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To cite this article: Gustavo Martínez & Peter Mitchell (2017) Introducing Coastal Deserts, The Journal of Island and Coastal Archaeology, 12:1, 1-7

To link to this article: <http://dx.doi.org/10.1080/15564894.2016.1272505>



Published online: 17 Jan 2017.



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Introduction

Introducing Coastal Deserts

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Coastal deserts sit at the interface of two quite different environments, one arid or semi-arid and terrestrial, the other littoral but becoming fully marine as one moves away from the shore (see Bailey et al. 2008:2095). The situation is even more complex where these arid or semi-arid environments are crossed by rivers that rise elsewhere, or where they form part of ecotones in which different biological communities intersect. Arising out of a session held at the Fourth Southern Deserts Conference in Mendoza, Argentina, in November 2014, this special issue of the *Journal of Island & Coastal Archaeology* explores how people have dealt with these situations in the coastal deserts of the southern hemisphere. Its focus is on the diverse ways in which people have inhabited, exploited, and transformed coastal desert environments as part of the overall organization of human behavior over a period that reaches back into the

Upper Pleistocene and forward into historical times.

One of the first things to note is how extensive and diverse the specifically *coastal* deserts of the southern hemisphere are. Although the cases presented here do not exhaust their ecological and archaeological variability, they nevertheless offer an interesting panorama of some of them. In this sense, for example, the Atacama Desert of South America's Pacific coast represents a hyper-arid environment that is nevertheless bordered by an exceptionally rich marine one, while the long Atlantic shore of Patagonia (Scartascini 2017; Martínez and colleagues 2017) combines arid to semi-arid inland regions with productive marine environments that are significantly enriched by the resources found at the mouths of rivers and in deltas. Across the Atlantic Ocean, extreme aridity imposed severe limits on human settlement in the world's oldest desert,

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the Namib (Kinahan and Kinahan 2017), limits still felt in the only marginally less arid landscapes of Namaqualand, in the far northwest of South Africa (Dewar and Stewart 2017; Orton 2017). Australia, the world's driest inhabited continent, brings a particular dimension of its own to the study of coastal deserts since the survival of archaeological deposits on offshore islands opens up opportunities to explore human use of arid landscapes as their very configuration changed significantly through the late Pleistocene and Holocene (McDonald and Berry 2017; Veth et al. 2017).

With the longest archaeological record of any of our case studies, the article by Kinahan and Kinahan (2017) illustrates the punctuated nature of human occupation along the Namib Desert's coast from the mid-Pleistocene to the nineteenth century AD. Access here to the marine resources used by people practicing different economic systems (hunter-gatherer and nomadic pastoral communities) depended greatly upon coastal geomorphology, but instead of interpreting coastal environments as isolated cores of human occupation, Kinahan and Kinahan see them as connected with their hinterland via oases and ephemeral river systems. In a similar vein, Martínez and colleagues (2017) connect the records of coastal and inland environments from northeastern Patagonia to explore whether a process of regionalization (see Lourandos 1997) took place in this region in the late Holocene, drawing in evidence on a wider, macro-regional scale that includes both the Argentine Pampas and northern Patagonia. This arid to semi-arid ecotonal landscape crossed by important rivers provides an interesting scenario for discussing issues related to increasing territoriality and the emergence of relatively closed social systems, with human burial practices, evidence for increased ritual activity, and the circulation of lithic raw materials and images on portable items providing a basis for discussing processes of regionalization here during the last 1000 years BP. Focusing more on a single site, Dewar and Stewart (2017) present a complete set of data from Spitzkloof A Rockshelter in order to deal

with chronology, subsistence, and settlement in northern Namaqualand's rugged Richtersveld. This site testifies, if intermittently, to human occupation in some of the coldest portions of the Pleistocene, from ca. 50,000 to 17,000 cal BP. Central issues in their article relate to the timing of human dispersal into, and the first hunter-gatherer exploration and settlement of, this harsh environment. Their discussion underlines the necessity of understanding palaeoenvironmental change since nowhere have climate and environment remained wholly static over the time-spans through which people have inhabited this, or other, desert regions. As they indicate, enhanced rainfall and lower evapotranspiration made Namaqualand attractive to people at several intervals through the late Quaternary. Providing a detailed analysis of the material culture record of late Holocene societies in the same region, Orton's (2017) contribution from the same region is another good case in point, since southward movement of the herders perhaps represented archaeologically by his Group 2 assemblages may well have been facilitated by a slightly moister and cooler Neoglacial climate, combined with the greater accessibility of water for herds of cattle and flocks of sheep along the coast (Orton et al. 2013).

