

A Look to the North and South: Camelid Herding Strategies in the Desert Coast of Peru

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Introduction

This contribution to the *Desert Archaeology* issue provides a coastal perspective from the Peruvian Andes region. The use of pack animals, the domesticated New World llama (*Lama glama*) and alpaca (*Vicugna pacos*), were important participants in economic systems connected to wool production, textile trade, large-scale feasting events and political ecology of arid environments. Much more work still needs to be conducted on coastal camelid herding, as there is little known concerning when camelids were introduced to the coast as well as how they were used in later prehistory (Mengoni and Yacobaccio 2006). Nevertheless, we do have evidence-and emerging ideas-regarding coastal interaction. This paper aims to demonstrate that human-animal relationships became established among coastal groups and their camelid herds. These relationships were essential to the success and expansion of distinct cultural practices and socio-political ideologies. In the case of this paper, the Moche and Nasca societies serve as case-studies to analyse coastal camelid practices.

Various projects that have considered highland herding have stressed environmental fluctuations, socio-economic transformations and the complex relationship with agriculturalists; as well as the spread of languages (Finucane 2009; Grant and Lane 2018; Kuznar 1990, 1995; Lane 2006, 2010; Lynch 1983; Moore 2016). These high-altitude settings presented past communities with arid periods, flooding events and unpredictable frosts. Some may think that the harsh desert landscape may have limited. However, in reality, the flexibility, resilience and mobility of the pastoral lifeway allowed not only for survival, but the expansion of communities and the flourishing of political, economic and ideological influences (Rademaker et al. 2014).

While highland environments have been the focus of past studies on camelid herding, coastal regions provide another landscape where one can research the resilience and complexity of early Andean societies. This paper considers the coastal region of the Peruvian Andes to establish the setting where the use of domesticated New World camelids formed an important factor for the expansion of socio-political and religious systems. Much has been written about the exploitation of herding animals in various parts of the world (Smith 1992) and the role that these animals played in early milk production, development of social complexity and diversity of lifeways. This article proposes to move beyond discussions about human-animal interactions from early hunter-gatherer contexts in the Andes and moves towards considering how herding in desert environments was integral to the construction of state ideologies in arid contexts.

Coastal Region of the Peruvian Andes

The coast of the Peruvian Andes is hyper-arid with expansive areas of sand and large dunes (fig. 1). This environment can receive as little as 20mm of rain per year, with some surface waters being replenished by mists (or *garúa*) during the winter months between May and December (Collin Delavaud 1968; Peñaherrera Del Aguila 1986). *Lomas* consist of succulent plants and other herbaceous species that take advantage of the higher moisture content. *Lomas* are the perennial ecosystems that occur on the Andean foothills between 200 and 1,000 masl and provide a setting for wildlife like deer, coastal birds and vegetation to forage and grow (Beresford-Jones *et*

al. 2015; Dollfus 1978). Engel (1973) attests to a high density of Holocene and later occupational period sites being associated with the *lomas* during periods of marine transgression and warmer environments. Persistent vegetation has been recorded following El Niño events that cause greater rainfall along the desert coast and can mimic *lomas* environments (Vining 2018a). While the *lomas* environments provided seasonal moist settings for different species to converge, it was the rich river valleys of the coast that teemed with life and interaction.

This dry environment is bisected by 53 lush river valleys supporting diverse ecosystems that form the convergence point for many species. These ecosystems are active places where greater species interaction occurs as they take advantage of the large water resource, vegetation and species to collect from riverine sources as well as terrestrial species like deer (*Odocoileus virginianus*). Outside of these river valleys and the *lomas*, the coast is not a place where agriculture and permanent animal husbandry is possible. These kinds of practices were pursued following the transformation of the desert landscape to include complex irrigation systems including canals, feeder channels and ordered fields systems to maximise the areas where water could reach for agricultural production (Dillehay et al. 2009).

