science has nearly been erased in a series of studies of Amazonian Dark Earth (ADE), a covering term for a variety of cultural phenomena also called *terra preta do indio*, *terra preta*, and *terra mulata* (Glaser and Woods 2004; Lehmann 2003; Woods 2008). Three recent edited volumes describe these artificial soils, which stretch for kilometers along the main rivers of

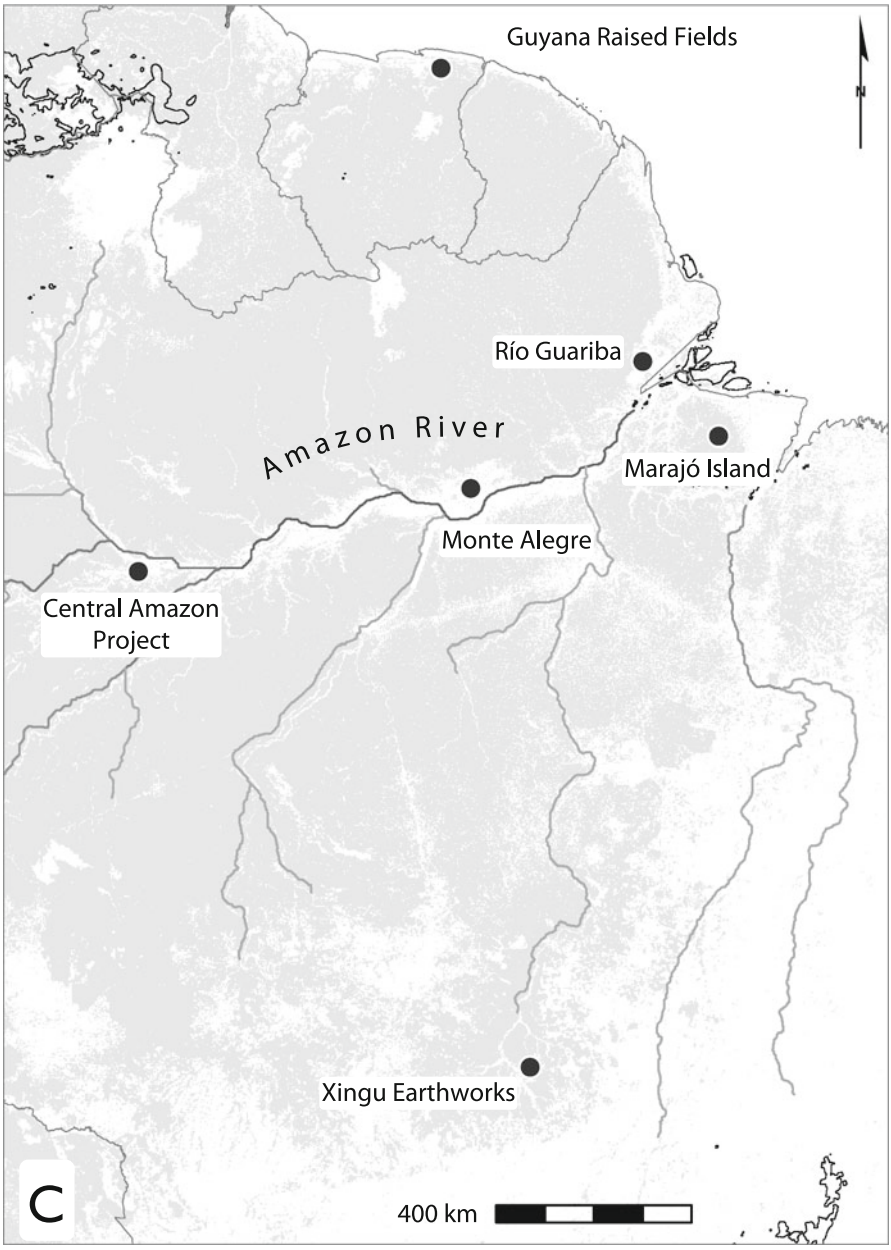

Fig. 4 Area map with locations mentioned in the text in Brazil and the Guyanas

the Amazon; they also are found in the interfluves and along smaller tributaries. To define these soils, which sustained agriculture over long periods of time, requires the archaeological record of habitation and use at those locations. ADE are clearly artificial, and refining their definition addresses questions about whether soils were

engineered for agricultural purposes or were the unintentional products of long-term occupation. ADE studies establish that the main channels of the Amazon were the settings for large, permanent occupations, suggesting that populations throughout the basin were higher than previously thought (McEwan et al. 2001). Today, ADE soils are mined and sold as potting soil in Brazilian cities, selected by farmers for their agricultural properties. To "reverse engineer" such soils would build a direct link between archaeological interpretation and contemporary agricultural alternatives.

Faunal and skeletal studies

Faunal analysis provides a crucial body of data for historical ecology. Recent efforts have included the documentation of fully domesticated species (Miller and Burger 1995) and species that were part of domesticated landscape (Stahl 2005a). Faunal analysis yields evidence of indicator species (and suites of them) that accompany human domestication of the environment (Stahl 2000, 2003, 2005b). Particularly in the lowlands, methods in faunal analysis are advancing, with the appreciation that water screening and filtration are needed to recover fragmentary remains of fish, amphibians, and small mammals (Stahl 1996).

Finally, a landscape perspective has been used in bioarchaeology to study population movements from isotopic analysis of human hair (White et al. 2009). In this case, isotope analysis provides an independent source of data on the question of migration of individuals to Pacatnamu (Fig. 2), a pilgrimage site, or perhaps a political or administrative center on the Pacific Coast. When these methods are applied critically, with careful analysis of the connection between isotope ratios and how diet is connected to cuisine, they combine with archaeological studies to facilitate a much more detailed and nuanced view of plant and animal consumers.

Paleobotany

East of the Andes, the palynological record suggests a long and complex interaction between human societies and vegetation, including the use of palm forests (Iriarte 2006b). Vegetation histories provide evidence for the biogeography of forests and savannas at large and small scales but little consensus regarding parameters of human modification. Slash-and-burn techniques depend on fire but also on metal tools, which in South America postdate contact with Europeans (Denevan 1998; Métraux 1959). Slash-and-burn agriculture is neither an evolutionary holdover from the Stone Age (Holmberg 1950), nor a regression resulting from colonial contact, but a conscious choice that often has political motivations (Rival 2002; Scott 2009; Stearman 1987b). Fire was an important tool for pre-Columbian South Americans, but its role in landscape management is not well studied or agreed on (Pyne 1997, 2001).

Interpretation of the Amazonian environment also turns on the question of how many tree species and how much of the forest was planted, tended, and manipulated by indigenous Amazonians. Balée's earliest estimate of 12 % of the basin covers an area larger than France and Great Britain combined, but even half that figure represents 840,000 km^2 (Balée 1989). Framing tropical forests as gardens or artifacts belies the notion that Amazonians moved through the forest with very little

impact on their environment. Peach palm (*Bactris gasipaes*) domestication is a clear example of why tropical forests must be analyzed as artifacts, much as an earlier generation of archaeologists considered maize cobs as artifacts (Clement 1999a, b). The expansion of pine forests (favored by fire) into the southern Brazilian highlands (Fig. 5) provided pine nuts, a significant and reliable resource, to the economies that underwrote complex societies beginning in the third millennium BC (Iriarte and Behling 2007). Erickson and Balée (2006) combine archaeological and ethnobotanical research at a small scale to demonstrate that pre-Columbian mound-builders constructed landscapes by both building earthworks and planting and tending the forests growing on them. In short, if tropical forests symbolize pristine or untouched nature, this interpretation cannot withstand these studies. That tropical forest grows on pre-Columbian earthworks is a powerful statement about the hybrid of nature and culture in the Amazon, with global implications.

