

A Constellation of Practice in the Experience of Sea-Level Rise

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Registered in the archives of human history are moments when connections among people with independent histories coalesced into broader institutions and structures of practice. We know well how this developed over the past 500 years, as colonial and capital interests expanded outward to encapsulate and transform communities across the globe (Wolf 1982). We know less about the circumstances of premodern times, when seemingly independent and varied communities coalesced around shared experience. Absent of the economic and political forces behind the globalization of modernity, the emergent structures of ancient times are traced by archaeologists to ideological or cosmological motives (e.g., Dillehay 2007; Pauketat 2013) or, in more prosaic terms, to a sociality of cooperation that promotes sustainability through pooled risk (e.g., Bettinger 1991; Braun and Plog 1982). In all such cases, practices that transcend local communities to form what Wenger (1998) calls “constellations of practice” can be expected to involve shared experiences, like globalization, of commensurate scale. For instance, climate change and its manifestations in drought, flooding, and sea-level rise can be experienced simultaneously by communities distributed across vast spaces (also Schoenbrun, this volume). How experiences among dispersed people inform practice at larger social scales is a matter of considerable interest not only to the historians of ancient times but also to policy makers who hope to mitigate the impact of global climate change through transnational, cooperative action.

About 3,500 years ago across the lower southeast United States, a constellation of practice coalesced around the experience of sea-level rise. Over scores of generations its forebears experienced transgressive seas that flooded ancestral homeland and pushed communities landward repeatedly. With its low gradient and sandy composition, the Gulf coastal

setting of this shared history was especially vulnerable to shoreline erosion and inundation. Did living through centuries of constant change in such an environment enable communities to project futures far beyond the next generation? Did a constellation of practice emerge not merely from shared past experience with rising sea but also as a collective intervention against future uncertainties?

My intent in this chapter is to address these questions through the archaeological residues of life on the Gulf coast from ~5,000–3,200 years ago, when settlements, cemeteries, monuments, and caches formed a constellation of practice that culminated ~3,500 years ago in the Poverty Point culture of northeast Louisiana. I first review theory that informs my interpretation of these residues, starting with Wenger's (1998) constellations of practice and the agents that link communities, followed by phenomenological perspectives on movement and temporality that help to explain how constellations arise as instruments of intervention.

Constellations of Practice

As the editors of this volume emphasize in their introduction, issues of scale challenge the application of situated learning theory in archaeology. How far can a community of practice be expanded as an analytical construct before it loses its interpretive value? If communities of practice are not something to look for, but a way of looking, as Wenger (1998) advises, then analytical scale would appear to be a matter of choice, not of discovery. If, for example, we allow that communities of practice arise out of consumption, as well as production (e.g., Knappett 2011; Mills et al. 2015; Roddick 2009; Mills, Roddick, this volume), communities are open to agents with roles beyond the face-to-face transmission of culture. This perspective also redirects our analytical emphasis away from learning bodily skills and towards the resources of social reproduction within networks (e.g., alliance, exchange, coalescence). It also puts things in motion by virtue of networks whose constituencies are linked through the physical movement of human agents and their material counterparts (Blair, Harris, Mills, Schoenbrun, this volume).

The multiscale nature of communities of practice is captured nicely in Wenger's (1998) notion of *constellations of practice*. Abstracted from the connections among diverse and dispersed communities of practice,

constellations of practice encapsulate multiple constituencies, even persons who may never see but can imagine one another. Constellations coalesce as meaningful social units through the actions of particular agents—human and otherwise—who connect communities across space and through time. Following Wenger, two such agents are *boundary objects* and *brokers*.

Boundary Objects and Brokers

Connections among diverse communities take many forms and can be materialized (*reified*, per Wenger [1998]) in objects and places that convey meaning or value across time and space. *Boundary objects*, for instance, serve to coordinate the perspectives of diverse communities for common purpose. Examples of boundary objects noted by the authors of this volume include the clay sources shared by potters of distinct communities (Roddick) or the marketed pot, which, in the context of a public market, coordinates interactions among producers, consumers, and other producers (Gosselain).

Boundary objects transcend the physical and social constraints of participation by indexing other places, times, persons, and ideas. They cannot, however, convey unambiguous meaning across communities without some form of mutual engagement. Wenger (1998) points to a variety of circumstances that have the potential to afford transcendent qualities to boundary objects and hence give rise to constellations of practice. These include, among others, common historical roots, parallel experiences, members in common, and geographic relations of proximity. Ultimately, some form of interpersonal engagement is necessary for boundary objects to work in connecting communities. In this respect, the relative positions of agents across two or more communities of practice bear relevance. Wenger defines *brokers* as members on the periphery of particular communities whose participation in other communities is a potential source of alternative perspectives. Being a member of two or more communities does not alone qualify one as a broker, as this status requires what Wenger (1998) calls “participative connections,” essentially the translation and coordination of practices among communities through mutual participation.

Boundary objects and brokers are conceptualized by Wenger as complementary modes of connection, the former through reification, the latter

in participation. The complementarity is most sharply seen, he argues, when boundary objects and brokers travel together. Wenger also argues that practice itself can be a form of connection, as in the delegation of boundary practices to address conflict and seek resolution between communities. In these cases, constellations may not emerge from long-term, evolving practice so much as they do from the intent of individuals to intervene in uncertain futures (also Schoenbrun, this volume).

As should be evident by now, the distinction between boundary objects and brokers need not be drawn too sharply because objects may themselves be animate and brokers may take nonhuman form. This perspective goes a bit beyond Wenger's thinking on constellations, but it is fully consistent with incarnations of practice and agency theory in archaeology that make space for agency of any imaginable form (Watts 2013). Of course, what makes something imaginable is constrained somewhat by the *space of experience* (sensu Koselleck 2004) and how experience is encoded and transferred as knowledge. We thus arrive back at situated learning theory, where we need to open up space for phenomenological perspectives to enhance its interpretive value when brokers and objects are put into motion.