The transformation of this arid landscape allowed for high agricultural yields and for long-distance trade to occur with evidence of coastal, highland and jungle environments exchanging goods (Rademaker et al. 2014, 2016; Vining 2018b). There were cycles of disruption in these annual practices with El Niño events, which could result in flooding and the collapse of fishing industries on a 7–20 cycle (Sandweiss et al. 2001; Vining 2018a; Wells and Noller 1999). The impact on fishing industries was significant during these El Niño events because it threatened resources that could have been important supplemental food sources. Therefore, if these resources were at risk, agricultural success was required to be more prosperous to feed communities along the coast and in these arid environments (Duke et al. 2018). With the threat of failure in agricultural yield, long-distance trade via caravan routes would have allowed resources from the highlands and other parts of the coast to be brought to areas where certain resources were needed.



Fig. 1. Topographic map of Peru with locations of sites that are mentioned in the text (Adapted from Vidal 1987).

Domesticated New World Camelids and Pastoralism in the Andes

The llama (*Lama glama*) and alpaca (*Vicugna pacos*) have been essential to the kinds of feasting practices, trade relationships, value systems and ideologies of the Peruvian Andes for millennia (Alaica 2018; deFrance 2009; Miller and Burger 1995). These animals have behavioural traits—such as strong territoriality and resistance to arid environments—that made their use in early hunter-gatherer traditions ideal for providing meat resources but also in cultivating extensive networks of interaction (Franklin 1982). Early Holocene evidence in the Arequipa region of Peru show that obsidian trade could have been sustained and expanded through caravan routes that placed great dependence on this raw material for many lithic industries in the region and farther abroad (Rademaker et al. 2016). Coastal and highland interaction has been further established through these routes with seasonality evidence at Quebrada Jaguay that show seasonal movement of communities were descending from the highlands to extract marine resources as well as trade obsidian with coastal societies (Gruver and Rademaker 2018). This early evidence showcases that camelids were capable of moving great distances and surviving across highland and coastal environments.

The domesticated camelids are medium-sized animals that were previously thought to be adapted to high-altitude settings but recent research has attested to their affinity to dry coastal environments (Dufour et al. 2014). The llama can thrive in a variety of landscapes, while the alpaca tends to be more of a highland domesticate. Llamas can prosper in a setting above 3,500 meters above sea level. These animals can carry packs of 35 kilograms for a day's journey (or approximately 25km) (Andaluz Westreicher et al. 2007). From ethnographic work (Andaluz Westreicher et al. 2007), it has been observed that male pack animals are not sheared so that part of the animal's coat is used as a cushion for their loads. The female llamas are sheared but this fibre is mainly used for rope making, as the quality of this material is lower than that of the alpaca. Llama coats can be white, light brown or black while it is uncommon to find spotted examples (Goepfert et al. 2018).

Alpacas can live between 15 and 25 years, and once they reach seven years they become mainly a source of meat (Andaluz Westreicher et al. 2007). Smaller than llamas, they are adapted for environments with low humidity and altitudes of 4,000 to 5,200 meters. Alpacas bred and maintained in lower altitudes, such as below 3,400 meters, are affected by parasites that can change the integrity of the wool, making it short and uneven thus reducing this valuable resource (Andaluz Westreicher et al. 2007). The shearing of alpacas occurs, from November to December, before the rainy season (Dransart 2009). Alpacas are sensitive to the amount of moisture that they are exposed to and if there is inadequate rain then they can develop a fatal foot disease, which ultimately leads to a higher mortality rate (Andaluz Westreicher et al. 2007). Alpacas require land to graze and they can quickly consume much of a pasture area (Franklin 1982).

While it has been argued that camelids are well-adapted to the highland *puna* environments (Browman 1974; Lynch 1983), they could have also survived in the dry coast. Antunez de Mayolo (1981) attests to llamas being able to drink brackish water and consume fodder rejected by horses, cattle, sheep and goats. Also, Wheeler (1995) relays from her analysis of the Chiribaya fibre that the coastal desert could have been a good place to raise llamas and alpacas, with the possibility of coastal breads from evidence of (1) uniformity and fineness of fleece, (2) accelerated fibre growth, (3) uniform colouration, and (4) existence of a single coat llama. The vitality of the desert has been addressed more recently with work in the Sechura region, in which various lines of evidence attest to populations for over 1000 years were exploiting the rich ocean resources (Christol et al. 2018). Therefore, there would have been both a need to herd camelids to the coast-to take advantage of marine resources throughout Andean prehistory-and these animals had the necessary traits to adapt to arid environments allowing for long-distance trade and interaction.