Plant domestication

The use of palynological and micro- and macrobotanical techniques to model plant domestication has grown. Scholars have defined hearths of domestication for a wide variety of plants, as well as the associated social and cultural changes. This line of

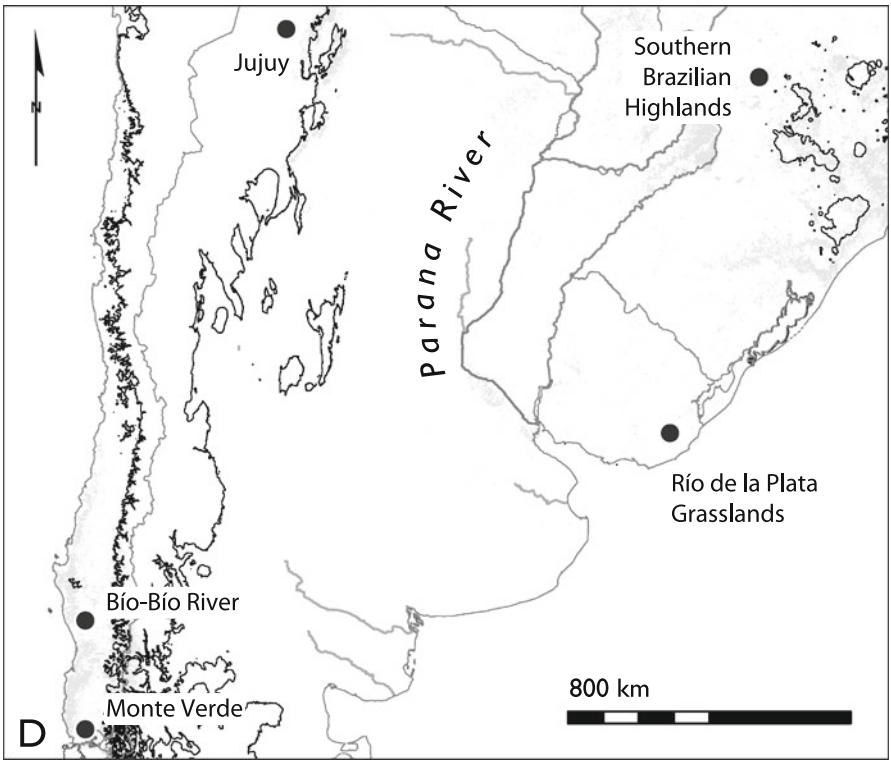

Fig. 5 Area map with locations mentioned in the text in Chile, Argentina, Uruguay, and Brazil

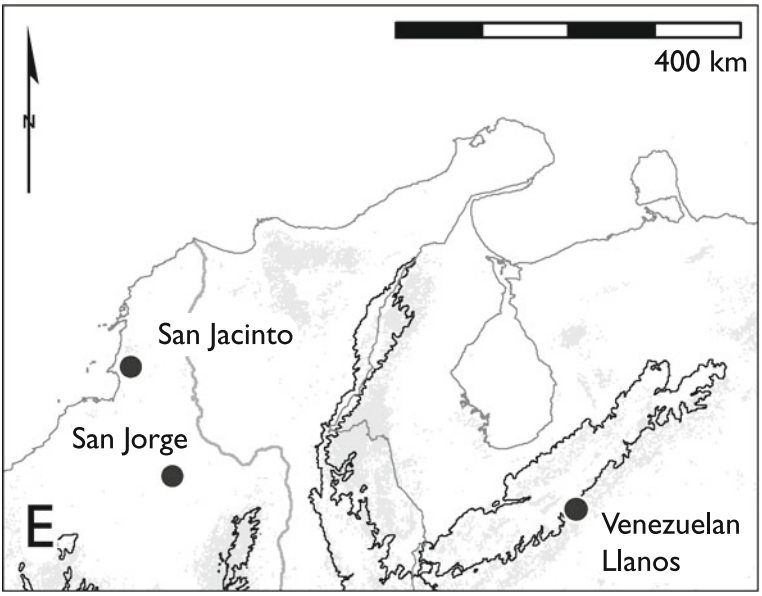

Fig. 6 Area map with locations mentioned in the text in Colombia and Venezuela

argument draws on systems models, such as coevolution (Rindos 1984), to explain the role of maize in the development of agriculture and agricultural societies across the Americas. For South Americanists, maize has proved as controversial as for Mesoamericanists. Its development has been proposed as a watershed in the development of agriculture and sociocultural organization (Roosevelt 1980; Staller et al. 2006).

At issue has been the reinterpretation of data from lowland Ecuador. Staller and Thompson (2002) argue that maize appeared more recently in the Ecuadorian Formative, tied to ritual activity rather than subsistence. Pearsall and her colleagues counter with data from Real Alto (Fig. 2) to defend the antiquity of maize in Ecuador, as well as its importance as a food source (Duncan et al 2009; Pearsall 2002; Pearsall et al. 2004; Pearsall and Piperno 1990; Piperno and Dillehay 2008; Zarrillo et al. 2008). Deboer and Raymond (2006) compiled an ethnological survey of the cultivation of maize by nomadic groups and found that maize is the last plant abandoned before trekking and the first cultivated after choosing sedentism. Rather than a determinant or marker of comprehensive changes in population or social organization, maize is one of a large repertoire of plants used to create a variety of cuisines in different environments.

Deboer and Raymond reinterpret plant domestication, breaking the links binding the constellation of ceramics, sedentism, agriculture, and population. In northwestern South America, for example, fiber-tempered pottery is associated with the earliest sedentary communities, but no link between fiber-tempered pottery and sedentism exists at San Jacinto on the northwest coast of Colombia (Fig. 6) (Oyuela-Caycedo and Bonzani 2005). Fiber-tempered pottery is connected to the

serving of foods at a communal scale, however. If foods served in fiber-tempered pots were part of a formal or ritual setting, even at this early date (5,200-6,000 BP), then the connection between economy and ritual is basic. This ties landscape archaeology to both the interpretation of ceramic assemblages and public architecture and the recent emphasis on feasting as an explanatory process in the development of political and social organization (Bray 2003; Duncan et al. 2009; Iriarte et al. 2008; Klokler 2008; Swenson 2006).

As part of a pan-American debate over alternative paths to the domestication of maize, DeBoer (2003) notes that our models of plant domestication are preoccupied with famine and population pressure, whereas: "…emphasizing the appeal of sweet and fermentable stalks injects desirous human agents into the account, a palliative for the stern 'food crises' and 'population pressures' that haunt our angst-driven prehistories. How charming it would be to have a snack-and-party crowd, hassled by only an occasional aggrandizer or two, at the base of the Neolithic!" DeBoer lays bare the links between modern assumptions and interpretations of even the remote past. Consideration of domestication within specific landscapes makes these assumptions clearer.

Palynological studies now incorporate more trained specialists, comparative collections, and reference materials, particularly for the lowlands (Colinvaux et al. 1999). Techniques permit the analysis of starch grains recovered from both archaeological soils and residues scraped from lithics and ceramics (Chandler-Ezell et al. 2006; Pearsall et al. 2007; Piperno and Dillehay 2008). In addition to providing information on plants otherwise difficult to document (such as manioc and other root crops), these breakthroughs provide direct evidence of pre-Columbian cuisines.

Starch grains can be used to identify plant remains to genus (and in some cases to species level) and also to define suites of utilized plants directly from the remains preserved on ceramics and other food-processing tools. A recent study from preceramic coastal Peru (Chillon Valley, Fig. 2) analyzes squash and gourd containers (Duncan et al. 2009). Interpreting these data in relationship to landscape means that paleoenvironmental reconstruction can be linked to histories of agriculture and cuisine. The consideration of food and landscape together in a "provisioning spreadsheet" (Terrell et al. 2003) model is a continuation of ecological understanding of humans and other species in systemic relationships. Starch grains taken from teeth in the Ñanchoc Valley provide direct evidence for "predomestication cultivation" by about 6,600 BC (Piperno and Dillehay 2008). Even at this early date, these ways of life are linked to modification of the landscape.

Landscape domestication: Toward built environment

Landscape archaeologists contribute to debates about the origins of agriculture by redefining domestication, pulling research away from attributes of individual plants or animals to how landscape morphology reflects human manipulation. Spatial analysis of vegetation, movement of animals, and the manipulation of fire, soil, and water to create and control patterns leads to the consideration of the domestication

of the landscape rather than just the plants and animals found in it. Denevan's (2001) review of the geography of plant domestication in South America demonstrates that artificial selection of plants and the investment of labor in the landscape must be considered together rather than as a two-step process (see also Steward 1930). The transition to agriculture in the New World, and in South America in particular, is now understood as having several loci of domestication for a variety of important plants: grasses, tubers, fruits, trees, and industrial plants (Piperno and Pearsall 1998). It now appears that domestication took place about as early in the New World as in the Old World (Denham et al. 2007; Pearsall 2009). That many domesticates originated east of the Andes forces reconsideration of contact and movement of people and crop plants across the continent, perhaps more than 14,000 years ago. The earliest documented inhabitants of South America at Monte Verde (Fig. 5) used a variety of plants and animals, which reinforces both the dating of that site and its interpretation as an economy distinct from that of North American Clovis peoples (Dillehay 1989). Identification of nine seaweed species, as well as terrestrial plants from different microenvironments, confirms that the inhabitants of Monte Verde had a sophisticated understanding of the properties and value of many plants and ecological niches (Dillehay et al. 2008).

The record of plant and animal domestication continues to be extended back in time, and it is being profitably reconsidered in relation to geographic factors as the "domestication of the landscape"—a perspective that sprouted decades ago (Sauer 1952). Using a spatial perspective, ethnographic and ethnoarchaeological studies of hunter-gatherers and part-time farmers allow this process to be documented in detail (Politis 1996, 2007; Stearman 1987b). Human communities domesticate the landscape by changing the geographic distribution of plants and animals, not only by planting or taming them but also by controlling fire and water to make them more easily available in specific locations. Groves of peach palms, stands of chocolate trees, and abandoned fields that attract prey animals all result from human intention (Clement et al. 2009). When and where landscape domestication takes place, the spatial pattern and natural history of plants and animals are heavily modified, even when genotype and morphology do not change measurably.

