

# MARITIME ORIGINS, NICHE CONSTRUCTION, AND THE EMERGENCE OF COMPLEXITY AMONG THE NORTHWEST COAST SOCIETIES AND THE NORTE CHICO COMPLEXES

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## ABSTRACT

The complex hunter-gatherer societies of the Pacific Northwest and the early satellite states of the Norte Chico (3<sup>rd</sup> to 1<sup>st</sup> millennia BCE) are used as case studies in an analysis of the proposed maritime origins of early complex societies and emergence of agriculture. Niche construction theory will be used within these case studies to assess the co-evolution of maritime resource use and the intensification of cultivation practices. *To what extent do marine resources impact the economic prospects and growth of human groups? Could marine abundance associated with localized terrestrial niches drive the co-evolution of complex society and cultivation?* The Northwest Coast (NWC)—much like the early development of the Peruvian coast—were influenced by maritime subsistence levels which due to the increasing populations, may have resulted in the intensified production of plant foods. The state level Peruvian complexes will be compared against the NWC complex hunter gatherers; shedding light on the similarities and difference of how their development took place in their respective environments. This paper seeks to understand how differing cultures create niches within coastal environments and the underlying connection between cultural complexity and maritime societies.

## INTRODUCTION

The rise of complex social organization and the emergence of agriculturally based civilizations have been assumed to develop through hierarchical stages that eventually peak with agriculturally based, state level civilizations. The complex societies of Norte Chico on the arid coast of Peru (3<sup>rd</sup> to 1<sup>st</sup> millennia BCE) and those of the Northwest Coast of North America (2<sup>nd</sup> millennia BCE to historic period) are two examples of complex social organizations that emerged without the deep foundations of agriculture. Rather, it was

ecosystems on land and bounty from the sea that played important roles in their development. This paper takes a historical ecological approach in examining how the abundance of marine resources and local terrestrial niches impact the co-evolution of complex society and cultivation.

### *Concepts regarding the emergence of social complexity*

Complex societies are thought to emerge as the result of growing populations of people clustering in large sedentary communities. There are two outcomes of a growing population that influence the complexity of society (Diamond 1999). The first outcome suggests that smaller communities utilize familial relations in mediating disagreements; therefore, have less violent resolutions to conflicts. Additionally, larger communities which contain multiple familial relations are more likely to experience violent conflicts between outlying groups; thus, there is a need for a system of laws and enforcement of rules. Social hierarchy can often emerge when particular individuals or groups are placed in positions of power and consign preferential treatment or subjugation on others. The second outcome suggests that the greater the population the more opportunities for diverse occupations and specialization of services. With the resultant social hierarchy, centralized government, diversification of economies, there can emerge associated tenants of “civilization.”

The emergence of agriculture, specifically the use of cereal crops (Diamond 1999:141), has been credited as the primary cause of nomadic hunter-gatherer societies transitioning towards more populous sedentary settlements. The societies that did not cultivate domestic crops themselves are thought to have acquired the knowledge of farming from neighbours (1999:178-191). According to Jared Diamond (1999:284) the intensification of wild crops over long periods of time encouraged more complex societal organization as populations in sedentary communities increased. Where this transition towards social complexity occurred, and what cultures benefitted from it, has largely been seen as simply congruent with what species on earth were “domesticatable” in certain areas. Grasses or cereals lend themselves to domestication over large areas, as do many existing beasts of burden; hence their appeal to early human manipulation and

use (1999:165). Environmental conditions and human ingenuity are thought to contribute to the intensified use and domestication of plant and animal species. This gives rise to growing sedentary communities and agricultural surpluses around which complex civilization propagates.

Two culture histories on the west coast of the Americas are considered as case studies in which dependence on agriculture was not necessarily a catalyst for emergent complexity. The dynamics of these cultures' rise to complexity appear to be less dependent on a couple individual species and rather in the interaction with multiple ecosystems. The rise of both the "affluent hunter-gatherers" of the Pacific Northwest Coast and the early coastal forebears of the Andean civilizations are illustrations of populations driven not only through the cultivation of plant species but also through access to the bounty of rich fisheries and abundant coastlines. Their emergence illustrates the co-evolution of cultural interactions within each unique local marine and terrestrial niche and suggests great duality of processes in the formation of regional complexity and cultural development.