According to Andaluz Westreicher et al. (2007), the movement of people and herds between fixed points allowed for the seasonal exploitation of pastures, which formed the basis of transhumance lifeways in the Andes. While there is a strong connection between elevation shifts, precipitation and growing ranges, the barriers that existed between specific regions based on agricultural realities could have been broken down by herding.

Something specific to the coast is that horizontal transhumance can be more opportunistic, with movement between sites developing over short-term periods, such as with climatic disruptions (i.e. El Niño), economic factors and political forces (Tomczyk 2018). Dransart (2009) addresses how useful camelid herding and exploitation was to the arid environment of the Atacama Desert in the Archaic period that allowed for early sedentism. However, herding becomes a new strategy for the expansion of socio-political and ideological influence in later periods on the Peruvian Coast. Isotopic evidence collected by Szpak et al. (2014, 2015 and 2018) and Tomczyk et al. (2018) showcase patterns for local, small-scale animal husbandry. This suggests highland herds may not have been contributing to the camelid populations on the coast, or at least these highland animals are not as often deposited or used on the coast. We would argue that increasing evidence showing local, small-scale husbandry was a coastal response to the social and political complexity of the Early Intermediate and Middle Horizon phases along the coast when more intensive influence from Moche, Nasca and Wari ideologies were spreading throughout the coast environment (Alaica et al. in prep; Szpak et al. 2014, 2015 and 2018; Tomczyk et al. 2018). Taking control of camelid herds at the local level was a way for coastal communities to engage with these new political, social and economic complexities due to increasing long-distance interaction. By investing in their own herds, coastal communities were integrating themselves in the network of camelid communities that provided social capital in addition to the economic and political ones.

Early work on pastoralism (Bonavia 1996; Kent 1983; Miller and Burger 1995; Shimada and Shimada 1985; Wheeler 1982, 1984, 1995) considered mainly highland strategies of pastoralism. These strategies focused on the concept of the vertical archipelago of the Andes and the socio-political practices of sharing between microclimates to sustain population growth (Murra 1980). However, Shimada and Shimada (1985) considered the question of camelid herding on the coast more closely and argued that camelids, including both llamas and alpacas, are physiologically capable of not only surviving on the coast but can *thrive* there. For Shimada and Shimada (1985), coastal polities would have had control over caravans in a way that made them dynamic members of highland-jungle-coastal

trade networks. The inland vertical dimension of this trade is known from earlier publications (Browman 1984; Lynch 1983; Murra 1980) but Shimada (1982) considers that the coast had a *horizontal* dimension of travel and trade. This would have created significant relationships between fishermen, agriculturalists and herders and would have enabled ideas and goods to spread. There are great social implications for horizontal, coastal networks that involved camelid caravans because these animal groups would have afforded economic capital and power to polities that had domain over herds (Shimada and Shimada 1985). This is evident in the ways that both coastal and highland powers established and colonized areas of the coast to reinforce exchange centres that brought many kinds of trade and interactions. For example, Wari influence in the central coast at Castillo de Huarmey showcases how this highland-originate power saw the coast as a valuable area to establish a centre of influence (Tomaczyk et al. 2018). Moche influence along the north coast is concentrated between the Lambayeque and Nepeña Valleys but there is a pocket of Moche influence in Piura at the site of Loma Negra. The great distance between these two regions would have been connected by camelid caravans bringing Moche style ceramics, Moche copper and Moche ideas to this frontier zone (Quilter and Koons 2012).

Recent work on isotopic analyses have demonstrated that coastal camelid rearing is strongly evident (Dufour et al. 2014, 2018; Mader et al. 2018; Szpak et al. 2014, 2015, 2018; Tomczyk et al. 2018). The variability among stable isotope ratios for carbon, nitrogen, oxygen and strontium indicate that many camelids found in Moche (Huacas de Moche), Virú (Huaca Santa Clara), coastal Wari (Castillo de Huarmey) and Palpa (Jauranga, Collanco and Cutamalla) sites were raised coastally. At the osteological level, it is difficult to determine where camelid remains belong to either llamas or alpacas due to the similarity of their skeletons, therefore this isotopic data discusses camelids in general. The overwhelming evidence for coastal camelid rearing is concentrated on the north coast with southern regions, like in the Palpa Valley, showing more mixed highland and coastally-raised camelid herds (Mader et al. 2018).