Movement and Temporality

Constellations of practice are predicated on connections, and connections involve movement. Familiar in the modern era are the movements of human bodies, as in migration or pilgrimage, and of things, as in transport and trade. There are likewise a variety of "natural" movements humans conscript for various purposes, such as the seasonal flight of migratory birds or the annual orbit of the earth around the sun. All such phenomena hold the potential for temporalizing experience, for placing events into meaningful sequences or cycles. The rhythms of social life among *caboclo* fishing communities of the Amazon (Harris 2000, this volume), for instance, follow seasonal changes in river levels, cyclically enabling and constraining the movement and gathering of persons in regional communities. Drawing on Ingold (1995:126), Harris (2000) takes a dwelling perspective to account for the "resonance" between the movements of humans and the rhythmic fluctuations of environment. In this sense, dwelling is the flow of activity, the relational nature of being and time. Persons gain perception of these flows by engaging their full senses

in monitoring their surroundings and its changes, mutually constituting seasonality through embodied periodicity of activity, movement, and social interaction.

Other temporalities emerge from long-term and discontinuous experiences with movement and change, events that structure the contours of history by challenging the familiar and extrapolating the space of experience onto horizons of expectation. The *Dreaming* of Native people of Australia, for instance, appears timeless for its enduring qualities, but it greatly factors into ontologies for change. Many of the places of *Dreaming* were not permanent or enduring sites of human activity, and many such places emerged not out of experience (myth/history/lineage) but out of expectation (anticipated change; Morphy 1995). This twist of perspective is revealed in moments of colonial encounter, of turbulence, when connections of Native people to familiar land were disrupted. Such disruptions were also an outcome of eventful environmental changes, such as droughts, that challenged the permanence of place for aboriginal peoples long before the encroachment of Europeans (Holdaway and Allen 2012). Similarly, Harris (2000:125, this volume) sees the resilience of floodplain peasant communities of the Amazon to colonial encounter as intrinsically linked to a long history of engaging with environmental change.

In the view of Howard Morphy (1995), *Dreaming* is an ontology that links time to places in a very stable relationship while also allowing for a fluid relationship between actual persons and places. Time is therefore subordinated to space without requiring continuity of practice or even the social memory of particular persons or actual events. This is enabled by a time-space referential system that is transposable to virtually any context, making change in material surroundings appear familiar by referring change to movement. New surroundings in this sense are not so much novel experiences as they are discoveries about a structured, mythical past. New places appear timeless because they are anticipated by a past saturated with movement: movement of mythical beings, social bodies, and “inanimate” matter. The *Dreaming* also enables transmission of knowledge about the need to abandon some areas and reoccupy others (Holdaway and Allen 2012:92).

The literature on landscape learning deals mostly with the colonization of unfamiliar terrain (e.g., Rockman and Steele 2003), but it also

involves the study of changing environmental conditions. Whether an experience is novel due to migration or local change, learning is about identifying contrasts between past and present conditions (Rockman 2012:100). Of the types of landscape learning identified by Rockman (2003), *limitational* and *social* knowledge are predicated on experiences that potentially span multiple human generations. Limitational knowledge involves information on the nature of long-term variation within an environment, such as the periodicity of drought or the rate at which seas are rising. Social knowledge refers to the cultural encoding of “locational or limitational knowledge in forms that are remembered and transmitted by the group to succeeding generations” (Rockman 2012:102). Because landscape learning is generally informal and experiential among people glossed as “hunter-gatherers,” transmission of knowledge about long-term change is likely to involve some form of inscribed memory (sensu Connerton 1989), such as rock art, mounds, or “natural” features imbued with meaning. As with Aboriginal Dreaming, however, such features need not be fixed on the landscape but rather arrayed in spatial (and temporal) relation to one another to allow for their transposability.

We are thus interested in how people learn about movement, human and otherwise, as a means of coping with changes in landscapes with which they are familiar. In this respect, the concept of *wayfinding* bears relevance. According to Golledge (2003:25), wayfinding is the ability to determine and learn a route, follow it, and then reverse it from memory. The initial use of this term by Lynch (1960) and later Ingold (2000) is a bit more encompassing, relating it to schema that would include, for instance, the narratives of Dreaming. To use a map, Ingold argues, is to navigate a route; wayfinding, in contrast, is about moving from place to place and not merely to get somewhere and back but to constantly work on knowledge of the environment. Movement, not linked places, defines the route of a wayfinder: movement “in response to the movements, in his or her surroundings, of other people, animals, the wind, celestial bodies, and so on” (Ingold 2000:242). Places on the landscape do not have locations as much as they have histories, in this case histories of movement. Constellations of practice can thus be defined by movement rather than the places or communities connected by movement (e.g., Morphy 1995; Myers 1986).

Futures

Despite his emphasis on movement, Ingold (2000) does not envision wayfinding as futures work per se. To consider how places and communities have not only histories but also futures we must consider how change is anticipated and not just experienced.

How do sociohistorical structures (like constellations of practice) take form through the relationship between experience and expectation, and how do changing relationships between the past and present lead to new senses of time? Common to all humans, according to Koselleck (2004:259), is the *space of experience*, in which past things are present or can be remembered, and the *horizon of expectation*, in which the future is made present through anticipation. This follows from the phenomenology of Husserl, Heidegger, and others who conceptualize time as the flow of succession and retention (see Lucas 2005:22–24), the latter a matter of social memory. What structures the relationship between the past and present is the space of experience in which past events have been gathered together and ordered into patterns of recurrence or repetition. Prospective futures are bound most closely to the past when history is predicated on repeated or enduring experience.