## MARITIME ASSOCIATED CASE STUDIES



*Figure 1: Norte Chico complexes (Bing Maps, referenced Moseley, 1975)*

The Peruvian coastline is home to potentially the oldest known civilization in the Americas (Pringle 2001). Norte Chico emerged on the Peruvian coast below the desert foothills of the Andes

Mountains. A number of populated urban centers arose without the use of ceramics and arguably little early dependence on agriculture (Moseley 1975). Despite these hallmarks of old world societies, populous and dispersed urban complexes developed exhibiting hierarchical government, manufacture of crafts and textiles, elaborate burials, and monumental architecture (1975). Dating as early as 3500 BCE (Mann 2005) the network of coastal and inland urban complexes are thought to be one of the few regions of the world where complex civilization emerged independently of other complex societies (Pringle 2001; Solis et al. 2001). Large sites along the coast and in the interior appear to have both developed in unison (starting in 3000 BCE), until the growth and development of inland sites exceeded those on the coast (2500 BCE to 2000 BCE) (Haas et al. 2004); a time which roughly corresponds with the rise of the region's largest site, Caral (Solis et al. 2001).

In 1975, Michael Moseley, an archaeologist working at the Norte Chico sites in Peru, developed the "Maritime Foundations of Andean Civilization" (MFAC) theory in response to an overwhelming archaeological assemblage of fish and shell appearing at large population centres. He found the largest coastal centers produced little in the way of agricultural resources and were adjacent to the most productive fisheries on the Peruvian coast (Moseley 1975). He attributed the Norte Chico society's remarkable growth in population and size to a subsistence system based almost exclusively off of marine resources. Agricultural systems were not excluded entirely from subsistence systems (1975:116). They were developed along the coast and near inland sites mainly for the purposes of growing cotton for fabrics and fish netting; plant food products were seen as an afterthought (1975:116). The natural coastal environment and marine economy was thought to have driven and sustained population growth and as such, contributed to the emergence of social complexity for the Norte Chico.

Moseley (1975) argued that the eventual transition towards inland irrigation systems and the greater dependence on agricultural products was made possible by coastal peoples "pre-adaptation" to the cultivation of plants from an early period of valley floodwater farming. He suggests the opening of inland deserts to intensive cultivation would have required some early foundations in farming. The cultivation of naturally flooded valleys would have introduced the

conditions for plant domestication and farming to supply dietary supplements and resources to an otherwise large and wholly maritime population. Additionally, a strong workforce and established social institutions (created and maintained through marine resources) would have had to exist to mobilize and construct irrigation and canal earthworks in the arid interior (1975:117).

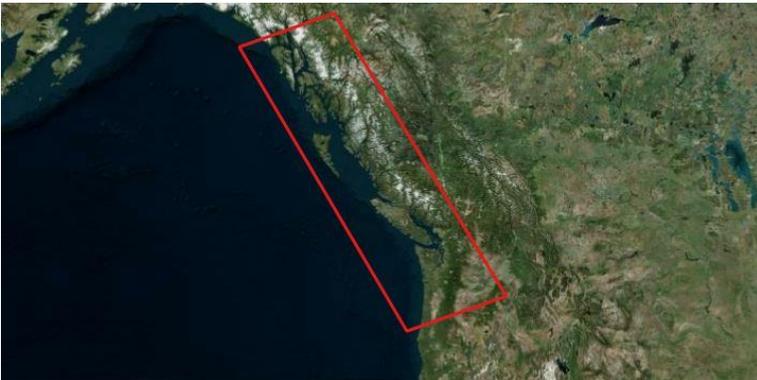
Later archaeological dating (Raymond 1981), however, suggested that inland sites were fairly contemporaneous with the earliest coastal centres and were considerably larger than previously thought (Pringle 2001; Raymond 1981). This has cast doubt on the centrality of maritime subsistence at Norte Chico. It suggests that the region was composed of numerous satellite villages connected to large inland and coastal sites which were dependent on both marine and agricultural resources (Pringle 2001).