Therefore, the argument can be made that those spheres of influence from Moche, Nasca and even earlier Paracas were successful in their ability to

sponsor feasting events but also for controlling camelid groups in arid environments and ensuring their successful reproduction and care on an annual basis (Edwards 2015). In order to sustain the level of exchange for political, social and ideological purposes, these societies had to foster relationships with *llameros* (llama and alpaca herders). Therefore, we argue that herding communities served as the had an impact on the success of different coastal powers throughout the Early Intermediate (200 BC–AD 600) and Middle Horizon period (AD 600–1000). The evidence for these herding communities as linchpins for the expansion of coastal powers during this time has been addressed through our discussion on Castillo de Huarmey and Moche polities in the central and northern coast. There was a distinct scale of trade and the scale of influence that had not been witnessed before on the coast, which attests to the power and advantage that these groups had through their role in caravan routes.

Herding through the Early Intermediate Period and Middle Horizon (200 BC–AD 1000)

Early Intermediate Period (EIP) (200 BC–AD 600)

During the EIP, the Moche society was centred on the north coast influencing the region as far north as Piura all the way south to the Nepeña valley. At the same time, the Nasca on the south coast flourished, establishing centres of influence like Cahuachi.

The early work conducted in the Moche valley of the north coast of Peru showed that camelids were introduced to the coast around AD 400 and were domesticated (Pozorski 1979). Szpak et al. (2015) attests to textile production and fibre exchange networks being far more complex than previously thought. In the lower Viru Valley, carbon isotopes attest to wool from camelids having higher contributions from C4 plants (like maize) that indicates coastal rearing or at least coastal foddering resources (Szpak et al. 2014). Therefore, depending on the period, to continue with the assumption of a highland origin of wool would be unsupported by scientific, archaeological data.

In the EIP, the Nasca region saw the emergence of Cahuachi, an important ceremonial centre that grew out of a loose federation of rural communities to become the main location for a religious ideology that dominated the region for hundreds of years (Kantner and Vaughn 2012; Silverman 1993; Silverman and Proulx 2002; Vaughn 2004, 2009; Whalen and Gonzalez La Rosa 2014). In Tierras Blancas Valley, at the site of Cocahuischo, recent work indicates that communal spaces had large amounts of camelid remains when compared to domestic household contexts (Whalen and Gonzalez La Rosa 2014). Metallurgy, elaborate polychrome ceramics and sharing of camelid meat were used to recreate feasting events at the household level to reinforce the religious ideology dominating the region and allowing for rural communities to engage with trade and exchange at Cahuachi and other important centres. The recreation of these kinds of feasting activities were evident in the excavations of habitation and a suprahousehold facility, which showed that there was higher artefact and species diversity along with greater evidence of metallurgical production (Whalen and Gonzalez La Rosa 2014). The density of camelid remains and the diversity of artefacts along with consumption of other fauna attest to well-connected members of the community engaging in trade that was facilitated through camelid herding and caravan activity.

Middle Horizon (MH)(AD 600–AD 1000)

During the beginning of the MH, the Wari Empire begun to expand from the Ayacucho Basin in the south of Peru. Recent analyses show the consolidation of efforts around the camelid herding and wool exploitation (Vining and Burns 2018) at the beginning of the Middle Horizon. In the Suches Basin of southern Peru there appears to have been reorganization of herding communities, which resulted in social fissioning as pastoral production intensified (Vining 2016). Using geospatial agent-based models, Vining and Burns (2018) argue that cultural niche construction was occurring in the MH with the advent of the Tiwanaku state (AD 500–900).

The management of camelid herds is also addressed by Lane and Grant (2018) who add to the debate by comparing the Antofagasta de la Sierra

of Argentina and the Huaylas region of Ancash, Peru, which both show herding specialization begins around AD 600 to 1000. These highland examples are a testament to how camelids formed specific bonds for local communities and regional political entities and the nuances of these relationships need to be addressed further on the coast during the Middle Horizon period (AD 600–1000).