Studies of social memory in archaeology occasionally privilege the actual experience of environmental change in shaping perceptions of the future. Dean (2000), for instance, explores how Ancestral Pueblo communities of the Colorado Plateau accumulated, stored, and retrieved information about variation in rainfall. With paleoenvironmental data scaled to the yearly chronology of tree-rings, Dean identified four multi-generational periods over a 2,000-year interval of Colorado Plateau occupation when the frequency of extreme rainfall variations shifted from low to high. In comparing this record to the culture history of the region, Dean found that major adaptive transformations were associated with regional-scale climatic phenomena that were so infrequent as to elude traditional environmental knowledge. High-frequency variation was often encoded as memory that allowed communities to respond by planned relocation, but low-frequency variation posed challenges to tradition in the contradiction between experience and expectation. Another study employing tree-ring data by Anderson et al. (1995) shows how

food-storage strategies among Mississippian chiefdoms of the American Southeast were structured by the severity and frequency of droughts, and Sassaman and O'Donoghue (2015) examine how varying rhythms of environmental change in the same region led to alternative temporalities across 2,000 years of Native history.

How futures were held as memory in these various studies remains vague, but in others the horizon of expectation is a matter of political control. For instance, the Tarascan state of Mexico arguably arose by imposing temporal structure to annual fluctuations in lake levels. This is the argument of Haskell and Stawski (2013), who project a series of landscape views in 50-year increments of the Lake Pátzcuaro basin, showing fluctuations in water levels that could be visualized from the viewpoint of adjacent mountain tops. The alternating losses and gains in land correlated with production capacity, so knowledge of future lake levels could be used to plan for economic expansion or contraction. Those who climbed to elevated perspectives for religious purposes, according to Haskell and Stawski (2013), developed such knowledge and mobilized it for political gain. Encoded in memory and passed down through generations, knowledge of lake fluctuations became a historical resource in which memories were materialized in particular landscape features and futures anticipated by relational properties among them, not unlike those of Dreaming. Ultimately landmarks to changing lake levels became the materialized memories of past conditions for purposes of futures planning.

In the Tarascan case we see how power intervened in futures, and we can take this one step further to see how futures fall under the control of entire constellations of communities who experience turbulence from without. The Araucanian (Mapuche) of Spanish Conquest Chile was a regional population of Indigenous people who participated in the creation and ritual renewal of settlements, mounds, and cemeteries that were integrated by cosmological spatial referents (Dillehay 2007). This cosmological community—what Dillehay (2007) calls a *cosmunity*—persisted for centuries in dynamic relationship to enduring external threats (Spanish incursions) not by guarding tradition but rather by mobilizing social bodies in novel forms of resistance. Dillehay draws on French theorist Louis Marin's (1984) notions of "utopic social engineering" and "utopic spatial play," in which a society's concept of utopia is expressed spatially, as in urban planning, landscape gardening, or other civic works projects.

Although built places like these draw on historical resources and existing frames of spatial reference, they are oriented expressly towards alternative futures, towards novel material circumstances and new social practices.

What can be gleaned from the foregoing to inform the emergence of a constellation of practice from the shared experience of sea-level rise on the Gulf coast of North America? Several key concepts warrant emphasis:

1. *Movement*. Short of the distributed communities of cyberspace (Cianciolo and Evans 2013), constellations (connections) among communities are actualized in the movement of agents.
2. Agents include *boundary objects* and *brokers*, the former a materialized (reified) form of connection, the latter a participatory form. These categories are neither mutually exclusive nor essential, but instead relational.
3. *Temporality* arises from the interplay between experience and expectation, and when movement is experienced as cyclical (e.g., river fluctuations, celestial orbits), anticipated futures are bound closely to experiences of the past. Movement that is instead non-cyclical or eventful (e.g., colonial displacement, encroaching sea) need not appear novel so long as change (e.g., encountering new places) is referred to movement, as we see with *Dreaming*.
4. *Intervention* is futures work, in both the deliberate effort to change things from the way they are to the way they are imagined to be (Wobst 2000) and in the mediation between two points, itself a matter of movement but materialized in boundary objects, including places of planned abandonment, like those of the American Southwest.
5. A *constellation of practice* can emerge as an intervention against alternative futures from the time-space connections among boundary objects and the brokers who mobilize them. When referred to cyclical change, boundary objects can flatten the temporality of movement to make change appear changeless.

Constellating the Practice of Sea-Level Rise

My own example of an archaeological *community* or constellation of practice consists of an array of mounds, caches, cemeteries, and settlements

whose integration—spatially, socially, historically—can be informed by experiences like those of the Araucanians. Granted, the unrelenting threat of Spanish incursions into southern Chile may at first glance bear little similarity to the turbulence of climate change on the Gulf coast. However, they have in common an enduring quality, both lasting for centuries, as well as a punctuated rhythm (i.e., periodic onslaught via military forces in one case and intermittent storm surge in the other) that benefited from spatial frameworks and ritualized practices that connected events across otherwise disjointed space and time. The rich and complex archaeological record of ancient life on the Gulf coast serves as testimony to a constellation of practice that parlayed the experience of unrelenting climate change across vast geographies and integrated it in a spatial framework that referenced time and change for purposes of futures planning. I regret not being able to share its full details here, but I cannot proceed without some empirical scaffolding on which to hang my abstractions (see Sassaman [2013] for details on *futurescapes*; Sassaman et al. [2014] for an overview of a Gulf coast research project; and a series of reports available online [<http://lsa.anthro.ufl.edu/publications.html>] for technical details of fieldwork).