McDonald and Berry's (2017) research on Rosemary Island in northwestern Australia has yielded that continent's first evidence for domestic stone structures dated to ca. 8,000 cal BP. Their construction took place in a context where people adopted a mangrove-focused occupation strategy as part of a complex set of behaviors, among them rock art production. Collectively, these behaviors indicate increased social pressure arising from diminishing territories, as the coastal plain on which people lived became an outer island of today's Dampier Archipelago. They provide important insights into the dynamics of mobile, arid-adapted hunter-fisher-gatherers in the Early Holocene. In the same region of Australia, Veth and his co-workers (2017) address changes in the regional hunter-gatherer economy using data from Barrow Island. Drawing on multiple lines of

evidence (archaeological, zooarchaeological, and geoarchaeological), they conclude that marine resources were being consumed in this region well before the Holocene and that coastal resources were not only an important part of people's subsistence, but were also being transported inland by at least 17,000 BP. The specific combinations in which those resources were exploited on Barrow Island show further changes through into the Holocene, while across the world on the Atlantic coastline of Patagonia, Scartascini (2017) gives us a detailed study of variation in the exploitation of one category of marine resource—fish—over the last 5500 years BP. Taking into account latitudinal and chronological parameters, he proposes that fish remains in the archaeological record significantly diminished at higher latitudes in response to a combination of environmental and cultural causes.

We turn now from the specifics of individual contributions to some of the wider comparative themes that they address and to others not discussed here that also merit consideration. First, we note that arid and semi-arid landscapes have repeatedly undergone intense geomorphic activity, abrupt changes in depositional processes, and high rates of erosion. These conditions frequently lead to differential destruction of landforms and of the archaeological record associated with them, resulting in serious taphonomic and visibility biases. As a result, sites in stratigraphic position are not always available, or may be deeply buried, and archaeological materials are often strongly degraded. In these environments it can therefore be difficult to find continuous stratigraphic sequences that contain archaeological data. Even the record of the coastal fringe and the immediate inland portion can be differently affected by geomorphological processes. The existence of “gaps” in many of our regional sequences then raises important issues when it comes to understanding social processes and adaptations over time, issues that can be usefully investigated by looking at the probabilistic distributions of radiocarbon dates (e.g., Favier Dubois 2013; Martínez et al. 2013). As Kinahan and

Kinahan (2017) write of the Namib Desert, “Marine, fluvial and aeolian processes determined the visibility and survival of archaeological evidence on the coast.” In this sense, coastal areas that are part of arid and semi-arid environments present major challenges to understanding how humans living there organized themselves and how this changed over the long term. The contributions of Martínez and colleagues (2017) and Scartascini (2017) deal indirectly with these issues from a Patagonian perspective, while in southern Africa both Kinahan and Kinahan and Dewar and Stewart (2017) underline how deflation and a shifting marine environment can variously expose, degrade, move, and bury archaeological materials. Conversely, tidal inundation of the edges of the Walvis Bay lagoon has preserved the tracks of animals and people in great detail (Kinahan and Kinahan 2017), while in situations where few constraints affect where people can exploit coastal resources or camp, and deflation is limited, relatively undisturbed, palimpsest-free sites may survive, often marked by accumulations of shell. Such situations can provide highly unusual opportunities for understanding the spatial patterning of activities and campsite organization (Orton 2012; Parkington et al. 2009). As Orton's (2017) article demonstrates, when dated by a thorough and large-scale application of radiocarbon dating they offer a means of building robust regional sequences, even where rockshelters are few and far between.