Raymond (1981) argues that while the presence of maize is fairly under-represented in the archaeological record so too are other root and potato crops that could have been dietary staples and grown in a multitude of different environments. Such plants may not have preserved well over time compared to fish and sea mammal bones or even plant seeds. “Achira” or *Canna edulis* is an understudied root crop known to have been eaten at Norte Chico (1981:814). It could have provided a large portion of the population’s dietary needs, and yet has been largely lost due to poor preservation (1981:814). The biases in preservation and the presence of domesticated crops at most sites suggests that Mosley’s Maritime Hypothesis (1975) was too heavy handed in its dismissal of the impact of farming on Norte Chico’s early rise (Raymond 1981). The interpretation of the archaeological record has not yet determined which of the major sites emerged earliest and whether or not marine resources were depended upon primarily.

With greater scrutiny of the MFAC hypothesis it remains clear that even the large inland sites have evidence of at least some dependence on a seafood diet in addition to terrestrial crops. Despite the distance from the sea, fish bones and mollusk shells remain abundant in archaeological deposits and animal bones are found to be almost exclusively those of marine mammals (Pringle 2001:623; Solis et al. 2001). Even the preserved feces found in middens universally contain anchovy bones (Pringle 2001:623). As such maritime

resources likely played a large role in the early development of population growth, cultivation, and sedentism.

Norte Chico development into complexity in terms of sustenance may not be solely dependent on either the abundance from the sea or intensification of the land, but rather interplay between the two. Moseley's (1975) argument that irrigation and intensified agriculture would not have emerged without a transition period in which cultivation was established is not without merit. Especially, since cultivation requires major terra-forming activities to prepare the desert for farming. How might maritime abundance have led to the intensification of cultivation and the production of anthropogenic landscapes? Turning now to the second case study up the west coast of the Americas in the Pacific Northwest, may present similar conditions of abundant coastlines, large populations, social complexities and intensification of landscapes.



*Figure 2: Northwest Coast societies*

The parched desert was potentially the biggest factor inhibiting the early development of agriculture for indigenous cultures of Norte Chico. The opposite extreme, a dense abundant coastal rainforest in the Northwest Coast, might have curtailed development of intensified agriculture in a similar way. In both case studies the maritime environment made land-use limitations relatively less of a factor in the growth of populations and development of complexity. Parallels between these two case studies are demonstrated by the use of marine resources which likely provided an impetus for the development of complex social structure and growth. The

development of Northwest Coast social complexity could be seen as a sort of template as to how maritime people develop cultivation practices within landscape limitations and how agriculture is not always tied exclusively to the beginning or end of a complex society's development.

The Northwest Coast is often seen as a relatively unique example of a group of hunter gatherers exhibiting complex social hierarchy, sedentary lifestyle, and many other hallmarks of more complex agricultural groups. Traditionally the affluent coastal chiefdoms were seen as the expected consequence of a rich coastal environment (Ames and Maschner 1999). Today this view is critiqued due to the landscape dynamics of complex coastal environments and our better understanding of the development of cultivation practices.

A closer examination of the fertile coastline finds great variability in resource on a more localized scale. Salmon runs, considered the backbone of coastal economies, were known to periodically fail causing famine for large populations (Deur 1999:132). Some rivers had extremely poor runs, while neighbouring tribes would gather more salmon than could be consumed by their people. Some groups inhabited resource abundant areas while others inhabited largely marginal environments. Deur (1999:132) notes that aside from rivers the coastal environment was a patchy network of small ecosystems with isolated 'hot-spots' of use. Sea mammal gathering rocks, clearings in which deer and elk gathered, productive shellfish beaches and mussel headlands, berry patches, larger estuaries, and scattered prairie all varied seasonally and spatially across the landscape. Therefore, the resource abundance that was available to human groups on the coast was largely the result of a constant interplay of the local and the regional and the terrestrial and marine environments. Rich local groups grew and prospered while poorer groups were often forced to join confederacies and participate in feasting networks to gain better access to resources (Ames and Maschner 1999). The territoriality and culture that emerged along with population growth thus established much of the hierarchical systems that led to complexity on the coast.