Landscape archaeologists understand the environment as a dynamic relationship between human communities, plants, animals, soils, climate, and topography. Although this idea has long been considered, recent studies illustrate that as the category of "environment" is analyzed, rather than taken as a constant or even as an independent variable, then the connection between pre-Columbian South Americans and contemporary South America becomes much clearer. Habitats throughout the continent were shaped through interaction with long histories of human occupation.

Landscape as built or marked environment

When an Andean farmer irrigates a raised field but keeps her *huaca* in view, or an Amazonian trader paddles downriver past the "village of the birds," the landscape manifests a relationship between individual and group. Built environment studies draw landscape archaeology into a deep collaborative relationship with cultural

anthropology (Basso 1996). The Huarochirí manuscript, a colonial testimony on Andean religion, is suffused with examples of shared religious meaning that reside in specific landscape features (Salomon and Urioste 1991). Connections also have been found in the lowlands between trees that are ancestors or records of historical events, and people who invest and recall those meanings (Rival 1993, 2006, 2007; Rival and McKey 2008). Paleobotanical records of Amazonian forests, at large and small scales, describe a history of plant communities through time. If, as asserted by historical ecologists, pre-Columbian peoples significantly modified Amazonian forests (Balée 1989), and specific groves, forest islands, or patterns also can be associated with particular uses, then maps of botanical data can be overlaid on maps of modern toponyms and ethnobotanical terms to connect built environments to history and myth.

Built environments also are analyzed as investments of labor. Interpretations range widely from the remains of state-driven political economies to analyses of animal domestication. If landscapes are investments of labor and meaning, then roads, agricultural fields, and isolated finds are central rather than negatively defined off-site features. "Built environment" emphasizes the relationship between what societies construct and how those constructions affect societies. The term is often applied to how architecture crystallizes daily practice: "we shape our buildings, and afterwards our buildings shape us" (from a speech by Churchill in 1943; Lawrence and Low 1990; Rapoport 1990). Agricultural infrastructure is well known and long studied in the Andes, which take their name from pre-Columbian terraces or *andenes*. The built-environment perspective revitalized debates about social and political organization, and the connection between political centralization and intensive agriculture. Built environment also has been useful in the analysis of features seemingly unrelated to production, like the Nazca lines. A powerful connection to ethnography lies in descriptions of how South Americans inscribe meaning in less obviously constructed features of the landscape: paths, trails, mountain peaks, and trees.

This "marked environment" reflects a smaller investment of labor but no less an investment of meaning. Rock art, trails, and paths all mark the environment; even in the absence of physical markers, mapped landscapes of movement are repositories of history, moral teachings, and political power (Snead et al. 2009).

Altiplano

In the 1980s, several archaeologists and anthropologists documented the scale of the built environment in the Altiplano, concluding that raised fields covered approximately 1,200 km^2 on the margins of Lake Titicaca (Bandy 2006; Erickson 2000a; Kolata 1996). Agreement on the importance of this phenomenon gave way to disagreements about societies that built and maintained this infrastructure. Analysis of the Lake Titicaca Basin became an argument between top-down and bottom-up organization of raised field agriculture, although this conversation may be completing its course. Erickson's bottom-up interpretation is rooted in a long-term ethnographic and archaeological project in Huatta, Peru (Fig. 3), on the northern end of the lake, highlighting the organizational ability and local knowledge of small

groups of Altiplano farmers (Erickson 2006). That raised field landscapes were within the ability of local communities to construct is now a consensus position. Erickson sees the rise of the Tiwanaku political and economic organization as a shorter-lived phenomenon built on top of a long-lasting foundation of intensive farming and interlocking uses of the landscape by small communities. He argues that the agricultural landscapes in the Titicaca Basin are fully as monumental as any temple or pyramid. In Erickson's interpretation, Titicaca farmers invested labor to construct landscapes and institutions that helped them cope with both wet and dry years. Raised fields are found in lake margin wetlands, and as the water rose and fell and some fields were flooded or were left too dry to farm, other areas became workable (Orlove et al. 2002).

From the top down, Kolata and Janusek make their primary task to interpret the effect of the Tiwanaku state on the surrounding countryside (Janusek 2004; Kolata 1982, 1986; Kolata et al. 2000). Raised fields are associated with a period of intensification chronologically linked to monumental construction and urbanism at Tiwanaku and the development of the state. In this interpretation, based on a large program of survey and excavation along the southern (Bolivian) end of the lake, the Tiwanaku state created landscapes of widespread raised-field agriculture to support its political power. When environmental conditions changed, making raised fields unproductive, this led rapidly to the decline and fall of the state. Environmental reconstructions based on the Quelccaya glacier (Fig. 3) are interpreted to indicate the parameters of successful raised-field agriculture (Kolata and Ortloff 1996). Changes in annual precipitation around AD 1000 made raised-field agriculture untenable, undercutting the economic foundations of Tiwanaku. From this top-down approach, analysis of the relationship between climatic changes and the built environment is the key to understanding the collapse of the state.

Despite occasionally heated rhetoric, the two perspectives share common ground regarding the size and scale of the modification of the lakeshore, as well as the productivity of raised-field agriculture. Both agree that communities did not require the direction of the state to build and farm raised fields. The dialogue reflects different goals and a different understanding of the relationship between humans and the environment. In the bottom-up view, the built environment is a product of local knowledge of plants, animals, climate, and social arrangements, accumulating over centuries. In the top-down view, it is a product of large-scale state organization that directs modifications of the environment for the benefit of a set of translocal political and economic institutions. The question is not whether the state is required to explain the presence of raised-field agriculture but whether the state did in fact direct the construction of raised fields. Reconstructing the history of political economy in the Titicaca Basin does not preclude other avenues of investigation within this landscape.

Bandy (2006) has filled in much of the regional map of settlement pattern around Lake Titicaca. He argues that the productivity of raised fields, based on preliminary data, has been overstated. The impact of nematodes—soil parasites particularly harmful to potatoes—is a significant corrective factor. Raised fields were remarkable not for high yields but for how they allowed agricultural intensification (such as that directed by the state) to coexist with non-raised-field subsistence agriculture. Reaffirming Boserup's analysis of agricultural change, he argues that

raised fields are important, not because they allow farmers to escape Boserupian choices between labor and land (Stone and Downum 1999), but because they lengthen the growing season, which allowed the Tiwanaku state to finance its activities without disrupting local production. Bandy argues that the modern failures of raised-field reconstructions in the 1980s and 1990s reflect the limits of pre-Columbian systems. These failures are well documented (Swartley 2002), but the political, social, and economic contexts of the late 20th century differ sufficiently from the first millennium that this conclusion must be provisional. For example, nematodes were a significant potato pest, but they may have been managed by intentional flooding. More long-term experimental and agronomic research is needed along with of analysis of sociopolitical organization. Agricultural choices by individuals and groups always include political and cultural dimensions; they are never straightforward calculations (Scott 2009).

Beyond the Andes

Raised fields are found throughout the continent in dense concentrations in the Sinú Valley in Colombia, the coastal plains of the Guyanas, and the Llanos de Mojos in Bolivia (see Denevan 2001). Although none have seen the same kinds of interpretive discussions as in the Altiplano, these all have been better documented in recent years. The Mojos landscapes, which were first documented in the 1960s, are spread over an area much larger than the Titicaca Basin (Fig. 3), approximately the same size as the Yucatán Peninsula or Syria. At least six distinct kinds of pre-Columbian agricultural landscapes (including raised fields and other earthworks) make up this area (Walker 2008b). Mixed savanna and forest vegetation makes these fields more difficult to record with satellite images and aerial photographs. In several cases, raised fields and ring ditches have been found under "primary growth" forest, suggesting that they may be even more widespread. Fields date to at least 1 AD, and research has yet to focus on the origins of raised-field agriculture. Along the Iruyañez River in north-central Mojos, raised fields are associated with two settlements that date between the 5th-6th century AD and the 13th-15th century (Fig. 3) (Walker 2004). Supporting a population roughly 100 times that of today, these farmers probably abandoned their fields following the demographic disasters associated with European contact, as well as the spread of metal tools.

East of the Mamoré River is a series of ring ditches, long causeways, and zigzag causeways that define the Baures Hydraulic Complex, another distinctive landscape (Fig. 3) (Erickson 2000b). Harnessing the cycle of inundation and drought, these causeways may have created a set of artificial fisheries, as well as facilitated communication and transport across the savanna. Ring ditches are widespread throughout the large forested islands of the area (Erickson 2010; Prümers et al. 2006). The Arawak-speaking Baure are associated with this part of Mojos in ethnohistorical sources. The construction of a fishery covering 525 km^2 is significant, not only for its scale but as an entirely different form of economic intensification not directly related to cultivation of plants.

An area of closely packed fields, punctuated by causeways and mounds, represents another distinct landscape type on the Apere River in central Mojos.