A second issue that warrants attention is the extent to which the coastal archaeological record can be interpreted in an isolated manner, without considering areas further inland. Should we, in exploring their human occupancy, only consider situations where people lived at or near the sea all year round? Or are there distinctive ways in which they exploited those settings on a seasonal, or even less regular, basis, sometimes moving well away from the shore, or perhaps between different stretches of the same coast? How far indeed were coastal deserts refugia for populations confronted inland by much harsher environments, but sheltered, along the coast,

by more moderate temperature regimes, the enhanced effective moisture produced by coastal fogs, the availability of seeps where freshwater runs along bedrock to emerge beyond the high tide level, and perhaps ecologically more diverse and productive resources from both land and sea (see Borrero and Barberena 2006; Shea 2008)? Clearly, processes like subsistence, settlement, mobility, technology, and lithic raw material exploitation, social relationships, and mechanisms of exchange all need to be considered on a broader spatial scale than that afforded by coastal fringes alone. Several of the articles here address the importance of connections between coasts and their interiors. For example, Kinahan and Kinahan (2017) and Martínez and colleagues (2017) both raise issues that range from the exploitation of subsistence resources and lithic raw materials to processes of intensification that include marine resources such as fish, demographic packing, and regionalization, among others. In allowing people to move with ease between the shore and areas inland of it, Dewar and Stewart (2017), Kinahan and Kinahan, Martínez and colleagues, and Orton (2017) also demonstrate how even simple technologies like the use of flasks for carrying and storing water made from the eggs of large ratites (ostriches in Africa, Rheidae in South America) can be effective in overcoming some resource constraints. Moreover, such flasks are often profusely decorated (e.g., Martínez et al.; see also Carden and Martínez 2014), reminding us that the encoding of information in symbolic form and the establishment of effective systems of social communication are additional critical components of living successfully in desert environments. Together with the employment of material culture to signal identity in the form of jewelry, such as ostrich eggshell beads (e.g., Orton), and the circulation of specific kinds of lithic raw materials (e.g., Martínez et al.), such evidence allows us to address aspects of past desert adaptations related to social networks and the processes of social integration and/or differentiation in operation between groups (e.g., Hitchcock 2012).

Marine and littoral environments have changed profoundly over time, not least because at times of lowered sea level what are now coastal deserts may have been located well inland and the archaeology of such coastal arid or semi-arid habitats as did exist is now lost to rising sea levels or—in favorable circumstances—preserved on what are now offshore islands. The formation of those islands (variously described as “islandization” or “insulation”) provides extensive opportunities for exploring how people shifted their use of available resources and altered their exploitation of the regional landscape in response to sea-level transgression. Archaeological investigations on them may also be able to identify much older instances of coastal resource use than survive along present-day continental shorelines. Here, the articles by McDonald and Berry (2017) and by Veth et al. (2017) consider precisely these situations with respect to northwestern Australia where several islands that are now offshore were part of the mainland during the Pleistocene. McDonald and Berry, in particular, also emphasize the importance of considering how people understood, made sense of, and laid claim to the landscape in which they lived, for example by inscribing it with rock art or constructing permanent structures, something that Martínez and colleagues (2017) discuss further with regard to the emergence of formal areas for the burial of the dead in northeastern Patagonia.

Yet even where, as in southern Africa, the continental shelf is comparatively narrow, offshore islands are effectively absent, and sea-level change is *not* therefore a major consideration, the productivity of coastal environments has certainly altered, an outcome of coastline configurations and morphologies, variation in the strength and direction of offshore winds and currents, and processes of ecological succession. As Peter Veth and his colleagues (2017) remind us, the result may well have been novel resource configurations that have no modern parallels. Change, then, in space and time—and the possibilities of coordinated, tele-connected, change across the southern hemisphere—is one major theme for

the future: one obvious focus is the El Niño/Southern Oscillation (Holmgren et al. 2006), which today has major effects on the marine productivity and onshore climate of the Pacific desert coasts of South America while bringing cyclical floods and droughts to much of arid Australia. At more regional levels, the impacts of the Indian Ocean Dipole and the so-called Benguela Niño—and the connections between all three phenomena—also merit exploration.