Moving with the Sea and Sun

A scaffold can be erected from the archaeological traces of living on the northern Gulf coast of Florida through 80 meters of sea-level rise and 250 kilometers of shoreline retreat since the end of the Pleistocene. The average rate of transgression has been 20 meters/year, or a football field every five years. This part of the Gulf coast has an extremely low-gradient coastline and is thus highly vulnerable to changes in sea level. The Florida peninsula today is only half the landmass it was when people first arrived ~14,000 years ago.¹

Most of the rise in sea and attendant shoreline loss took place in the first two millennia of the postglacial era (Donoghue 2011). It then slowed to a moderate rate that persisted until about 5,000 years ago and then to a rate that has all but flatlined until the hockey stick of industrialization. Slowing in the rate after 5,000 years ago has long been thought to have triggered the initial development of productive estuarine environments, when an intricate balance was reached among water salinity, sedimentation, and marsh aggradation that was until then precluded by rapid

sea-level rise. The underwater archaeology needed to evaluate this presumption is thin, but enough evidence from beneath Gulf water has been recorded (e.g., Faught 2004) to know that people spent time on the coast since at least the early Holocene, when rates of sea-level rise were high.

We have no purchase on the experiences of the earliest coastal dwellers other than to venture that they came to not only appreciate that change occurred but also anticipate change going forward. The archaeological record of Gulf coastal living after ~5,000 years ago² presents itself as a variety of material traces for futures planning (Sassaman et al. 2014). Besides the expected residues of “domestic” dwelling is an array of mounds, ridges, rings, and other terraforming involving both shell and earth; cemeteries and mortuary mounds with persons both local and nonlocal; and caches of material goods that trace to distant sources. Inferred from this record are several instances of landward retreat from the coast, presumably in response to rising seas. Although the rate of rise slowed considerably after 5,000 years ago, over the next two millennia it rose another 2 meters and the shoreline transgressed about 5 kilometers in the northern Gulf coastal region of Florida (Wright et al. 2005), where my graduate students and I work.

Among the evidence for coastal retreat are the locations of cemeteries dating to ca. 5,000–4,500 cal B.P. (Fig. 9.1). Three such cemeteries have been at least partially documented in the study area. The best-documented of them, McClamory Key, contains secondary burials among an estimated 32 individuals, many grouped together and one subset possibly oriented in a line parallel to the coast (Sassaman et al. 2015). They were reinterred at this location when the sea was lower and the coastline 4 to 5 kilometers to the west. This cemetery and the other two were emplaced about 10 kilometers apart on the northern distal arms of parabolic dunes, all at the same elevation. They have each been exposed in recent years by storm surges and the ambient erosion of a rising sea. The northernmost cemetery, at Bird Island (Stojanowski and Doran 1998), was occupied a few centuries after emplacement of the cemetery and was later the recipient of at least 15 soapstone vessels from geological sources nearly 600 kilometers to the north (Yates 2000). Despite its distance from sources, the Bird Island soapstone vessel assemblage is the largest known in Florida. Moreover, the emplacement of these vessels after 4,100 cal B.P. appears to be a post-abandonment

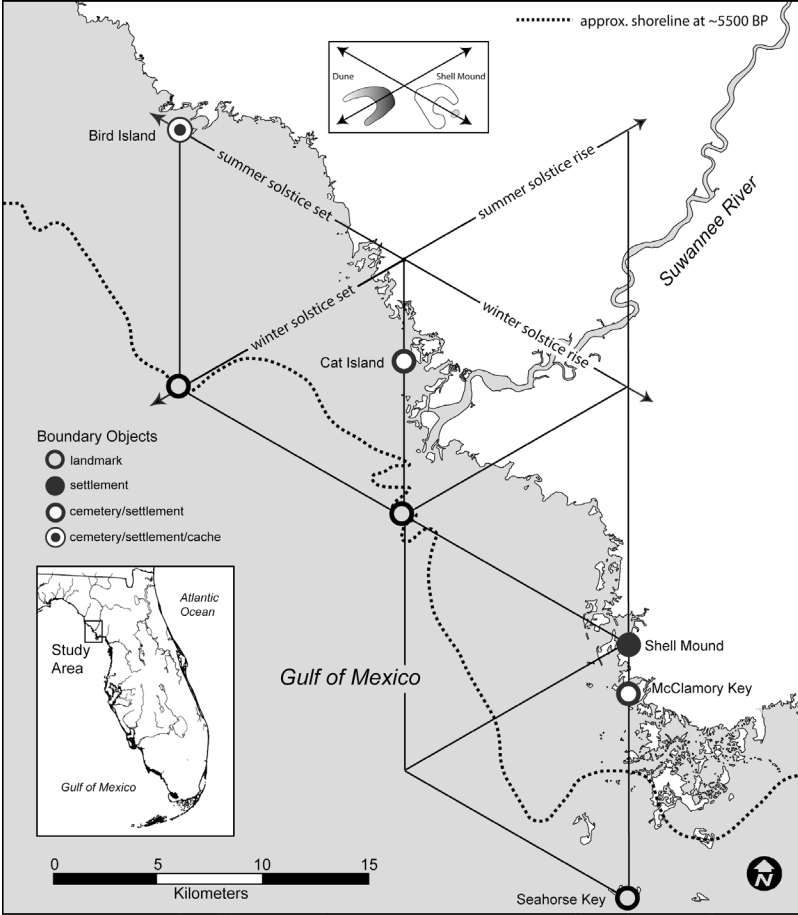


Figure 9.1. Futurescape of the Late Archaic period of the Lower Suwannee region, Florida, showing boundary markers of cemeteries, caches, settlements, and landmarks aligned to meridians and solstice angles. Illustration by Kenneth E. Sassaman.

event, the capstone to a sequence that started with the establishment of the cemetery.