Among the Moche of the Jequetepeque Valley, Swenson (2012:22) argues that the central ritual chamber of the Late Moche site (AD 650–850) of Huaca Colorada is transformed from an exclusive feasting hall into an open and accessible space. In these spaces, ritual events would have taken place to encourage reflection on self, identity, cosmos, and even potential what it meant to be Moche in Jequetepeque Valley. The main aspect of these feasts was the exchange of camelid meat, shellfish and maize. All of these goods were the product of the interaction between agriculturalists, fisherfolk and herders. These ritually and socially-charged events thus allowed for ideological and political negotiations to take place.

At the site of Pataraya, in the tributary of Tierras Blancas, in the Nasca region of southern Peru evidence shows that this site was situated in the Wari administrative system that was concentrated on the extraction of coastal products (such as coca and cotton) and their exchange with highland locales via interregional roads and thus implicitly through these caravan networks (Edwards 2010, 2013; Schreiber 2005, 2012). The textiles of the Wari are famed and their technique blended fabric containing both camelid wool and cotton fibres (Rodeman and Fernandez 2000). Edwards et al. (2015) indicate that these weaving techniques were part of daily practices that were the result of coordinate efforts in the MH to produce valued textile for trade and exchange. The strong association between weaving, trading, power and caravans articulates how integral the use of camelids was to both the economic vitality of a society but also to the socio-political and religious foundations.

While Nuñez and Perlès (2018) argue for early camelid use and domestication in the Late Archaic of the Atacama Desert, there is zooarchaeological evidence from the Jequetepeque Valley that during the MH camelid herding and pastoral lifeways become the main means

by which ideas and items are moving through the coastal landscape in an effective and intentional way (Alaica et al. 2018 in prep.).

The North and South Coast through the EIP and MH Periods

The EIP and MH are therefore periods that saw tremendous changes in community affiliations and trade relations and is important to consider more closely for debates around camelid herding and pastoralism. Camelids provided an irreplaceable energetic resource that formed the foundation of many lifeways. From agricultural products being brought to and from domestic sites, to the trade of fish and molluscs, the exchange of local and non-local ceramic vessels and the use of cotton in highland textiles (Quilter and Koons 2012). These practices can be found in ceramic and textile artefacts showing the daily and ritual use of these animals that formed strong values for many coastal and highland communities (fig. 2).

The EIP (200 BC–AD 600) and MH (AD 600–1000) were the earliest phases for divine lordship as well as a period when communities in both



Fig. 2. Human and camelid Moche figure, the human figure is carrying a pack on their back, Larco Museum, Lima, Peru ML002278 (Alaica 2018, Fig. 5).

the highlands and the coast were renegotiating their boundaries and spheres of influence. Therefore, powerful individuals were beginning to use their resources differently to organize and perform large spectacles and feasts. Near the end of the EIP and beginning of the MH, there are many established highland strongholds on the coast, from the evidence of Cerro Chepen in the Jequetepeque (Castillo 2010), to Wari associations at Castillo de Huarmey in the central coast (Tomaczyk et al. 2018) and in the Nasca region at Pataraya (Horn et al. 2009; Mader et al. 2018). Negotiation of power is evident by non-local ceramics, obsidian and textiles because these items attest to long-distance trade that demand the command and control of camelid caravans. The explosion in demand and manufacture for non-local items supports our hypothesis that the control of camelid herds at both the local level as well as horizontally along the coast contributed to the establishment of Moche and Nasca power centers and subsequent spheres of influence to be established.

On the north coast, the exploitation of camelids continued through the Middle Horizon (Pozorski 1976, 1979; Wheeler 1995). Pozorski (1979) suggested that there was clear evidence of ritual use of camelids in the EIP at the Moche III and IV burials of Huaca de la Cruz in the Virú Valley. The archaeological evidence shows that (1) camelids were present on the North Coast since the Early Horizon (1200–200 BC), (2) fetus/neonate to adult individuals were being butchered from at least the Middle Horizon, (3) zooarchaeological work attests that all the major skeletal elements are present in the Moche contexts, (4) dug deposits are extensive and in LIP contexts many examples indicate that algarrobo (*Prosopis sp.*, or the mesquite tree) were being fed to herds, and (5) survivorship curves from camelid age data indicate that different strategies were being used at different sites (Shimada and Shimada 1985). These lines of evidence support our argument that political networks of the Early Intermediate Period and Middle Horizon were utilizing the versatility of camelids in the face of harsh environmental conditions to expand state interests.

