The Complex Interplay of Culture and Nature in Coastal South-Central Ecuador

An Interdisciplinary Work

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INTERDISCIPLINARY BEGINNINGS

One of the most enduring domains of inquiry within anthropology has been that of the human-environment relationship. Here we report on our research, one of few attempts at combining ethnography, archaeology, and the natural sciences in one region toward understanding the ever-changing and complex relationships among human exploitation of nature and various aspects of human culture, particularly social and economic organization.

Over the past four years we have focused on the south-central coast of Ecuador, the central province of Manabí, where we have explicitly brought ethnographic and archaeological inquiries together through an interdisciplinary study—archaeology, ethnology, botany, geography/GIS, malacology (the study of shellfish), and zoology—that spans 5500 years, from 3500 B.C. to the present, of human-land-marine interrelationships. All this provides a broader understanding of the interaction between indigenous populations and local ecosystems in this remarkable, environmentally diverse region.

Salango: remains of a large non-domestic structure, 50 m. x 20 m., constructed alongside the shoreline.

In Ecuador's south-central coast we are discovering a pattern of continuity and change in the lives of its residents, where they live, and what they do, that will help us understand the evolution of human societies in the Americas.

UTILIZING MICRO-ECOSYSTEMS FOR SUBSISTENCE

Anthropology has come to understand that the human-environment is complex in that it relates to many economic, political and social aspects. For example, in regard to trade and commerce in the present, the local, regional, and global markets are an integral part of our investigations. We are especially concerned with how both prehistoric and contemporary populations have utilized a diversity of micro-ecosystems in their subsistence practices, where micro-ecosystems are defined as small areas of distinct climatic zones and biotic communities. Manabí is especially interesting in this regard because coastal communities exploit a variety of habitats within a relatively small area. These habitats range in character from various oceanic regimes, to inland sub-tropical horticultural terraces, humid forest mountains, and dry coastal valleys.

The type of interdisciplinary study presented here offers anthropology an opportunity to stretch its theoretical limits in

Dry tropical forest.

Transitional dry to humid ecotone.

Environmental zones and archaeological sites in study area, Salango–Río Chico River Valleys, Manabí, Ecuador. Some of the site data were provided by the Programa de Antropologia para el Ecuador (PAE) from an earlier survey. Site distribution reflects a distinct pattern of human occupation in the alluvial valleys during the earlier periods and movement further inland in later periods through pre-Columbian times. As lands in the relatively narrow and level areas close to the ocean were occupied, communities in later periods dispersed to higher terrains, incorporating the dry forest areas.

LEFT: Humid forest. RIGHT: Semi-humid riverine zone (river valley).

two ways. First, the archaeological patterns can be looked for in contemporary practice and *vice versa*. The effect is an enriched, and more subtle, anthropology. Second, theories about culture change and the human-environment interaction can be explored and tested more convincingly.

MANABÍ

South-central Ecuador comprises five river valleys known as the Puerto López-Ayampe moisture trap zone. This zone encompasses 150 square kilometers of a portion of territory characterized by a series of bays surrounded by coastal mountains of more than 200 meters above sea level. The pilot study area, Salango and Río Chico river valleys, is ecologically classified as sub-desertic tropical. However, changes in the ocean winds flowing to the continent have permitted a series of climatic regimens along the coastal mountains, varying from desertic to humid: dry tropical forest (0-50 m.); transitional dry to humid ecotone (50-80 m.); and humid forest (>80 m.). Additionally, seasonal precipitation patterns determine the small variations in moisture or micro-climates, known as the semi-humid riverine zone, for plant growth along the river courses.

PREHISTORIC SETTLEMENT PATTERNS AND CULTURAL OCCUPATIONS

Most sites investigated to date have been situated at the bottom of alluvial valleys within 100 meters of the Pacific Ocean. The Río Chico site is located on lower alluvial terraces formed within the past 12,000 years; and the Salango site is located to the north, in a flat sandy bay area. Both sites have been occupied repeatedly over time, offering a combined record of human occupation—with evidence of a wide range of activities—spanning millennia.

These communities were heavily oriented toward exploiting the abundant maritime resource base as well as practicing inland agriculture. Shell harvesting and the working of different species of shell into manufactured products were important activities during much of the prehistoric period.

Río Chico is a multi-component village site, excavated by the Florida Atlantic University (FAU) archaeology team for the past six field seasons. Based on ceramic analysis, we have recognized the following occupation periods: Valdivia (3500 B.C.),

LOWER RIGHT: Charles Roberts; ALL OTHER PHOTOS: Michael Harris

Río Chico Site (OMJPLP170), Manabí, Ecuador.