I suspect that ancient cemeteries were located landward of the coast in anticipation of the landward movement of increasingly vulnerable coastal settlements. Substantiating this idea means locating evidence for

now-submerged sites, assuming they have not been destroyed by trans-gressive sea. In the meantime, alignments among known settlements, cemeteries, and submerged physiographic landmarks suggest that the di-rection of movement was consistently to the north. This is seen best in the alignment of Seahorse Key, McClamory Key, and Shell Mound on a meridian (Fig. 9.1). Seahorse Key is the highest elevation in the region, the relict of a parabolic dune that has survived sea-level rise. At the op-posite end of the meridian is Shell Mound, a fifth-century A.D. con-struction overlying a ca. 4,500–4,400 B.P. settlement. Notably, parabolic dunes in the area are open to the southwest, at roughly 240 degrees east of north, which is the angle of the winter solstice set (and its reciprocal, the summer solstice rise). Shell Mound was constructed to be open to the southeast, at roughly 120 degrees east of north, the angle of the winter solstice rise (and its reciprocal, the summer solstice set). Solstice angles form equilateral triangles when one axis is aligned to a meridian. As elaborated on further below, equilateral (solstice) triangles factored into the siting of mounds and other features at places of ritual gathering.

Another instance of northward retreat is suggested in the construction of a massive shell ring on the western shore of Lake George in northeast Florida (Sassaman et al. 2011). In size, shape, and orientation, the Silver Glen ring is very similar to a coastal ring at Bonita Bay in southwest Florida (Dickel 1992), ~320 kilometers to the south (Fig. 9.2). Both are U-shaped ridges of shell (oyster at Bonita Bay; freshwater snails at Silver Glen) roughly 250 × 150 meters in plan and open to the southwest. With only four age estimates from ambiguous contexts, the ring at Bonita Bay is not well dated but was apparently occupied from about 4,950 to 4,150 years ago (Russo 2006:149). The occupational sequence at Silver Glen is better known (Sassaman et al. 2011), with a range of intermittent occupation extending back nearly 9,000 years and a more-or-less-continuous, intensive occupation from 5,000 to 3,600 years ago. The ring at Silver Glen was completed at about 4,100 cal B.P., at about the same time that Bonita Bay was abandoned. Regionwide, shell rings of the Gulf and Atlantic coasts of the Southeast span the fifth and fourth millennia B.P. and assume a variety of sizes and shapes (Russo and Heide 2001). Silver Glen and Bonita Bay are among the largest ever recorded, and they are positioned on a meridian running through the center of the Florida peninsula.

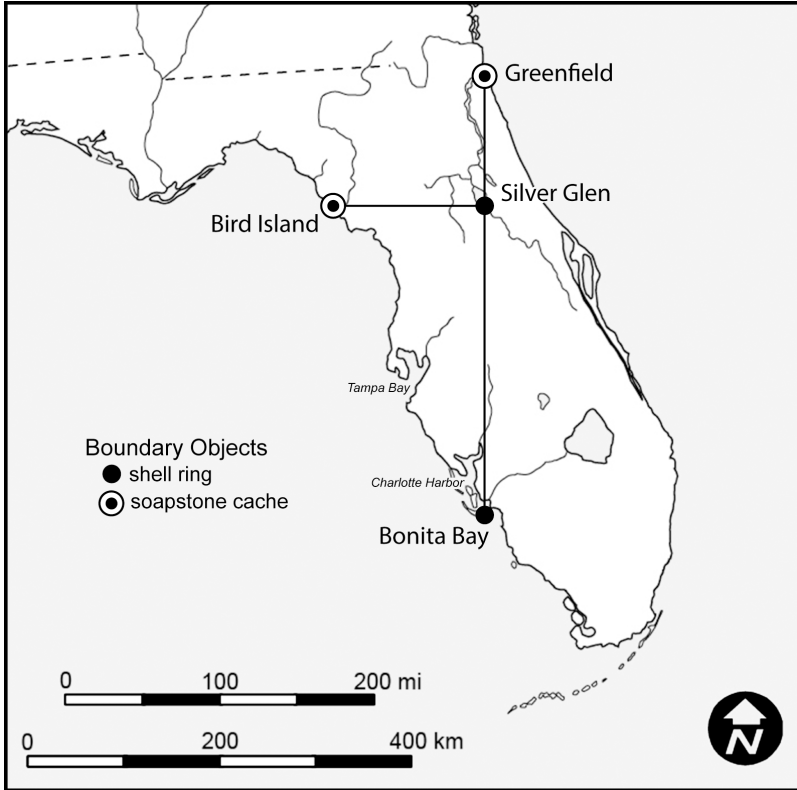


Figure 9.2. Meridian connecting Bonita Bay, Silver Glen, and soapstone cache at Greenfield site and orthogonal connecting Bird Island to Silver Glen. Illustration by Kenneth E. Sassaman.

The function of shell rings is a matter of ongoing debate among regional specialists, with some emphasizing residential aspects and others their ceremonial import (Russo 2006:8–26). Whatever the activities at Silver Glen, they resulted in the accumulation of an enormous amount of pottery, some of the oldest and most ornate in all of Florida (Gilmore 2014). This was the advent of pottery making regionwide, and it arrived with great fanfare. Literally thousands of large decorated bowls were used, broken, and discarded on the northern fringe of the ring, which was elevated several meters above the lake. The assemblage has all the hallmarks of large-scale feasts, and the facilities to provision large

groups of people with food is well-documented at a location only 500 meters west of the ring (Gilmore 2014).

That large-scale feasts at Silver Glen were attended by nonlocal persons can be seen in the provenance of the pottery. Many of the vessels deposited at Silver Glen were made from nonlocal clays. Neutron activation analyses conducted by Gilmore (2014) show that 63 of the 125 vessels sampled from the ring were made from clays from southwest Florida, at least 200 kilometers away. High levels of antimony, uranium, and sodium, along with limited iron, point to clay deposits located between Tampa Bay and Charlotte Harbor, not too far north of Bonita Bay. Notably, the shell ring at Bonita Bay is itself devoid of pottery. In general, this region of Florida is believed to be late in adopting pottery, even with large centers of settlement—like Bonita Bay and the somewhat earlier Horrs Island (Russo 1991)—thriving during the first few centuries (4,400–4,100 cal B.P.) of pottery use at places like Silver Glen. Multicentury alliances between communities who made pottery and those that did not are documented elsewhere in the greater region (Sassaman 1993). The clay sourcing data from Silver Glen, however, suggests that alliances with groups in southwest Florida involved the transfer of vessels (and presumably persons) by coastal communities that made but did not consume vessels locally, at least not in archaeologically conspicuous ways. The production of vessels for gifting would later become a hallmark of Woodland-era communities of the Southeast (Wallis 2011).