Causeways were used there not to impound water but to limit and define areas in the transitional zones between higher river levees and lower backslopes (Erickson and Walker 2009). These earthworks are distinct in form and complexity from those in other areas (Walker 2011). The same theoretical questions can be raised about the relationship between society, agriculture, intensification, and landscape in Mojos as the Altiplano, but in a different context. Relationships between farmers in the highlands and lowlands, as well as between these distinct landscapes, are glaring and understudied questions.

Associations between raised fields and Arawak-speaking groups have drawn comment from two different perspectives (Hill and Santos-Granero 2002; see also Denevan 1966; Lathrap 1970). Heckenberger sees earthworks as a signature of Arawak-speaking peoples who migrated along the main channels of the Amazon (Heckenberger 2002, 2005). Raised fields and associated earthworks represent a transformational historical event that took place throughout lowland South America, connecting Arawak ethnic identity with a constellation of political authority, large villages, and an ideology combining ideas of power and the body. In the second perspective, Arawak ethnicity is more flexible and associated with earthworks as part of a continental system of trade and interaction (Hornborg 2005). In this view, Arawak is more of a *lingua franca*, making possible interaction between people speaking a variety of languages. Political and economic histories of lowland societies will have to be investigated in much more detail and then compared with and related to developments in neighboring areas, such as the Southern Cone and the Andes.

Raised fields in other regions are increasingly well documented. In the Guayas Basin, Ecuador (Fig. 2) (Delgado 2002), San Jorge, Colombia, and Venezuela (Fig. 6) (Redmond and Spencer 2007; Rostain 2008, 2010), research continues in areas where raised fields were documented in the 1960s. In the Guyanas, the lifetime of work by Williams (1997, 2003) has been published posthumously. Raised fields, associated with Arawak speakers, are found in the wetlands on the backslopes of coastal dunes. Earthworks are found in French Guiana, associated there with Barrancoid and Arauquinoid peoples (Rostain 2008).

Raised fields have recently been mapped in an entirely new area on the Bío-Bío River in central Chile (Fig. 5) (Dillehay 2007; Dillehay et al. 2007). This region is well known for the determined and effective resistance of Araucanian peoples to Inca, Spanish, and Chilean rule, lasting into the 1890s. The presence of agricultural infrastructure adds another layer of complexity to how nearby Araucanians (including the Mapuche) related to earthworks as social beings. It also suggests a relationship between systems of agricultural intensification and the ability of communities to resist incorporation into the state. Raised fields are likely to go unnoticed unless they are actively sought out. Particularly under thick vegetation, earthworks are very difficult to recognize. Modification of the environment, in the form of irrigation canals, predates the establishment of domesticated plants as important food sources in the Zaña Valley in Peru (Fig. 2) (Dillehay et al. 2005). Isolated examples of earthworks and entire built environments likely remain to be documented in both the highlands and the lowlands. The long and rich history of studying terraced agriculture in the Andes is highlighted below.

Marked environments

Agricultural landscapes occupy South American archaeologists, but the Nazca lines may resonate more strongly with a wider audience (Fig. 2) (Curry 2009). Of a range of interpretations, the Nazca lines have been seen as markers of celestial alignments, although Aveni (1990, 2000, 2003) has shown that astronomical explanations may be overdrawn. In a parallel to Erickson's raised-field construction experiments, Aveni shows that the lines can be constructed by a small number of people and that an essentially infinite number of alignments are possible. Function is more tightly connected to the junctions that spatially organize many of the straight lines (as opposed to zoomorphic forms and trapezoidal shapes). Johnson proposes a provocative link between the end points of many lines and underground water sources (Johnson et al. 2002), indicating that the Nazca marked important terrestrial locations. Silverman's (1993) research at Cahuachi links the Nazca lines to the nearby pyramids and settlement (Fig. 2). She argues that Cahuachi was a sacred location and the settlement was built by the annual pilgrimages of many different groups of people. The stronger interpretation of the lines is as pathways for movements of people.

A powerful approach to comparing these viewpoints is the comprehensive mapping of the lines by a multidisciplinary, international project (Lambers 2004). This project combines the careful mapping of all the geoglyphs in painstaking detail through aerial photogrammetry at a level of precision impossible in a ground survey, except at a very high cost. All geoglyphs will be mapped such that comprehensive statements about their characteristics can be made: orientation, connections to water features, and connections to archaeologically known and dated settlement.

The line builders were investing less labor per unit area in the landscape than terrace builders or raised-field builders, but they certainly invested as much meaning in the landscape. Similar geoglyphs are well known from different parts of the coast and the highlands. Briones (2006) has mapped geoglyphs in northern Chile at Azapa (Fig. 3), and it seems likely that more examples will be forthcoming as these features enter the consciousness of more fieldworkers.

Rock art

The study of rock art has a long tenure in South American archaeology. Recent studies locate representations of animals not only within the landscape, as marked points, but as indicators of the process of domestication among pastoral peoples. The presentation of camelids in rock art shows a significant difference between shorter- and longer-legged representations, which may map onto domesticated and wild forms (Gallardo and Yacobaccio 2005). Although rock art is best documented in northwestern Argentina and the southern periphery of the Andean world, it has been studied elsewhere in South America as well (Carden 2007; Clarkson 1999; Hernández Llosas 2006; Nieves 2007; Roosevelt 1999; Troncoso Meléndez 2004). Roosevelt's study connects rock art to early evidence of occupation in the Amazon Basin (Fig. 4), and a recent study has connected rock art at Monte Alegre to specific celestial events (Davis 2009).

Although it is difficult to date, rock art links human activity clearly to a particular location—a strong link in space. Toponyms are not as precisely linked, but toponymy also holds great promise for landscape archaeologists. A fruitful alliance with linguistic anthropology and the revival of historical linguistics also could be founded on the study of toponyms (Epps 2009; Heggarty and Beresford-Jones 2010). This gives field archaeologists and local stakeholders common ground as they negotiate the everyday concerns of archaeological practice. Linguistic terms for trees are another avenue by which landscape and language can be linked (Balée and Badie 2009).

Classifying different kinds of built environments, from dense raised-field landscapes, to bundles of lines crossing the landscapes, to patterns of isolated pieces of rock art (analogous to areas, lines, and points [see Patterson 2008]), does not demonstrate a connection between the intensity of landscape construction and the amount of meaning invested in living in that same landscape, or the position of a society on an evolutionary scale. By the 1930s, Steward had already pointed out that communities with gathering and hunting economies were modifying and maintaining aspects of their environment (Clemmer 2009; Steward 1930). The example of Paiute people irrigating plants in the absence of domesticated plants (perhaps paralleled by the Ñanchoc example) is an object lesson that manipulation of the environment is not the exclusive province of modern industrial societies or of premodern, agricultural societies.

Landscape archaeology has made great strides in documenting built environments across South America. These demonstrations of the effects of human activity on environments usually considered "natural" are achievements that open a new field of inquiry. The next step (which many archaeologists are already taking) is to understand how the built environment conditioned culture or behavior. As with buildings, so with the environment: pre-Columbian communities built their landscapes and their landscapes built them.

Landscape as cosmos and stage

In the institutions where archaeologists work, a gulf has been fixed between the study of the physical world and the supernatural. Cartesian divisions between mind and body, form and substance, and nature and culture both support and are supported by this division of labor. Because cosmology seems to be attached to specific places, in indigenous South America this gulf is not so wide. For example, the newly translated ethnoarchaeology of the Nukak (Politis 2007) contains an anecdote in which digging a hole runs the risk of breaking through into the underworld, located only a meter or two below the surface. If South Americans move (and perhaps moved) between different worlds so easily during everyday life, then landscape archaeologists should discuss and analyze the link between the terrestrial world on which people walk and the celestial world that turns overhead, and how people move in and between those worlds.

Since the mid-20th century, Zuidema (1985, 1990) has interpreted Inca calendrics as a link between kinship, politics, and spatial organization. The Inca

state used *ceque* lines in the 15th century AD to connect and organize *huacas* near Cuzco, places invested with centuries of meaning (Fig. 2). These ideas are reflected in the way Spanish-speaking chroniclers described indigenous places, people, and history. *Huacas* can be impressive buildings but also mountain peaks, large rocks, or springs. Their meanings can be shared across wide areas, but they always have important local meanings as well. Zuidema's structuralist model is rooted in the interpretation of ethnohistoric materials, documenting how Inca religion pulled meaning from mountain peaks and the sky overhead. This model is a top-down understanding of Inca spatial organization, in that Inca principles redefined holy places across much of the Andes. Independently, Aveni (1990, 2003) relates "naked eye" astronomy with cultural context and demystifies archaeoastronomy, confirming that the Inca were accomplished observers of the night sky. Sherbondy (1993, 1996) takes Zuidema's model to interpret spatial patterns of agricultural land. Archaeological survey complements ethnohistoric analysis, and in the 1990s, Bauer and Dearborn surveyed the Cuzco Valley to find evidence for the *huacas* associated with the *ceque* system, through pedestrian survey and test excavation (Bauer 1990, 1992, 1996, 1997, 1998, 2004, 2007; Bauer and Dearborn 1995). The places that can be surveyed and identified with particular *huacas* are not located along the straight lines identified by the ethnohistoric sources. The two sources of information can be used together (Aveni 2003), and although this question remains open, what written sources refer to as *ceque* lines connected *huacas* with points on the horizon, even when the places do not lie in a straight line. Practices of dwelling in the landscape need not conflict with ideals of how the landscape was organized, and the ideal does not determine the layout of *huacas* according to astronomical sight lines.