Chorrera/Bahía (800 B.C.), Guangala (200 B.C.), and Manteño (A.D. 800-1500). Additionally, we have identified a historic colonial period site in the immediate vicinity, east of Río Chico.

Río Chico was a relatively small dwelling site during the early periods of occupation from the Valdivia through Guangala periods. However, in later times, during the Manteño period, a major activity at the site was oriented toward the capturing, processing, storing, and redistributing of Spondylus shells.

The Salango region appears to be the epicenter for Spondylus shell production. Trade in this resource is known to be widespread in South America, extending to Peru. Here, we have uncovered remains of a large non-domestic structure, 50 m. x 20 m., constructed alongside the shoreline. This is the largest non-ceremonial structure to be recorded for this coastal region. Distinct activity areas and associated cultural materials (i.e. shells, stone tools, pits, and hearths) found in the interior of the structure suggest the existence of a large specialized workshop of "industrial" capability.

Inside the structure, complete Spondylus shell specimens are conspicuously absent. Instead, many hinges and valves, with only the white central portion, are present. Wear evidence and fracture patterns observed on these shell "core" fragments indicate that the colorful outer rim was intentionally removed. Stone tools, such as hammers, slabs, and chisels found in the structure were employed to perform this activity.

Pits of assorted sizes, distributed throughout the structure, were used as large "subterranean silos" to store the shells. Additionally, several isolated burnt areas, most likely reflect hearths frequently used to prepare foodstuffs for the work force. The processed raw material of vibrant red and purple colored Spondylus rims was then redistributed to nearby manufacturing centers such as Salango and López Viejo to be made into beads, broaches, and other forms of personal adornment.

Ongoing analysis of vertebrate fauna, molluscan remains, and lithics suggests changes in resource exploitation through time. There is a shift in the size and type of fish from the Valdivia to the Manteño component. The Valdivia component had 30 fish species, while the Manteño component had 20 species, a 33 percent reduction in species biodiversity. Likewise, during the later Manteño phase, fish are smaller in size and weigh less.

The change in species diversity over time suggests that Valdivia fishermen were making heavy use of estuaries, while later groups increasingly exploited the deeper waters offshore. This proposes a substitution in fishing strategies through time from lines to nets. Fish species in the Manteño period indicate fishing in deeper waters that is consistent with the use of nets and small boats.

Analysis of mollusks also indicates an increase through time of deep-water resource exploitation. For the Valdivia period, there is a greater emphasis on mollusk and gastropod collection from the rocky intertidal zone. From the Chorrera/Bahía through the Guangala period the proportion of specimens from deep water increases until it reaches its highest point during the Manteño period. In early periods, there was a greater reliance on mother of pearl, with some Spondylus collection. By Manteño times, Spondylus is the primary species harvested.

Overall, there are very few worked shell artifacts in the sample for Manteño times. This is significant since, at other regional sites, shell artifacts and the byproducts of bead manufacture in the form of shell "chips" are commonplace. The predominance of shell "core" fragments and the relative absence of finished artifacts in the Manteño sample argue that, at this time, Río Chico was not organized towards the manufacture of finished products. Rather, there is a pronounced trend towards specialization in the capturing and processing of Spondylus.

Lithic analysis indicates the use of a very simple lithic technology consistent with shell-working activities present in Valdivia but absent for the Manteño period. We would expect a lithic assemblage used in craft production to contain a number of artifacts with clear evidence of edge damage. In the case of shell working, this would likely include large microflake scars, changes in edge morphology, edge grinding, striations, and polishing. Tool forms would probably include drills and

Charles Roberts

Salango: distinct activity areas found in the interior of the structure suggest the existence of a large specialized workshop of "industrial" capability.

Spondylus.

gravers. The Manteño period tool assemblage consists mainly of hammers, slabs (probably used as anvils), chisels, and few flakes. This latter stone tool assemblage does not appear to have been used in shell working.

Salango: wear evidence and fracture patterns observed on these shell "core" fragments.

The Salango site, originally excavated by Presley Norton and Richard Lunniss in the 1980s, was recorded historically as the locus of one of the four towns that collectively formed a large "Señorío" or chiefdom. For the Manteño period prior to the arrival of the Spanish Conquistadors, Salango was the recipient of processed shells from Río Chico for the manufacture of beads and other artifacts.

Our current research provides an initial look into what could have been a developing regional and economic polity that had interesting internal properties and that was also part of a wide trade network. By Manteño times, the region's sites show well-developed local, and likely, self-sufficient, subsistence systems, with sites specialized as either collectors-processors or manufacturers of finished products. In terms of external trade, there is evidence, discussed by other researchers—such as Valentina L. Martínez, Alexander Martin, Joanne Pillsbury, Izumi Shimada, Anne Marie Hocquenghem, Presley Norton, John Murra, and Allison Paulsen—of commerce between this region and coastal Perú.