One hundred and twenty kilometers north of Silver Glen on the meridian connecting it to Bonita Bay is a site on Greenfield Peninsula on the south bank of the St. Johns River that contained at least four soapstone vessels, three in proximity to burials (Smith et al. 2001). The age of the burials is uncertain, but soot from one of the soapstone vessels returned an age estimate of ca. 3,550–3,350 cal B.P. (Sassaman 2006). This is obviously much later than occupations at the two shell rings on the meridian but coeval with the high-volume transfer of soapstone vessels along the Gulf coast and up the Mississippi River, discussed below. The lack of coevalness among burials, objects, and occupations obscures what are arguably related historical events. For instance, the association of soapstone vessels with burials and early pottery at Bird Island illustrates how the three were enchainned in practices elapsing over centuries. The burials at Bird Island are not well-dated but almost certainly

predate 4,500 cal B.P.; the settlement at Bird Island dates to ca. 4,450–4,250 cal B.P. (McFadden and Palmiotto 2012); and the soapstone vessels deposited near the burials are estimated to date ca. 4,100–3,800 cal B. P. (Sassaman 2006). Early pottery is not abundant at Bird Island, but the site has produced sherds of an unusual type known as Tick Island Incised. Restricted to only a few sites, Tick Island Incised is most abundant at Silver Glen Run, dated securely to 3,900–3,700 cal B.P., and concentrated in a shell deposit that arguably capped the assemblage of food-processing pits for provisioning feasts at the shell ring (Gilmore 2015). Thus, the Bird Island sequence suggests that a location of burials on the coast at a time when sea level was down and the coastline seaward was later occupied, abandoned a century or two later, the recipient of soapstone vessels another century or two later, and then the recipient of a highly unusual pottery motif with a Silver Glen pedigree. What is more, Bird Island lies on an orthogonal of the meridian connecting Bonita Bay, Silver Glen, and Greenfield, about 165 kilometers due west of Silver Glen. Over 600 kilometers directly north of Bird Island is one of the sources of soapstone used to make vessels deposited at this Gulf coast site (Yates 2000).

The alignments inferred to this point among cemeteries, places of dwelling, large-scale gatherings, and caches of soapstone vessels were anchored by boundary objects to particular places, but they became reified as a constellation through movement—through knowledge, persons, and things “on the move.” As such they involved time, in this case centuries, but I suggest they were made timeless, reified as structure, by referring noncyclical and erratic movements, like those of the rising sea level, to cyclical movements of the sun. Substantiating this assertion requires up-scaling the constellation even further.

The meridians that intercept soapstone vessel caches in peninsular Florida, spaced some 165 kilometers apart, can be transposed over six multiples, westward across the Gulf coast, to intercept other known occurrences of soapstone vessel caches and/or major sources of soapstone in the interior Southeast (Fig. 9.3). Notable among the caches is one at Claiborne at the mouth of the Pearl River in Mississippi (Bruseh 1991), itself a shell ring of sorts, as well as a massive cache involving 200–300 vessels at Poverty Point in northeast Louisiana (Webb 1944), a complex of earthworks erected between 3,600–3,200 years ago.

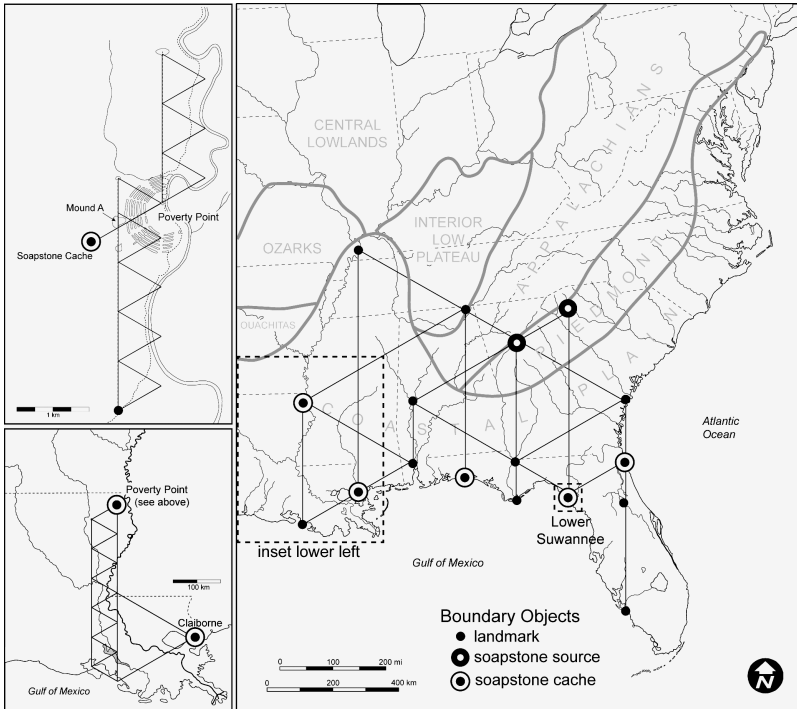


Figure 9.3. Futurescape of the Late Archaic period along the greater Gulf coast, showing boundary markers of soapstone caches, soapstone sources, and other landmarks aligned to meridians and solstice angles. Lower Mississippi River (inset lower left), showing relationship of Claiborne to Poverty Point, and Poverty Point site (inset upper left), showing siting of mounds through triangulation and soapstone cache on solstice angle aligned with two mounds, including Mound A. Illustration by Kenneth E. Sassaman.