A related study was set on the Island of the Sun in Lake Titicaca, strongly linked to Inca imperial ideology (Fig. 3). Its location outside the sacred valley and the center of the empire links Inca origins to the lake and to the Altiplano to the south. The island's settlement history predates Inca occupation and reinterpretation (Stanish and Bauer 2004). The island also is covered with terraces, an almost complete translation of the island from a "natural" to "cultural" place, through the ascription and investment of meaning and the investment of labor in durable agricultural infrastructure. As previously mentioned, Erickson illustrates the difference between a site-based and a landscape-based methodology with this example (Erickson 2006).

The much earlier center of Chankillo (4th century BC) on the coast has been interpreted in part as a celestial observatory (Fig. 2) because of sight lines to the 13 towers east of the fortress (Ghezzi 2006; Ghezzi and Ruggles 2006, 2007). These towers, the fortress, and a building located between them form a calendrical device, a connection to the celestial world. This building may have been where participants walked from a visually restricted enclosure to suddenly witness the sunrise over one of the towers. This interpretation links colonial and ethnohistoric evidence of naked-eye astronomy to pre-Columbian architecture and site plans. Chankillo also is a central piece of evidence in the interpretation of early warfare. If the fortress overlooked this celestial observatory, then one of its functions may have been to defend it, whatever the nature of Andean warfare at that time.

In the sierra, Williams and Nash (2006) interpret the summit of Cerro Baúl (Fig. 3) as an *apu*, or mountain spirit within a community of sacred mountain peaks; they link it to surrounding *apus* and the faraway communities that also can see them. Cerro Baúl is thereby linked to locations that symbolized ethnic identity. Through sight lines (analyzed through GIS analysis combined with field observation), the high ground that the Wari occupied connected the Moquegua Valley to a larger-scale system and to a longer history. The areas from which these peaks can be viewed (their "viewsheds") provide an avenue for understanding the spatial dimensions of local and regional religious practice.

East and west of the Andes, other landscapes have been interpreted as expressions of celestial knowledge. Geoglyphs on the Pampa Colorado, associated with the Nazca, have in the past been interpreted as manifestations of Nazca beliefs connected to astronomical events (Curry 2009). Recent descriptions of the geometrically precise "geoglyphs" of western Brazil raise the possibility of an astronomical interpretation and suggest that more examples are forthcoming (Pärsinnen et al. 2009). However, Aveni (1990) argued decisively that with a nearly infinite number of possible correlations, the burden of proof that particular orientations were meaningful is very high.

Links between kinship, space, and settlement also are important outside the Andes. For example, the Isoseño Guaraní of southeastern Bolivia (Fig. 3) orient themselves along a meandering, lowland river, a geographic feature not used in the highlands (Ortiz et al. 2008). Living along the Parapetí River, Guaraní speakers draw mythological meaning from particular locations, as well as the two sides of the river, each of which stands for different worlds within Isoseño cosmology. These specific consequences of the communal understanding of spatial organization for village layout, subsistence activities, and interpretation of space in the present day provide a rich source of analogy for archaeologists (Hill and Santos-Granero 2002).

The connection between celestial objects and events on the one hand and terrestrial landscapes on the other seems to have been commemorated and inscribed by a variety of communities in South America, as in other parts of the Americas. These connections are accessible when the landscape is viewed as infused with meaning. They can become part of living history when people enact meanings on the landscape as actors on a stage.

When the landscape is a stage for performance, archaeologists stumble into conversation with a broad range of disciplines, especially in the humanities: history and ethnohistory, even semiotics, literature, and theater. The tie between archaeology and cultural anthropology is particularly strong here. In pre-Columbian societies, the role of public places in corporate life makes the analysis of performance and stagecraft necessary, both indoors and outdoors. The landmark film "In the Footsteps of Taytacha" demonstrates how modern peoples use not only churches for religious rituals but glaciers, mountainsides, and trails to express and reinforce local and translocal identities (Getzels and Gordon 1985). Landscape is a stage when pilgrims to Qollur Riti, having come from throughout the southern Andes, travel up the mountain and create a gigantic, whirling pattern of color and sound, moving across a high mountain vale. Recent studies there have tremendous

promise for reinterpreting the role of ritual in pre-Columbian South America and across the Americas.

To see landscape as stage foregrounds indigenous ritual practice, including the agency of nonhuman elements of the landscape. Burial mounds (or *kuel*) are cultural actors, not passive settings, in recent studies in Araucania (Dillehay 2007). Dillehay and his interlocutors interpret decades of work in Chile to create a close reading of people using mounds and mounds using people for their own ends. Dillehay effectively integrates cultural anthropology and archaeology. Ethnographic data, including transcripts of ritual singing and placations of the *kuel*, are juxtaposed with archaeological data, not only through analogy but through relationships between people and specific *kuel*, which also are (from a separate perspective) archaeological sites. Archaeologists enter these worlds precisely through archaeological practice. Working in relationship with indigenous communities, petitioning the mounds for permission, archaeologists act within rituals that relate archaeological practice to indigenous belief.

Dillehay analyzes *kuel* both as independent actors and within relationships between Araucanian communities and the Inca, colonial, and Chilean states. The landscape was used to create and defend Araucanian identity in a particular historical context. Indigenous peoples in Araucania resisted state incorporation from the 14th through the 19th century, and these landscapes are related to nonstate spaces in other contexts (see also Scott 2009).

In a separate project, Moore presents a synthetic view of Andean landscapes as stages, building a strong link between the perception of sound and light, the logistics of daily life and ritual, and pre-Columbian architecture (Moore 1996, 2004, 2006; see also Conklin 1990). Including both ethnographic analogies and experimental studies, Moore classifies private and public architecture in the sierra and on the coast, connecting it to ritual activities that could have taken place within them. Some ritual spaces accommodate only a handful of participants while others permit hundreds. Moore traces three distinctive trajectories between the Andes and the coast. Differences in ritual practice relate to how religious and political leadership was constructed, supported, and dismantled. This method, which focuses on quantifiable and verifiable connections between the archaeological record and specific practices, has tremendous potential; it should certainly be applied more widely.

Moore's results suggest significant contrasts between coastal and highland religious traditions in the Andes, including the earliest examples of public architecture: U-shaped temples on the North coast of Peru. Moore applies proxemics to study how vision and hearing work at different spatial scales. This refines the analysis of regional traditions that can be seen in public architecture and accesses religious practice by "reading" the landscape. In a similar vein, Dillehay connects individual households with segmented ritual spaces to understand changes during the Late Intermediate period in the Zaña Valley in coastal Peru (Dillehay 2004).

Andean archaeologists have long thought of individual sites, temples, and pyramids as stages for ritual performances. Architectural details such as the tunnels at Chavín, archaeological evidence of pilgrimage from across the Andes at Pachacamac, and the relationship between the sacred valley and Cuzco suggested a

necessary relationship between public architecture and public ritual. Similarly, in the Amazonian lowlands the center of the village is swept clean, maintained as a symbolically charged location for many rituals (Heckenberger 2005). Linear features such as roads, *ceque* lines, and geoglyphs also have been interpreted as the settings for processions and ritual movement, both in the highlands and the lowlands.

Archaeologists have studied stagecraft at several sites and in the context of several theoretical issues in recent years. The site center at Tiwanaku has been reinterpreted according to at least two perspectives (Isbell and Vranich 2004; Yaeger and Bejarano 2004). The symbolic power of the Akapana pyramid and nearby sunken court was adopted and changed by the Inca, who recognized the power of this place. Vranich (2006) highlights the mechanisms by which these buildings channeled the movements of pilgrims to the site and channeled the thoughts of those pilgrims moving through the architecture, experiencing different vistas and perhaps different soundscapes as well.

In addition to more conventional excavation techniques, Vranich and colleagues painstakingly reconstructed architecture to better understand how ritual took place. The Pumapunku and the Akapana are parts of a complicated whole, designed to produce a series of effects in the minds of religious pilgrims, guiding them through a series of places, views, and experiences. As with the Inca and Chankillo examples, the method employed was to control the "viewshed" of the participants as they moved, culminating in moments when the vista changed dramatically. At Tiwanaku, the visibility of mountain peaks (and carved stone monuments like the Bennett and Ponce monoliths) was controlled to link Tiwanaku the place to such powerful entities. Recent disputes show that this question is still important today, with different stakeholders and groups contesting claims about monoliths and patrimony (Scarborough 2008, pp. 1089–1101).