Relatively large coastal populations began to settle near estuaries in larger villages between 4000 and 2000 BCE as sea levels stabilized following glaciations. Salmon and other fish became more prevalent in newly established ecosystems (Deur 1999). This influx in

food and the development of storage techniques allowed for more year-round sedentism. Human populations grew between 2000 and 1000 BCE with the increased establishment of settlements near secondary resource sites such as sea mammal hunting sites, halibut fishing grounds, and berry/root/clam harvesting sites (1999:135). Populations continued to rise between 1000 BCE and 500 AD in which cultural development is seen with the increase in trade, potlatching, and legitimization of elites (1999:135). An increase in the population of Northwest coast communities parallels the growth of resource exploitation; salmon weirs and traps, dip nets, clam gardens, transplanting of clam and salmon smolts to new locations, and plant cultivation. Deur (1999) suggests that initial population growth was due largely in part to the abundance of marine resources which pushed demographic levels to the carrying capacity of the marine environment. Further growth in population can be largely attributed to the transition towards intensified use of terrestrial resources (Ames and Maschner 1999; Deur 1999).

This last spike in population growth and increased social/technological complexity was tied to—whether it had initiated or resulted from—the increased intensification of particular resources (Deur 1999). In the Northwest Coast, this has been attributed to various forms of micro-environments (Ames and Maschner 1999) in which niche expansion by human manipulation benefits other species. Deur describes this as the creation of *physio-mimetic* structures in the landscape; humans mimicked or enhanced the natural conditions by which certain plants grew (2002:13). As structures, they were not apart from the surrounding landscape, but instead, were simply expanded and enhanced ecosystems that already existed within the area. An example can be found in the Natural Oak prairies that lie in the rain shadow of the coastal mountains from southern Vancouver Island to northern California. These grasslands and open hardwood forests were created and extended through fire management and allowed for the cultivation of various root, bulb, and nut crops. In addition to controlled fire, clearings were made on south facing slopes in the densely settled spruce-hemlock rainforests of Oregon to produce root vegetables and berries (Deur 1999:141).

In coastal estuaries of British Columbia (BC) gravel beds were terraced, bordered, weeded, and fertilized, with ocean debris for root crops such as Pacific Silverweed and Springbank clover (Deur

2002:11; Lepofsky and Lertzman 2008:135). From Alaska through to Washington State, intertidal clam gardens were constructed to maximize shellfish harvesting. Large stone walls would hold back beach sediment creating relatively flat beach surfaces at particular levels of the intertidal that would maximize the habitat of particular species of shellfish (Groesbeck 2013:1,11). Whapato (Indian potato) was planted and harvested extensively in wetlands within beds of gravel to better access the roots under water (Deur 2002:16). This manipulation of landscape and plants created *agro-ecosystems* which maximized many food and resources over time.

## THEORETICAL FRAMEWORKS

### *Niche construction*

Maritime resources helped raise northwest coast populations to near carrying capacity. The plethora of anthropogenic management of natural environments in the Northwest is suggested by Deur (2002) to have been instigated by this strain on existing, wild resources by large and growing populations. Large sedentary villages that used all available resources of the sea were forced to look inland and along their shores to increase production of resources that were previously harvested only as dietary supplements. This scenario reflects the development of early Norte Chico complexes in which diminishing maritime resources forced populations to greater dependence on secondary resources from the land. If greater reliance on secondary resources was a factor in both the Norte Chico and NW cultures what were the environmental conditions on the land that may have created divergent paths for both cultures?

The development of human cultural complexity over time is not just driven by the influx of energy from the sea or early development of agricultural surpluses but a co-evolution of multiple forces enacting on humans in different ecological contexts. Historical ecology and Niche Construction Theory both posit that humans, like all organisms, “do not adapt to their environments [as much as they] construct them out of the bits and pieces of the external world” (Lewontin 1983:203). Humans are “enormously potent niche constructors” (1983:203) due to great flexibility in exploiting various environments. They are known to replicate natural disturbance

regimes that create and alter ecosystems around the world (Balée 2006). In coastal regions, what is gained energetically in one part of the human niche (namely the sea) can have direct effects on the success of that human population. Thus, having effect on its actions, choices and disturbance regimes within another part of the niche (the land). The road to complexity is a co-evolution of processes between humans and landscapes. The utilization of marine resources was a necessary foundation to both civilizations shaping the evolution of interactions with the terrestrial environment (Deur 1999; Moseley 1975). This relationship of land and sea reveals how important ecological context is as an evolutionary force impacting cultural development.