There is much more to Poverty Point than its assemblage of mounds and cache of soapstone. Poverty Point occupies the end of the 2,000-year sequence in question and thus encapsulates the historical interpretation of centuries past, as well as the social geographies involved, which were vast considering the inventory of nonlocal materials besides soapstone (Gibson 2000). Revealed in the layout of the mounds is a measurement system traced to earlier mound traditions (Clark 2004) and, in the case of Poverty Point, deployed in reference to solstice angles (Brecher and

Haag 1980; Romain and Davis 2013). Poverty Point was erected on a meridian, actually two meridians, spread 600 meters apart (Sassaman 2005). In practice, the layout of mounds on a straight line is merely a matter of sighting and back-sighting, but the practice of triangulation adds the possibility of measurement across space; it is, in fact, dependent on known distances between points. Equilateral triangles offer the simplest means to triangulate a straight line at fixed intervals, but they necessarily involve the sighting of two parallel lines, like those at Poverty Point. As noted earlier, equilateral triangles assume solstice angles when one axis is aligned to a meridian.

The scale of Poverty Point's residential community is a matter of enduring debate, but in one moment of grandeur, near the end of its time, a few thousand people converged at this place for a few months to participate in a massive public works project. Mound A at Poverty Point, the second-largest earthen mound in North America, was erected in less than 90 days by a work force of at least 2,000 persons. This is the informed projection of Anthony Ortman and T. R. Kidder (2013; see also Kidder 2011), who add an estimated 1,000 support staff to the roster. There is little to suggest that all of these people resided at Poverty Point and much more to suggest that many of them converged at this place at this time to erect this mound. Its collective intentions aside, the gathering that was Poverty Point's crowning moment brought together for the largest public works project to date a community that was distributed widely across much of the Gulf coast (see also Spivey et al. 2015). What united them in practice was a shared set of cosmological principles about directions and distance that arguably was rendered temporal with reference to moving bodies, in this case the sun, but ultimately the transgressive sea.

Solar Senses

Like so many other celestial bodies, the sun is accessible to all sighted observers and universally understood by them to "move" across the sky in redundant, hence predictable ways. The sun of course rises on the eastern horizon each morning and sets on the west, temporalizing with sunlight the rhythms of day and night. But given the ecliptic of the earth from a Gulf coastal perspective, the sun seems to migrate north along the horizon as it rises from its southeast position at winter solstice to its northeast position at summer solstice. Migrating back south after

its June 21 standstill, the sun therefore has both diurnal and annual cycles, the former subject to the latter in ways that account for the lengthening and shortening of days and attendant physical and ecological changes we recognize as seasonal change.

The sun factors into wayfinding in cultural contexts across the globe, and no doubt through all of human time (Pauketat 2013). Lynch (1960: 128–131) reviews several examples of solar wayfinding in his discussion of reference systems. The sun has obvious utility in determining cardinal directions, as any Boy Scout knows and our modern GPS units render obsolete. But beyond the capacity to determine which way is north, the sun's annual migration, north then south, across the horizons, both east and west, adds a spatial dimension to wayfinding that could be related, metaphorically (and perhaps as a boundary marker), to the rate of change, in this case a transgressive sea and retreating coastline. Thus, from an orientation along a meridian, solstice angles enabled the triangulation method used not only to site mounds at places like Poverty Point but also to temporalize movements north, notably the anticipation of landward resettlement with the rising sea.³

What cannot be inferred from available data is how Gulf coastal dwellers calibrated the spatial and temporal dimensions of the sun's movement as a referential system of wayfinding. I can only speculate on this for the time being but will note here that both short- and long-term dimensions are implicated in solar motions. The westward movement of soapstone among communities distributed along the Gulf coast, from Florida to Louisiana, followed the daily path of the sun. The relocation of cemeteries, the replication of the Bonita Bay center at Silver Glen, and the evolving moundscape of Poverty Point all went north, with the transgressive sea and migration of the sun into six months of growing days. It is hardly inconsequential that soapstone vessels were emplaced in caches (sometimes deliberately broken) after settlements were abandoned at set intervals along the sun's east-west path. How the temporality of this direction informed the temporality of north-south movement remains to be seen, but I suspect it is somehow related to the rate at which sea level rose and thus enabled coastal people to anticipate the timing of future abandonments.

Soapstone vessels in this *futurescape* (Sassaman 2013) were far more than tools of subsistence; they were, indeed, boundary objects. Given

the relative position of caches to other points of significance on the solar grid, it is worth considering that soapstone was a major medium of interaction and connectivity, a medium of consumption that defined constellations of practice. Quarry sources of soapstone and locations of caching are as far apart as 800 kilometers as the crow flies and no shorter than 400 kilometers. Meridians connect geological sources to caches in only one case (Bird Island), so I do not imagine that each of the caches had a spatial reference to meridians alone. However, three of the five caches occupy locations that fall along rivers oriented north-south (one, the St. Johns, flowing north and the others flowing south, to the Gulf). Moreover, the Gulf coast itself is generally orthogonal to these rivers (i.e., east-west in flow), and even the easternmost cache, near the mouth of the St. Johns River, lies on the orthogonal of meridians. The distribution of soapstone vessel caches maps on to the physiography of the Gulf coast and the rivers that drain into it, thus serving as geographic boundary objects for the interconnectivity of far-flung communities. As noted at the outset of this chapter, constellations of practice can be construed as networks of consumption. In this sense, the distribution and ritual caching of soapstone vessels signal a constellation of interacting communities whose shared experience with sea-level rise invited connections to high, dry interior lands in the direction of rebirth or renewal (north). It is thus hardly surprising that, following this logic to its end, the largest cache of soapstone vessels anywhere in the continent is at Poverty Point, the interior-most location of a massive constellation of practice and a major locus of consumption. As a metonym of not physiography per se, but movement across space, the soapstone cache at Poverty Point completed a 1,500-year-long journey that began in the mountains of present-day Georgia, 800 kilometers to the east.