Chavín de Huántar has long been framed as a religious theater, with elements of architecture and stone monuments illustrating the importance of hallucinogenic drugs. Chavín as an art style or "horizon" is significant because the art style is visible both on the coast and in the highlands. At Chavín, Rick (2004) and colleagues mapped the interior of the Old Temple, showing how tunnels, carved stone monuments, and conduits for water and light created an intense "multimedia" experience. Contreras (2009) used GIS to relate the site to the complex topography and ecology of the surrounding mountains. The temple derived its symbolic power from the production of individual experiences through group ritual combined with the controlled use of potent hallucinogens. The galleries generated a religious experience through sound, confinement, and sudden confrontation with the divine, as represented by the Lanzón at the center of the Old Temple. Whatever the specific messages, they were powerfully recalled by the use of ceramics or textiles that graphically referenced ritual experiences. Understanding how the tunnels were built and maintained reveals that the construction and use of elaborate ritual places by South Americans dates back at least 1,800 years. Chavín clearly exemplifies a tradition in which a limited number of people participate in ritual at any one moment.

Through analysis of architecture and public ritual at Chiripa (Fig. 3), Hastorf (2003) also draws on Moore's perspective to reinterpret Titicaca Basin archaeology. As architectural forms took on the form of a subterranean court, rituals and attendant institutions took on the form that would support later Middle Horizon civilization. This analysis interprets the uses to which architecture can be put and the experience of individuals relating those rituals and experiences to the spread of ideas around Lake Titicaca. Chiripa was a historical pivot, as Andean peoples tried out new ways to make a living, organize community life, and share religious and cosmological ideas.

Recovery and analysis of remains of large-scale production and use of *chicha* (or corn beer) at the mountaintop of Cerro Baúl confirm that this place was commemorated and used for several interlocking purposes (Moseley et al. 2005; Williams and Nash 2004). Evidence takes the form of massive jars for fermentation as well as a suite of vessel forms associated with serving and consumption. The brewery was ritually terminated around AD 800, when the vessels were smashed and the building destroyed by fire. The architectural complex is associated with an institution of "chosen women" who were taken from their kin-based societies of origin and claimed by the Wari for this purpose.

Several centuries later, throughout the Andes, the Inca connected a network of places, using a system of roads but also architectural canons, including *ushnus* (or platforms), *kallankas* (or feasting halls), and public spaces where state power was expressed and reinforced (Staller 2008). Coben shows that the duplication of architectural canons across the empire was a conscious imperial strategy that allowed the same set of state rituals to take place across the empire (Inomata and Coben 2006). Coben and Inomata examine buildings as stages for performance in cross-cultural perspective, and Coben takes Inca architecture at Incallacta as his focus (Fig. 3). Inca buildings and monuments, and combinations of them, have many features in common, even when they are not exact copies of central places at Cuzco. Coben suggests that these locations had in common the ability of the architecture to condition and shape the rituals that took place there. Although the entire set of architectural features was not always present, Inca buildings share the ability to support officials of the Inca state as they both received and dispensed tribute. State power was created and maintained through economic redistribution and political power, but also through carefully managed ritual.

Inca buildings follow a set of patterns that replicate a space tailored to the ritual practices used to create and project state power across the continent. The Inca state organized the construction of buildings and other infrastructure to demonstrate power: for example, the movement of 700-kg basalt blocks over 1,600 km of mountainous terrain between Cuzco and Saraguro (Fig. 2) (Ogburn 2004). The creation of Inca "theaters" throughout the empire (and especially in the south and southeastern parts of the empire) meant that long after their construction, expressions of state power could be accompanied by the proper retelling of Inca narratives. The ability of the Inca to control groups of people, each with their own narratives describing proper relations with the surrounding places, depended to a large extent on their ability to translate political and economic power into the

symbolic realm. These systematically replicated architectural complexes both created and were reinforced by this process.

Archaeologists who define landscape as a stage have traveled far from the notion that the landscape is a constant, limiting factor in cultural evolution. The two views are not completely incompatible, however. In both, culture is opposed to nature, even if understandings of those factors are diametrically opposed.

Landscape as pattern

Nowhere is the concept of archaeological settlement patterns older than in South America. Willey's (1953) Virú Valley study pushed archaeology toward a larger scale. The approach quickly became influential for comparing regions via spatial patterns of archaeological sites (MacNeish et al. 1975). In the 1960s and 1970s, the study of settlement patterns came to define how archaeological regions were studied and characterized across the Americas. Settlement survey in South America has progressed more slowly because of a smaller number of research projects, but many blank spaces on the map are being filled in.

Since 2000, settlement survey has mapped previously undocumented occupation in every South American country, sketched new areas where archaeological research is beginning, and changed an Andes-centered view of South American prehistory (Stahl 2004). Extending our knowledge of settlement back in time and across space is part of a new synthesis (Silverman and Isbell 2008). After decades in which South America was identified closely with Andean civilization, archaeologists have built a more continental map of settlement; at the same time, new tools for the curation, manipulation, analysis, and distribution of spatial data are being developed. The advent of more accessible GIS software and lower-cost data makes settlement patterns easier to place in larger geographic contexts.

Settlement archaeology and other kinds of landscape archaeology are codependent because the archaeological record of landscape is incomplete without settlement, and settlement is related to other aspects of landscape. One way to bring together these different views is to keep open the question of scale. Different interpretations result from working at different spatial scales and privileging "settlement pattern" or "site" or "landscape." When such terms are carefully defined and located in space, then different interpretations can be compared. Settlement archaeology always has incorporated scale by recognizing the differences between regions, settlements, sites, households, and activity areas, even if emphasis has remained on regions and other large patterns. Recognition that no single scale holds the analytical key to questions about culture or behavior provides common ground between settlement studies and other landscape archaeologies.

The necessary complements to settlement patterns are well-defined methodologies of settlement survey. If the daily work of a survey archaeologist is to find sites, this requires a binary interpretation of the landscape. Survey methodologies define clear criteria to make this decision, such as numbers of artifacts (Dunnell 1992). Siteless archaeology, the recording of archaeological information before or without making this decision, shows how settlement patterns can coexist with other

approaches; this approach also is represented in South America (Drennan and Peterson 2006). Many survey projects have completed work and published results in the past ten years; the following sections represent only the briefest tour of some of these studies. I have selected examples that reflect a landscape perspective.

Titicaca Basin

Surveys in the Titicaca Basin have multiplied, especially on the southern, Bolivian side of the lake. Satellite imagery, GIS, digital photography, and other technologies overcome many logistical problems at reduced costs. Comprehensive survey of the Katari correlates the history of Tiwanaku with this outlying valley (Janusek 2001, 2002, 2004, 2006; Janusek and Kolata 2004). In nearby Khonko Wankane, surveys provide a comparative case for the beginnings of settlement centralization and the concentration of political power (Stanish et al. 2005). Because Stanish and his colleagues extended the surveyed areas of the basin around the lake to both the north and south, they make it possible to model social process such as interpolity competition and warfare across the entire basin (Stanish 1994, 2002; Stanish et al. 2002, see also Burger et al. 2000). Plourde and Stanish (2006) base their evolutionary model of complex society and social, political, religious, and economic relationships on 3,000 years of settlement history. One reflection of this is the shift in terminology from horizons and intermediate periods to the definition of the Andean Formative, although this is by no means universal.

Working in the sharply defined environment of the Island of the Sun within Lake Titicaca, Stanish and Bauer (2004) focused on a landscape invested with meaning by local inhabitants and by Andean peoples more generally. The Island of the Sun was thought of as the mythological origin of the Inca, although the state was centered on Cuzco to the north. A very dense pattern of sites covers the island, and the settlement survey documents a long-term occupation that predates the Inca.

In his survey and excavation of Formative sites on Lake Titicaca, Bandy (2004, 2005, 2006) used settlement data as part of a comparative study of early villages and a new model of the Neolithic transition around the world. He combined comprehensive surveys over a large region with a sophisticated understanding of the relationship between settlement and agricultural infrastructure. Taking a comparative approach, Bandy sees Lake Titicaca as an expression of a dynamic combination of factors that led to the rapid development of village life, the key building block of Altiplano society.

Moquegua Valley

Combining Titicaca Basin data with surveys from the Moquegua Valley to the southwest makes it possible to evaluate Tiwanaku as an archaeological phenomenon in its core and on its periphery (Goldstein 2005). Goldstein's model of migration draws links between Andean patterns of ethnicity and population movement in historic time and during the Middle Horizon. Drawing on contemporary Andean

migration, Goldstein makes a nuanced argument that migration is always more than movement from one location to another. Instead, it involves a complex set of negotiations in several locations, including movements of people and culturally charged objects in several directions over time. Tiwanaku as a regional phenomenon is therefore less an imperial project and more a complex of material culture associated with an ethnic identity, negotiated differently in different geographic contexts. Much like modern Andean peoples, the Tiwanaku constructed identities at different points in their lives in relationship to the places where they were born and the places where they moved.