Considering the ranking of hunter-gatherer to agriculturalist it is important to focus on human populations as landscape architects rather than inevitable agriculturalists. Regional ecological contexts and historical processes have helped re-evaluate the ladder of progression in subsistence systems. The dividing lines have been blurred between foraging populations and complex agriculturalists. Northwest Coast cultures augmented their hunting and gathering practices with the creation of agro-ecosystems and cultivation. Likewise, foragers, low-intensity cultivators, intensive agriculturalists, hunters, and pastoralists have all persisted together around the world for ages (Deur and Turner 2005:15). Rather than a hierarchy of subsistence patterns, context, history, and cultural-ecological processes are the shapers of how populations of people go about interacting and impacting the land. Anderson and Wohlgenuth note that management of “plants for food must not be viewed in isolation, but rather in broader context of prehistoric subsistence systems and how these systems fit within and impact diverse and dynamic ecosystems” (2012:190).

In the cases of both Norte Chico and the Northwest coast societies, broader subsistence systems and environments are what shape the development of complexity. Both cases refute the assumption that human ingenuity and discovery of agriculture could have been the sole driver of cultural progression. Instead, the regional ecological contexts (maritime coastlines) contributed to population growth and may have resulted in the need for alternative resource options. The differences in the cultivation systems between both case studies suggest that field agriculture is not the inevitable final chapter

in the story of plant cultivation. Niche construction offers some perspectives as to how human populations shape local ecosystems over time and how similar early development of coastal societies could eventually diverge and establish unique systems of complexity.

When considering humans as landscape creators or “the ultimate niche constructors” (Smith 2007b:188 quoted in Laland and O’Brien 2010) one can begin to understand why our two coastal cultures might end up developing different subsistence trajectories such as “complex hunter gatherers” and “state agriculturalists.” Moseley (1975) and Deur (1999) have similar arguments regarding the initial moves towards complexity. They argue that an early transition towards a marine diet along extraordinarily abundant coastline fosters sedentism within increasingly complex societal organization. The increase in population and growth in settlement brings about strain on resources and thus the slow intensified use and cultivation of species.

Niche construction and ecological context may explain the divergence of cultural choices for both civilizations. The physio-mimetic structures described by Deur (1999) for the Northwest Coast are simply a kind of advanced niche development by which humans were able to replicate natural structures in the land to maximize productivity of a given species or system. What is seen as clam gardens, estuarine gardens, fish weirs and fire managed prairies in the Northwest are all simply man-made micro-environments within the human niche. As for the Norte Chico, the archaeological record suggests there was increased use of species which may have grown in the naturally flooded valley bottoms that stretched out to the coast (Pringle 2001:621-622). The physio-mimetic structure can be seen in the eventual expansion of these areas into the desert with the artificial flooding induced by man-made irrigation networks. Peru’s arid straight coastline may have lent itself to only one subsistence intensification system; agriculture. Whereas the Northwest Coast’s tremendously diversified coastline with abundant but unevenly clustered resources would have encouraged the development of multiple intensification practices.

There may have been no limits on the expansion of irrigation networks in Peru that were utilized to sustain agriculture into the desert when the transition to farming did occur. The archaeological record however shows the continued embrace of marine resources as an important part of the population’s diet (Mosely 1975; Pringle

2001). The Northwest Coast environment may have limited a similar sort of expansion into the intensified cultivation of any one terrestrial environment. The fire managed Oak prairies of northern California to Washington State were isolated to the drier regions of the northwest and are already thought to have supported the largest indigenous populations north of Mexico with just low-intensity cultivation (Anderson and Wohlgenuth 2012). Deur (1999) suggests that while maritime resources facilitated the emergence of cultivation on the coast through increased sedentism, social complexity, and population growth, it might have inhibited its establishment as a primary means of subsistence. The diversity of coastal resources may just have been enough to maintain high and sustainable population levels.