Conclusion

To understand why 3,000 people converged in northeast Louisiana for at least 90 days to erect a massive effigy mound in the shape of a bird flying west is to understand how history was mobilized to intervene against uncertain futures. Those enterprising people were accustomed to moving north with the rising sea, to reorienting themselves to the solstices that pointed to both pasts and futures. This was a transposable image

of the environment, to use Lynch's (1960) term. It was useful in gauging the rate of change and thus anticipating futures. Space precludes detailed discussion of Poverty Point's watershed moment: why it was so much larger in scale and more elaborate in form than anything that came before. In short, I will note that the construction of Mound A at Poverty Point signaled a new sense of the future. After experiencing rising seas for centuries, even millennia—enchaining distributed communities along a flood-prone coast through exchanges of soapstone and other media; emplacing through movement a solar grid that anticipated future relocations with familiar, transposable time-space references; and effectively coping with drastic changes in the land—the climate got wetter and cooler, and the sea began to recede (Kidder 2006). It must have been a moment of existential crisis. In erecting Mound A and emplacing into a pit on the angle of a setting winter solstice sun hundreds of broken soapstone vessels, the once-distributed communities that converged at Poverty Point redistributed themselves in a way that is today recognized by archaeologists as a thorough remaking of the cultural landscape of the southeast United States (Thomas and Sanger 2010). The once-distributed communities that converged at Poverty Point in this moment redistributed themselves in new form across the region, to become, for a while, nearly archaeologically invisible.

This was the endpoint of a constellation of practice that was 15 or more centuries in the making and—because of its protracted history of motion—arrayed across a vast swath of geography. The cosmological core that defined this constellation focused on practices that linked past experience with imagined futures, which, in this case, were not all that different from the past insofar as the spatial relationships of the cosmos, the *futurescape*, were transposed without structural change. The time-space scale of this constellation and its *futurescape* exceeds that of contact-era Araucanians in Chile. Dillehay's case material might be best classified as the mesoscale of practice (*sensu* Knappett 2011), arguably where communities of practice reside. The case I have described here includes vignettes of mesoscale histories—such as the relocation of Gulf coast cemeteries, the establishment of Silver Glen, and the construction of Mound A at Poverty Point—but ultimately, it is the macroscale of practice that warrants further investigation because of the challenge in linking real-time learning with enduring cosmologies. As with the Araucanians, the Gulf

coast communities participated in ritual events that enabled otherwise-situated persons and communities to coalesce around a set of shared ideals, tracing ultimately to shared experience with sea-level rise. Again, the power intrinsic to the Spanish Conquest regime of Araucanian communities may be vastly different from the power intrinsic to the processes of climate change, but both were turbulent, eventful, ever-threatening, and potentially fatal to large numbers of people.

Referring environmental change to movements of the sun not only normalized the variation of erratic change but also “democratized” knowledge about the cosmos that had practical utility in long-range planning. The sun in this regard was a broker that connected pasts with futures, and the caches, mounds, settlements, and landscape features aligned to the solstices were the boundary markers of connectivity. These resources made wayfinding an effective intervention for people experiencing frequent displacement and settlement. It may be useful to imagine how such a constellation of practice might inform our own challenges of coastal displacement and resettlement as an alternative to the capitalist forces that operate with time horizons too short to mitigate long-term risks.

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Notes

1. Conversely, Florida is now twice the peninsula it was during the last interglacial era, some 125,000 years ago, the last time the Greenland and West Antarctic

ice sheets collapsed. Projections for climate change and sea-level rise going forward have not factored these sorts of collapses into our futures because of enduring uncertainties. Geologists Dutton and Lambeck (2012), however, are documenting the rate and magnitude of this past future 125,000 years ago in order to lessen the uncertainties of our own.

2. Unless otherwise stated, age estimates reported here are based on radiocarbon assays calibrated using OxCal v4.2.4 (Bronk Ramsey and Lee 2013), although for ease of communication, ages or age ranges are generalized to the nearest century or half century.

3. A note here on the method of triangulation with solstice triangles is warranted. Any three people with two pieces of cordage of exact length can execute triangulation on flat ground with no obstructions. Of course, the longer the cordage the more challenging the triangulation, but theoretically the method works with any length desired. So, for instance, three people with two lengths of cordage, say 20 meters long each, can make a perfect equilateral triangle with minimal instruction. One person stands at an arbitrary starting point, while the second person stretches one length of cordage to its full extent. With these two persons each holding the end of a length of cordage, the third person walks away perpendicular to the baseline until the two cords intersect at the opposite ends when pulled taut. The result is an equilateral triangle with axes 20 meters long and a median of 17.3 meters. From this starting triangle the crew of three can extrapolate outwards in any direction parallel to one of the three axes, forming parallel lines as they triangulate outward, one nested triangle at a time. Now, if we were to orient the baseline on a north-south line, the resultant axes emanating outward follow the generic solstice angles of mid-latitude geography: 60 and 120 degrees east of north for the summer solstice and winter solstice rises, respectively, and, in the opposite direction, 240 and 300 degrees east of north for the winter and summer solstice sets, respectively. One would not need to use the solstices to establish a north-south baseline (that can be done with a pole in the ground in the manner of a sundial), but it would be obvious to anyone paying attention to the annual migration of the rising and setting sun that triangulation mirrored solar orientations. In other words, it would not take long for individuals to learn how to triangulate and to understand how this method related to solar movements, although it no doubt required a good bit of experience to chart meridians over great distances with accuracy.

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