An obvious, but nevertheless important, characteristic of coastal habitats is the availability of foods that are unavailable inland. Because of the productive nature of many offshore environments, such resources are often plentiful, and in many cases relatively easy to acquire. Fish, sea birds, marine mammals such as seals and sea lions, but above all shellfish all exemplify this, with beached cetaceans or occasional mass mortalities of fish and invertebrates like rock lobster (*Jasus lalandii*) providing additional, if sporadic, bonanzas (e.g., Favier Dubois et al. 2009; Parkington et al. 2014). But abundance is not universal (indeed, some marine environments may themselves be ‘deserts’), and many factors enter into the decision to exploit—and at what level—the resources that coastlines offer. Special technologies may be needed: the Atacama stands out, for example, for being the only southern hemisphere desert from which people regularly moved offshore to fish, though even there watercraft were not particularly seaworthy (with wood scarce, reed bundles and seal-skin floats were typically used; Bruhns 1994:284–285). Also in the Atacama, marine resources seem to have been a persistent staple for at least 8,000 years (Rebolledo et al. 2016), though elsewhere, for example on South Africa’s Atlantic coast, this possibility has been questioned (with specific reference to shellfish) because of a perceived risk of protein poisoning (Noli and Avery 1988). Of more general relevance, we need to consider the costs and benefits of particular resources. Thus, high processing costs and low returns per animal may certainly forestall the use of some kinds of shellfish, at

least where other constraints, like drinking water, keep populations small and mobile. The characterization of desert-dwelling Holocene people living on southern Australia’s Anxious Coast as keeping “their backs to the sea” provides a good example of this (Nicholson and Cane 1991:12),

Though not directly covered by any of the articles included here, the use of boats, which is well attested in the coastal Atacama Desert, lets us go even further from the shoreline and the areas immediately inland of it by positioning people *in* the sea, inviting us to play with notion of “seascapes” (Gosden and Pavlides 1994). To a lesser degree, the fishing techniques employed in some parts of Patagonia, as described here by Scartascini (2017), also make sense if we employ such a concept. These examples encourage us to consider the processes whereby people living in coastal deserts built and perceived their environment, an environment in which “the sea is not necessarily either a bridge or a barrier: it is what people make it” (Gosden and Pavlides 1994:170)

A final topic for further comparative study might be that of “deserted coasts,” the identification of fluctuations in the densities at which people inhabited coastal deserts and the conditions that encouraged, or constrained, that settlement. The articles here by Kinahan and Kinahan (2017) and Dewar and Stewart (2017) emphasize this from a southern African perspective since occupation signatures in both the Namib and Namaqualand are highly pulsed in time. One particular constraint, however, is independent of resource availability since it arises from the very configuration of coastlines themselves. This is because, unless they can reach other shores or offshore islands, people living along them inhabit an environment reduced to just three, rather than the normal four, orientations. Adding yet another constraint, where essential resources, such as water, are absent—as John and Jill Kinahan show was the case in much of the Namib—linear movement along the coast may itself be precluded, enforcing an inland-shore relationship channeled along ephemeral river

courses where water can still be found. We need to ask how either of these situations might have impacted on opportunities for aggregation and dispersal, or the maintenance of the networks needed to access information, exchange items, foodstuffs (in times of scarcity), and spouses. Ethnographic data lend support to computer simulation models that suggest human mating networks are most efficiently arranged in hexagonal fashion, with each constituent band having at least six neighbors (Wobst 1976). However, along coastlines the costs of maintaining these networks are literally stretched out, limiting the distances over which effective interaction may be possible, especially for those on their peripheries or without the distance-shortening assistance of watercraft, at times perhaps beyond what was biologically or socially sustainable (Stein Mandryk 1993:46). The importance of the social networks signaled by engraved ratite eggshell water flasks, shared patterns of lithic raw material use, and other forms of material culture to which we have already referred becomes readily understandable when considering these issues. They, and the other questions raised in this issue, will undoubtedly also benefit from comparing the histories of human populations in the coastal deserts of the southern hemisphere with the trajectories of those living in the many coastal deserts north of the Equator.

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