### *Emergent Norte Chico*

Archaeological evidence seems to suggest the early existence of large complexes in both the coastal and inland regions of Norte Chico (Pringle 2001:623). Remains of a large marine resource base are found at all sites, as are the traces of a large number of agricultural products. Due to limited archaeological preservation, it is difficult to establish the primary source of substance. Rather, it seems more likely that there were innovations within multiple substance sources. A feedback loop of dependence on marine resources may have triggered population growth and sedentism, led to increased cultivation and technology, more fishing and irrigation, and finally the development of state level complexity. History of the Northwest Coast suggests that cultivation processes likely did not emerge from a single evolutionary pressure, but rather multiple causal forces at play, over time, within an expanding human niche. The energy provided by maritime resources, the cultivator laboratory that was coastal river valleys, the inland desert, and the ingenuity of human groups as niche creators, all likely co-evolved over time to create such vast urban complexes. The abundance of coastal environments, as reflected in the pre-history Northwest Coast societies, suggests that the road to complexity cannot be attributed to either the sea or the land.

### *Emergent Northwest coast*

Both Northwest Coast and Norte Chico societies began to emerge in the archaeological record roughly about 5000 years ago. With roughly similar development time periods to each other and access to an abundance of marine resources one might consider why Northwest societies did not achieve the level of urbanism, monument structures, and state level complexity as the empires that emerged from the Peruvian desert. The answer may well lie in the extreme diversity and abundance of the coast. As was suggested above no one focus on domestication of plant resources lent itself to exploitation on the scale that would be needed to support a state. Climate, rainforest, varied coastline, and patchy landscape may not have provided the conditions for state level agriculture of the type seen in desert or grassland states. But the multiplicity of ways of shaping the land and gathering resources on the coast did create a complex system that befitted from the landscape. The societies on the coast were large, distinct and were comprised of eleven different language families and thirty-nine different languages (Ames and Maschner 1999:17) from North to South. Its heterogeneity is at least partly a reflection of large organized populations existing in very different isolated environments on a local scale. The latter stages of the Northwest Coast's cultural development are seen as a reflection of its natural environment; more along the lines of rainforest/savannah societies in pre-contact Amazonian than the Peruvian desert (Rival 1998).

## CONCLUSION

Removing the concept of hierarchical state development, one begins to understand how effectively maritime dependent cultures fit and impact their regional environments. It is not that innovations and discoveries pull nomadic societies from natural systems into man-made worlds, but rather, humans evolving within landscapes as environment creators. We could better understand cultural development by examining the effects of human action and physiomimetic construction on ecosystems.

As the case studies suggest, there are multiple roads towards complex cultural systems. Ecological abundances and constraints present unique scenarios to humans making choices in the landscape. The conditions of an ecosystem actively determine the course of cultural development. The relationship between humans and

environment however is not deterministic in the sense of neo-environmental determinism. Human ingenuity and ecological flexibility allows for niche construction and landscape development within certain ecosystems. Human interactions with local environments are more dialectical than they are determinist. Initially the environment can control the range of choices available to a population until the culture reshapes aspects of the environment in responding to available choices and its own needs (Balée 2006). The reshaped environment then presents a new set of possibilities for cultural change and creation. Over time a cycle of mutual determinism emerges (Cronon 1983:13); a form of reciprocity between nature and human culture. The micro environments created by humans are rooted within and develop out of an existing system and thus are natural to that system.

The cases of the Northwest and Norte Chico suggest processes and dynamic histories of interaction of humans existing in the margin between marine and terrestrial biomes. It can be understood that cultivation and fishing were important to the Norte Chico. However, it is not proven what stage the technological, cultivation and fishing systems were at during the onset of urban development. Did the emergence of one trigger the change to complexity or did the interactions of both build to a critical turning point? The population development within both regions is not yet fully understood due to limited archaeological work within the region. Evidence of the development of most plant foods, often lost due to poor preservation, would give better insight into ecological carrying capacity and transitions into cultivation systems.

Finally, what is the process of interactions between resources from the sea and those on land at the very start of sedentism on a coastline? The details are missing from these stories and thus insight into whole processes of development. Does the emergence of complex civilization and cultivation systems in some regions necessitate ecological conditions that are supportive of a large population; not necessarily the gradual advance of intensified cultivation among small groups? There is much missing from the archaeological record that might answer such questions.

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