While there is little work conducted on zooarchaeological and isotopic datasets from the coast and focusing on camelid herding, there is growing evidence that a combination of long-distance trading herds as well as small-scale husbandry were present on the coast in the Early Intermediate

Period and Middle Horizon (200 BC–AD 1000) at a time when political transformations are occurring (Dufour et al. 2014; Szpak et al. 2014). This signifies the potential for the politicisation of herding strategies that could have brought economic capital, political influence and social cohesion through shared trading practices sustained in an arid and often unforgiving environment. This politicisation of camelid herds is sustained into later periods, where the use of these animals as economic means but also as contributions to mass sacrifice, such as the mass camelid sacrifices of Huanchaquito-Las Llamas in the Late Intermediate Period (AD 1100–1470) (Dufour et al. 2018) support our argument that non-human beings become the basis of negotiating identity and social practice.

Discussion

Our exploration through coastal evidence for camelid herding emphasizes that more work is needed to provide a precise time that camelids arrived at the coast as well as when major shifts occurred in their use and incorporation in different kinds of economic, social and political activities. We echo previous thoughts on the exchange of important resources as the means to materialize ideology and secure power, as it was possible through the control of production, distribution and consumption of these materials (DeMarrais et al. 1996). Therefore, the control of animal breeding and rearing on the coast, and through a horizontal archipelago state, ideologies on the north coast were reinforced and in many instances expanded (Shimada 1982).

The negotiation of control over the raw material of camelid wool, tied to how coastal societies sustained trade and long-distance interaction articulates how pastoralism formed the central strategy for sustain influence in regions as well to expand socio-political ideologies. This is clear from examples provided from the Moche and Nasca regions as well as through the examples of Wari empire expansion into the arid coastal environments. The desert setting was not a place that formed just a marginal environment that had difficulties to overcome but a conquest opportunity that was taken advantage of by Moche, Nasca and Wari societies. These ideological influences in the desert coast of Peru were preceded by mainly highland-based herding, with evidence from Paracas in Chinca (Tantaleán

et al. 2016) and late Holocene Arequipa (Rademaker et al. 2014). The populations that would eventually show ties to these large spheres of ideological and religious influences were not necessarily Moche, Nasca or Wari but were groups that had cultural paraphernalia provided to them and symbols of these societies that they used to gain control over local contexts. There is little research on specific herds controlled by Moche of Nasca polities, however, the presence of camelid remains in faunal assemblages from these cultural affiliations attest to intense camelid pastoralism on the coast. Therefore, camelid herding was the economic basis for the trade of agricultural and marine resources. Furthermore, coastal pastoralism was the strategy that allowed for the control of wool to produce valued textiles and the energetic resource to transport symbols of power, such as the tumi to the staff god (Alaica et al. in prep; Pozorski 1979; Szpak et al. 2014).

Conclusion

Previous archaeological work on deserts has considered hunter-gatherer societies more extensively. By concentrating on the Early Intermediate Period and Middle Horizon (200 BC–AD 1000) of coastal Peru, the desert landscape can be addressed from the perspective of complex societies and state hierarchies at a time when various empires are expanding their influence towards the coast. This paper has been an attempt to illustrate how the desert coast of the Andes provided an environment where the flexibility of pastoral animals could allow for developing polities to benefit from highland interactions as well as coastal ones.

The arid setting of the Peruvian coast was not barren; as it was bisected by lush river valleys and was transformed by seasonal moisture in the lomas ecosystems as well as by El Niño events. The transformation of the coastal landscape following El Niño events has been argued to be catastrophic for coastal people, but in fact following flooding and other disruptions, El Niño events can provide lush vegetation for months if not years after and alter these arid settings for new kinds of activities and different agricultural practices (Christol et al. 2017; Vining 2018b). The ways that desert environments can fluctuate and shift from valley to valley and from season to season challenges the perspective that deserts as stagnate, predictable

places, and instead as somewhere that societies had to assemble effective strategies to maintain flexibility and resilience.

The pastoral lifeway of the Peruvian has been attested to through archaeological material from the north to the south coast and these lines of evidence are the starting point for more debate to juxtapose how herding strategies enabled the expansion of state interests and how local leaders took advantage of non-local symbols to maintain control of their regions.

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