So far, the data recovered at Río Chico gives clear signals of the final years of a trade network that originated in coastal Ecuador and eventually became to be known as the "League of Merchants," according to Jacinto Jijon y Caamaño. Colonial period ethnohistoric documents, such as those cited by Jijon y Caamano, have provided insights into the complexity of commerce and trade during the final years of this little known coastal chiefdom.

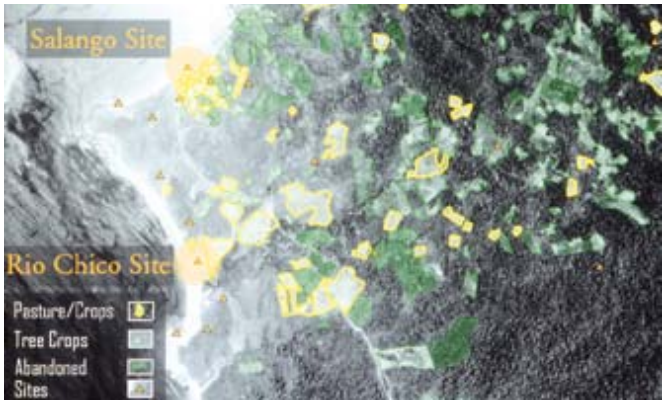
CONTEMPORARY SUBSISTENCE PATTERNS

The contemporary villages in southern Manabí are located in the river valleys and are primarily oriented parallel to the beaches. Not surprisingly, economic and subsistence systems are organized around ocean fishing. However, in the region, some villages are clearly more devoted to fishing, while others primarily pursue agriculture, agroforestry, and livestock raising. Those villages with protected bays generally have developed more advanced fishing systems, such as small commercial fishing boats employing seine nets. Villages along relatively unprotected beaches, while dependent on ocean products, devote more labor to horticulture and livestock. We hypothesize that this variability in the mix of subsistence strategies utilized in contemporary villages is a pattern that existed in prehistoric times as well.

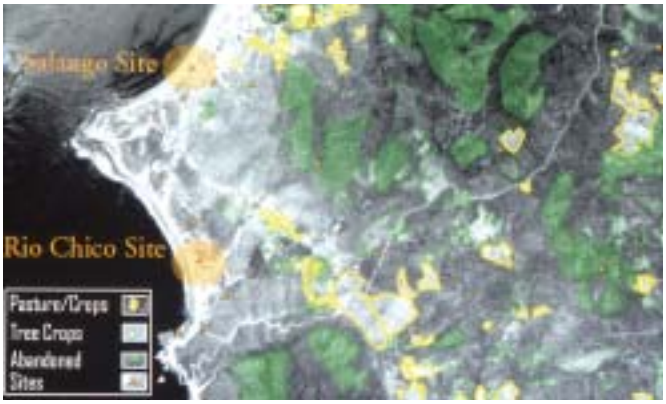
Ethnographic research has proceeded in the two villages that correspond to our archaeological investigation, Salango and Río Chico. The ethnographic record is illuminating, at the very least, from the perspective that villages located just a few miles from each other, that share a great deal both socially and in terms of kinship, can be oriented quite differently in their subsistence strategies. What follows is a discussion of Salango villagers' activities in the environment and a brief contrast to those of Río Chico's.

Approximately 1300 individuals reside permanently in the fishing village of Salango. Subsistence, at its most basic, draws from a diversity of micro-ecosystems within a one-to-two square mile area. About 90 percent of the village's 220 households are involved in some form of extracting resources from the ocean, and the majority of these households simultaneously practices some form of horticulture and agroforestry. Household subsistence strategies, in the form of labor patterns, are structured primarily by age and gender and are potentially the same types of patterns that can inform the archaeological record.

TOP RIGHT: Harold McKnight; TOP AND BOTTOM LEFT: Michael Harris



Land Use Patterns B 1961.



Land Use Patterns — 1996.

GEOGRAPHIC AND ECONOMIC CHANGE IN THE RECENT PAST

Over the past 30 years, the village of Salango has become more dependent on ocean resources. As boats became motorized and the coastal road was improved, fishing was more tightly integrated into a market system that expanded beyond the local area to meet demand from large cities. Consequently, the entire fishing enterprise became more lucrative and a relatively secure supply of cash for villagers.

Fishing intensified during this time and it is clear that population movements took place. Boat size and crew numbers increased. Seine fishing became more productive as larger, motorized boats ventured further offshore with larger nets. As a result, almost all mountain households that had been devoted primarily to horticulture and agroforestry moved to the coast, joining coastal populations. Many such households placed their young adult sons on fishing boats.