Settlement surveys by Williams and Nash in the Moquegua Valley around Cerro Baúl are an admirable treatment of the relationship between Tiwanaku and Wari, the other major phenomenon of the Middle Horizon, which they ground in a sophisticated theoretical foundation (Williams 2001; Williams and Nash 2002). Spatial patterns of settlement outside central Peru appear to be reflections of a different expression of communal identity across space. Settlement patterns outside the Wari "heartland" also may be related to water sources taken as religious places (Glowacki and Malpass 2003). The example of Wari settlement on Cerro Baúl and Tiwanaku settlement in the valley, with almost no contact between them, confounds expectations. Cerro Baúl illustrates geographic differences between Wari and Tiwanaku settlement; it is a compelling case study in which contemporary traditions coexisted within the same valley.

Hayashida (2006) and colleagues combine the survey of settlements and agricultural infrastructure on the Peruvian coast. Coastal settlements in the Pampa de Chaparrí (Fig. 2) combined irrigation agriculture at a very early date with a long tradition of exploiting maritime resources. Agricultural infrastructure was part of local sociopolitical structures, and even when dominated by powerful rulers from Chan Chan (Fig. 2), systems were administered locally (see Netherly 1984). The state was still strongly associated with the development of irrigation, however. A similar connection is drawn for the southern Moche state, where the administration of irrigation agriculture does not appear to have been as important as other factors (Billman 2002). Infrastructure associated with intensive agriculture does not require state intervention to create or sustain, but building such infrastructure does attract the interest of the state.

Even in regions as well known as the Peruvian coast, settlement survey has made tremendous contributions near Caral (Fig. 2). Survey and reanalysis of Norte Chico by several researchers have located many large settlements in a small area; the dating of monumental architecture at these sites to the fourth millennium BC has placed the development of complex society in the Andean region in the same time frame as the oldest comparative examples from around the world (Haas and Creamer 2006; Shady Solís 2006), including Mesopotamia, Egypt, Indus, and Chinese civilizations. That these examples of monumental architecture may be associated with fishing economies continues a long debate in South American archaeology (Moseley 1975). Even if no further "Norte Chicos" await our (re)discovery, mapping and understanding of this region is fragmentary, and well-designed settlement surveys remain indispensable.

East of the Andes

The eastern slope cannot be downplayed or marginalized as a miscellaneous category between the Andes to the west and the Amazon to the east (Fig. 1) (Church 1994; Church and von Hagen 2008). Although interpretations have focused on how ideas, artifacts, animals, and plants flowed between the highlands and the lowlands, the eastern slope was not a hybrid of cultural traits, but instead an independent locus of cultural life and sociopolitical organization. Site surveys in the Ecuadorian tropics documented dense occupations spread over thousands of years (Lippi 1998, 2004). On the southeastern fringes of the Inca empire, or perhaps more accurately on the northwestern extremes of Guarani territory, Alconini (2004, 2008) has documented Inca imperial strategy and its interaction with local societies at Oroncota (Fig. 3). It is likely that the strict division between highlands and lowlands that has often characterized a division of labor among anthropologists does not reflect a durable division between lowland and highland peoples (Santos-Granero 2002). Modern coca chewing in Bolivia may provide an informative parallel: although coca use is often thought of as a highland trait (Stearman 1987a), in recent years coca has become popular among indigenous lowlanders.

Surveys along the middle Amazon, in the Xingu, in the Bolivian Amazon, and on Marajó Island demonstrate that the population of Amazonia was in line with the estimates provided by Denevan (2003). From the Central Amazon Project, a sequence of large, multicomponent sites confirms the link between expanses of anthropogenic soils and large, permanent settlement (Heckenberger et al. 1999). Dense, sedentary populations were widespread throughout Amazonia, and new histories of complex society in South America will incorporate Amazonian societies as independent examples rather than foils to Andean societies (McEwan et al. 2001). One example uniting several regions is the ubiquity of geoglyphs, ring ditches, causeways, and large villages across southern and western Amazonia, an area spanning thousands of kilometers (Heckenberger et al. 2008; Pärsinnen et al. 2009; Walker 2008a). Pärsinnen and colleagues have mapped a huge area of geoglyphs—neatly laid out earthworks or geoglyphs oriented to the cardinal directions—from northern Bolivia through Brazil (Fig. 3). Similar ring ditches are found across Mojos (Schaan et al. 2007; Walker 2008a). Surveys at Marajó Island (Fig. 4) show the tremendous untapped potential of remote-sensing techniques to guide and even replace excavation (Bevan and Roosevelt 2003; Roosevelt 2007). Ground-penetrating radar also has been put to use in eastern Brazil, at the sites of Serrano and Morro Grande (Cezar et al. 2001). In many locations, these earthworks are located underneath "primary growth" or "climax" tropical forest, suggesting that what is today tropical forest may have been occupied in the past.

Southern cone

Surveys throughout the southern cone include Iriarte's (2006a) documentation of the nucleation of settlement in the southern Brazilian highlands about 4,000 years ago, which represents an independent tradition of villages and ceremonial architecture. As far from the Inca capital of Cuzco as is the Caribbean Sea, these

results demonstrated that sophisticated economies and sociopolitical organizations in the second millennium BC were not limited to the Andes. Iriarte's interpretation of settlement patterns draws persuasively on ethnographic analogy for burial mounds as foci for communal life. Although the relationship between the ethnographic (and ethnohistorical) record and archaeological interpretation has been a source of conflict, this conversation has been productive. Archaeology of settlement patterns suggests that the ethnographic and ethnohistorical information can provide valuable analogies for archaeological interpretation, with sufficient "source-side" criticism.

Settlement and subsistence

Settlement survey, first put into operation in South America, is a significant chapter in the history of processual archaeology. As South Americanists apply this methodology from a range of theoretical perspectives, more and more pre-Columbian ways of life have been brought "onto the map." The definition of a site is never free of theory, and the ways in which site definition has been analyzed (Dunnell 1992) led to the definition of landscape as part of a systemic relationship between settlement patterns and subsistence strategies. The expansion of settlement patterns to include "off-site" features such as agricultural fields, roads, paths, and resources draws on the explanatory power of a landscape perspective to incorporate daily, seasonal, and annual movements that are not confined within the "site." The reanalysis of the site concept began with this effort to problematize the connection between sites and subsistence resources (Dunnell 1992). The focus of these studies in American archaeology has been on the relationship between economy and settlement. Several studies illustrate the explanatory power of this approach.

Connections to the ethnohistoric record have long been central to South America. In the Andes, the applicability of ethnohistoric models to Inca and pre-Inca social organization has been an open question. The *ayllu*, an Andean social unit, has been presented both as a timeless entity and as a recent reaction to the invasive Inca state. Isbell's study of mortuary monuments focuses this argument on identifiable signatures in the archaeological record (usually considered part of the "off-site" archaeological record) as a correlate of ethnic identity and the *ayllu* system of social organization (Isbell 1997). Isbell interprets *chullpas* (monuments used to curate the dead) as archaeological criteria to trace the ayllu into the Late Intermediate period. This depends on the analysis of the "nonsite" archaeological record.

Landscape as a combination of settlement and agricultural patterns is used to relate the ethnohistoric and historical record of land tenure in the central Andes (Wernke 2006, 2007a, b). Wernke matches colonial land records to pedestrian survey of field boundaries and the analysis of aerial photographs, coordinating all these analyses within a GIS database. This research combines history and anthropology to show how social organization played out on an intricate patchwork of fields, with changing relationships between farmers, groups of farmers, and villages. The dual organization of Andean farmers is traced both in the documents and on the terraced slopes surrounding the village. The potential of this approach is

difficult to overstate; it incorporates both the documentary and the material record without privileging either.

The study of landscape as a combination of settlement and subsistence activities is facilitated by the ubiquity and ease of use of satellite imagery. The cost of remote-sensing data—and the tools to analyze them—has plunged dramatically. The same images that cost thousands of dollars each and required esoteric knowledge of file formats and proprietary software are now available worldwide on the internet (Schaan et al. 2007). Archaeological features, including buildings, roads, fields, canals, and monuments, can be mapped and cataloged from any personal computer connected to the internet. This makes all of South America accessible to landscape analysis. Where visibility of archaeological remains is high, remote-sensing research has few startup costs. Grassroots efforts involving local stakeholders could easily take advantage of these resources.

Survey, excavation, and interpretation of eastern Marajó Island, at the mouth of the Amazon, combined the study of subsistence pattern with an inventory of landscape features used for fish farming and management of water (Schaan 2004). Studying landscape management and comparing it to other chiefdoms based on nonagricultural economies, Schaan links developments in social complexity to the Camutins, pushing back Marajó Island chronology to include these societies that did not develop landscapes of intensive agriculture. Schaan also proposes a smaller population (2,000) for the Camutins, noting that there were likely several such societies on Marajó Island.

Landscape as a reflection of subsistence and settlement systems is underutilized in landscape archaeology. Shifting focus from the definition and mapping of archaeological sites to resources, activities, or cultural meanings opens a wide range of theoretical questions to spatial analysis. The relative ease of access to data and analytical tools makes these questions more amenable to archaeological research.

Conclusions

One measure of landscape archaeology is whether it creates a place where conflicting understandings of the past can be compared and then synthesized, reconciled, or left in opposition. Like other fields, South American archaeology is transforming beneath the weight of an avalanche of new information. Synthesis and analysis now depend not on heroic individuals who master larger and larger combinations of ceramic sequences, pollen diagrams, and 17th-century archival sources but on improving communication between specialists. Anthropologists in general and archaeologists in particular are well positioned as guides, synthesizers, and consensus builders; they are accustomed to reconciling data from a variety of fields, and their interests are often rooted in particular places or problems.

Today, landscape archaeologists traverse much of the same conceptual territory first explored in the 19th century. Because technology changed archaeological practice, archaeologists modified their methods, and they value their hard-won field data for good reason. But the same flood of spatial data that is overwhelming astronomy, biology, and sociology has overtaken archaeology, and the price per unit

(in time and money) of information is falling. Archaeologists will need to change their role as the exclusive gatekeepers of archaeological knowledge, as they have in the American Southwest (Fowles 2010). Landscape archaeology is most useful when it gathers specialists and stakeholders around a map and leads them to edit and change that map together. For "landscape" to be a means by which South Americanists do this, they will have to answer several strong critiques.

Is landscape archaeology only a new methodology? This is inaccurate for two reasons. First, reducing landscape archaeology to methodology conflates a range of techniques with different requirements, expectations, and interpretive frameworks: phytolith analysis, pollen analysis, faunal analysis, GIS, remote sensing, ethnography, ethnohistory, toponymy, oral history, linguistics, spatial analysis, archaeological survey, and area excavation. Second, landscape archaeologists aspire to more than adding new methodologies to an established repertoire. Landscape archaeologists variously claim that they are classifying indigenous perspectives on time and space, correcting methodological biases toward sites away from certain kinds of sites toward the top-down or the bottom-up, or documenting environmental histories.

Can landscape archaeology be safely ignored because it is a purely North American concern? South American landscape archaeology is hard to analyze as a subset of Anglo-American or North American archaeology because although it is related to academic traditions in North America, it also includes Latin American perspectives with independent intellectual histories (Patterson 2008; Politis 2003). Many landscape archaeologists are South Americans not trained in, or particularly concerned with, conflicts between North American theoretical camps. Historical perspective is essential, because archaeological practice is situated in modern contexts that affect both archaeologists and their theories. These topics are examined in more detail elsewhere (Liebmann and Rizvi 2008; Preucel and Hodder 1996).

Communities of archaeologists have used a landscape perspective to organize and clarify their disagreements. Discussions between Erickson, Janusek, Kolata, and Stanish make clearer the comparative strengths and weaknesses of a site-based and a landscape-based perspective. Without these interchanges, both rural landscapes and urban sites are studied but misunderstood. Cities, large sites, and monumental constructions cannot be understood in isolation from the landscape, and the landscape includes cities and monuments, too.

New possibilities are present in the development of GIS from a technology (geographic information systems) into an emerging discipline (geographic information science, or GIScience) and its application in South American landscape archaeology. GIS work can be a confrontation between the researcher, data, and a recalcitrant computer program, with little interest outside of a narrow specialty. But when users from landscape architecture, history, biology, and archaeology share experiences, not only regarding their computers but with their interpretations of spatial phenomena, they can communicate usefully about methods and results across disciplinary gaps comparable to those between North and South American archaeologies or between top-down and bottom-up perspectives.

GIScience can facilitate the comparison of phenomena at different scales, and landscape provides the theoretical link between these phenomena and anthropological issues. Studies of landscape archaeology demonstrate the importance of medium- and small-scale studies to large-scale models. The details of plant and animal distributions, elevation, temperature, and rainfall are important in reconstructing movements of people between continents, but also between their breakfast and potato field, or hunting trail. Theoretical questions can be related to scale. Comprehensive or comparative theories work at large scales, but convincing explanations also link together individual households and cities, or river valleys and adjacent highlands. The issue of scale requires precise terminology; for spatial analysis, comprehensive theories like processual archaeology, cultural ecology, sociobiology, or evolutionary psychology are large-scale ideas about how humans behave, societies are organized, or cultures change. History, historical particularism, and postprocessual archaeology all model smaller-scale processes and tend to downplay large-scale ones.

One example of how landscape archaeology can graft analyses at different scales is the reanalysis of Andean warfare as an institution, as three specific studies, in distinct contexts and at different scales, show. Interpretations of Andean warfare, which range widely between expressions of universal human attributes and distinctly Andean institutions, can be compared in the light of information from the entire landscape, not from a single scale. First, at a regional scale, Arkush (2008; Arkush and Stanish 2005) shows how fortresses across Lake Titicaca throughout the Late Intermediate period correspond to trends in the strategies that political actors chose to build and maintain alliances. In combination with the expanding and deepening knowledge of settlement, a regional map is used to analyze how fortification consolidates power and controls political economies.

At a smaller scale, the mapping, survey, and excavations at Chankillo demonstrate that the attribution of a defensive function to the site is the beginning of interpretation, not the end (Ghezzi 2006; Ghezzi and Ruggles 2006, 2007). The combination of a "defensible" site, importance of the location, architecture within thick masonry walls, and artifacts recovered from within those walls and buildings is interpreted holistically. Defensive walls cannot be understood in isolation from the towers. The classification of a site as a "fortress" is based on many assumptions about relationships with elevation, lines of sight, and proximity to resources, among other aspects of the landscape. This definition is implicitly based on the landscape surrounding the monumental architecture, and Ghezzi's work makes these assumptions explicit.

Excavation and mapping at Acaray in the Huaura Valley (Fig. 2) combine detailed topographic mapping of the site with archaeological experiments on the range achieved by Andean people equipped with slings (Brown Vega 2009; Brown Vega and Craig 2009). This weapon (which is also part of an Andean shepherd's toolkit)—described throughout the Andes in ethnographic records and material culture—can be discerned in the archaeological record in piles of shaped stones behind walls. Experimental data show how the architecture at Acaray was both a strong point and a platform to bombard besieging forces. Combined in a GIS with analysis of sightlines from various points within the buildings, this is an excellent

example of how spatial analysis integrates information from different sources. The sequence of construction at the site also is brought into the analysis, which describes long-term changes. As at Chankillo, Acaray is best interpreted in combination with the archaeological evidence of landscape. These three studies operate at different scales, presenting unique data defining Andean warfare. From the distribution of strongholds across a region, to the range and striking power of sling stones, to the lines of sight that make a location both a holy place and a defensive strongpoint, Andean warfare was a set of military, religious, and economic practices and institutions that focused resources, ideas, and people at particular locations; it also was historically and geographically contingent.

Landscape archaeology encourages discussions of antagonistic theoretical views of the same group of people, or the same set of archaeological problems, on the same map. Landscape does not unify incompatible approaches to archaeology, but it does make clear that to make a map is to make assumptions about time and space and the role of society in them. Perhaps the role of landscape (and GIScience) is to catalyze a Cartesian point of view, the better to compare and discuss descriptions of the landscape that "don't fit" into that database or that worldview. Some Amazonians, for example, have different ways of understanding the relationships between people, animals, and things (Santos-Granero 2009b), and relationships between space and time. To take these conversations in cultural anthropology seriously is to realize that Amazonian ideas about these relationships are difficult to map (Santos-Granero 2009a). Landscape in combination with GIScience maps the assumptions of South American archaeology, the better to contrast them with other cartographies, histories, and archaeologies. Landscape archaeologists have specific ideas about space, time, and people, and GIScience helps put those assumptions in front of the scholar, the policy maker, indigenous community, landowner, or other stakeholder.

Missed connections between North and South Americans keep South American archaeology underdeveloped, but landscape archaeology could play a beneficial role. A focus on environmental reconstruction and settlement patterns is necessary because processual approaches have much to say about pre-Columbian South America. But to focus exclusively on them distorts both the history of the field (Politis 2003) and what we think we know about the past. North American archaeology is in no danger of disappearing under a flood of alternative perspectives. Well funded and well established within modern sociopolitical structures, North American archaeologists will have an influential voice in how landscape archaeology is carried out. Recent research in South America demonstrates that it has not been and will not be the only voice.

Perhaps this cooperation or coordination of differing perspectives is unnecessary; the proof of landscape archaeology should rest on the results those individual scholars and projects have generated. What has landscape archaeology told us about pre-Columbian South America? Dillehay shows us the details of how Araucanian mounds act in a variety of social settings, interacting with people in the world today, as they incarnate the history of at least 700 years. Iriarte demonstrates that traditions of public architecture, political organization, and domestication of the landscape were not confined to the Andes. Hayashida details how agricultural spaces and

settlements were integrated on the north coast, and that local and regional-scale processes governed how irrigation farmers and Chimu administrators interacted. These three scholars might not agree on a definition, but they all use landscape to present the fruits of their analyses and cultivate new questions.

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