Today, most Salango households retain access to mountain land for both horticulture and agroforestry. Prehistorically, such movements may have occurred for similar reasons, particularly as the market relations of the Manteño traders extended up and down the Ecuadorian coast, reaching at times to Perú.

The aerial photos of land use for 1961 and 1996 indicate changes having taken place in both the Salango and Río Chico zones. Perhaps the most obvious feature of change is the modest increase in the 1990s in *montaña* parcels that are being used. See the table that indicates the changes in major uses we have been able to identify through aerial photographs and verify with ground-truthing.

While overall numbers and average plot sizes of mountain parcels in use have increased, the geographic record itself can be greatly informed by ethnographic work. Through ethnographic interviewing we know that the increase in utilization of mountain parcels occurs over the same period that the mountain as a residential area is abandoned. Also, in the latter part of the 1960s, a migratory movement of people from regions in the north (Jipijapa and environs) began to arrive in Río Chico. The new migrants were experienced mountain horticulturalists (manioc, corn, beans) and agroforesters (citrus, coffee, plantain, tagua palm). Hence the continuation and expansion of mountain horticulture and agroforestry is largely due to a migratory influx from outside the immediate region. On the other hand, indigenous mountain households largely abandoned the interior for the coast, drawn by a newly constructed coastal road that created new access to markets, government services, other resources, and to the expanding fishing economy. Thus, from the 1960s through the 1990s there were at least two population movements; one from the exterior to the region, and the other from the interior *montaña* to the new road and coast.

The village of Río Chico today—with approximately 500 residents—is a product of those twin movements. In

Table 1.
SUBSISTENCE PRACTICES IN MICRO-ECOSYSTEM ZONES

ECOSYSTEM	RESOURCE (CONSUMED)	ACTIVITY	HOUSEHOLD LABOR
Open Ocean	Fish	Fishing	Young to Middle Aged Men
Reef Areas	Fish, Squid, Octopus, Lobster, Shells	Diving	Young Men
Coast (Beach and Surf)	Shrimp, Larvae, Shells	Collecting	Young Men, Women, Children
Mangrove	Fish, Mollusks	Some Fishing	Young Men
River Valley	Pigs, Chickens, Buros	Animal Husbandry	Women, Older Men
Inland Terraces	Manioc, Corn, Plantain, Legumes	Horticulture	Women, Older Men, Children
Montaña	Citrus, Coffee, Plantain, Tagua	Agroforestry	Older Men
Dry Forest	Wood, Corn, Manioc, Plantain	Horticulture	Young Men, Older Men
Humid Forest	Cattle, Wild Game	Hunting	Young Men, Older Men

Table 2.
CHANGES IN LAND USE, 1961-1996

YEAR	TOTAL PARCELS	PASTURE/ HORTICULTURE	AGRO-FORESTRY CURRENT	AGRO-FORESTRY FALLOW/ LOMO
1961	254	82	113	59
1996	291	111	133	47

Charles Roberts

recent years, villagers have been selling coastal lands to outside investors. This has made their access to the ocean and beach areas more difficult. Consequently, Río Chico households have had to maintain a stronger tie to horticulture for subsistence, while Salango residents continue their orientation to the ocean.

Our current work, integrating anthropology and geography, attempts to identify land use changes through the use of aerial photos and to enhance our ability to decipher patterns with the addition of new types of data, particularly the use of satellite photos of the region.

Our next step will be to conduct systematic and simultaneous geographic and archaeological surveys of the watershed basins. This will allow us to build dynamic, virtual hydrological models that can map out how particular climatic events, such as drought and El Niño, would have affected the actual landscape and prehistoric settlements of varying phase, size, and function.

The surveys will further provide the basis for understanding the integration of major (coastal) and minor (*montaña*) sites as parts of larger sociopolitical units that developed and changed through time. Finally, the hydrological model will also be useful for predicting the effects of future rainfall scenarios, such as El Niño events, on contemporary populations and landscapes.

In summary, our research concurrently pulls archaeology forward into the present and ethnography backward to the past. The result is a dynamism and interaction in the research process that allows for a great amount of cross-fertilization of ideas and theories. The question of how maritime trade influenced settlement patterns 1,000 years ago can be approached from two directions: present to past *and* past to present. This approach provides innovative tensions in the research and, we hope, can generate fresh theoretical directions for the field of anthropology as a whole and especially for both archaeology and ethnology.

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FROM LEFT TO RIGHT: Charles Roberts, James Gammack-Clark, Valentina Martinez, Michael Harris, and Wm. Jerald Kennedy.

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