SOCIAL AND ECONOMIC DEVELOPMENT OF A SPECIALIZED COMMUNITY IN CHENGUE, PARQUE TAIRONA, COLOMBIA.

by

Alejandro Dever

B.A. Antropología, Universidad de los Andes, 1998

Submitted to the Graduate Faculty of

Arts and Sciences in partial fulfillment

of the requirements for the degree of

Doctor of Philosophy

University of Pittsburgh

2007

UNIVERSITY OF PITTSBURGH

FACULTY OF ARTS AND SCIENCES

This dissertation was presented

by

Alejandro Dever

It was defended on

April 3, 2007

and approved by:

Dr. Mark Abbott

Dr. Marc Bermann

Dr. Olivier de Montmollin

Dr. James T. Richardson III

Dr. Robert D. Drennan
Dissertation Director

SOCIAL AND ECONOMIC EVOLUTION OF A SPECIALIZED COMMUNITY IN CHENGUE, PARQUE TAIRONA, COLOMBIA

Alejandro Dever, PhD

University of Pittsburgh, 2007

The primary intention of this research has been to establish how the specialized Tairona community of Chengue was formed and how social inequality plays a role in socio-economic change from 200BC to 1650AD. The main questions are organized around two opposing scenarios designed to test top-down and bottom-up processes for community formation. In the top-down scenario the community would be the result of an external agent that had sufficient authority to "create" a community with the intention to extract a highly concentrated resource, marine salt. In the alternative scenario, the bottom-up process, the community would become specialized as a result of a slower process in which the changes that led to specialization are the product of decisions of the individuals who resided in Chengue and natural environmental changes. Consequently specialization would have been the role of individual agents (individuals and households) at a very small scale. Although the observed sequence had components from both scenarios, the bottom-up process appears to be the primary force in the formation of a specialized community and the production of surplus that led to social inequality.

Study of soils, lagoon and coastal sediments, flora and fauna allowed the climatic reconstruction the last 2500 years. During this long span of time communal units larger than households but smaller than villages had great stability and appear to have been the motors of socio-economic change. The evidence from Chengue suggests that progressive specialization in the context of environmental limitations produced a group of people less well-off than others. Elites do not; however, appear to have had much range of political action during most of the sequence.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PREFACE

This volume is the result of the energy and work of many people, but the committee members and very specially Dr. Robert Drennan were invaluable. I am very grateful to Wenner-Gren Foundation and Dr. Pamela Smith, which supported me during most of the doctorate. Special thanks to Dr. Carl H. Langebaek for sharing data from the regional survey of the Parque Tairona. Felipe Cardenas and Dr. Langebaek were also important in providing assistance and ideas for the ethnohistorical aspects of this investigation. I also would like to thank the Center of Latin American Studies of the University of Pittsburgh, and especially Dr. John Frechione for the travel grants and inspiration that made possible the visit to the Archivo General de Indias in Seville and preliminary visits to Chengue in 2002 and 2003 respectively. Over the years the committee members had an active role in the process of writing this volume. Dr. De Montmollin provided inspiration and ideas during the long conversations we had in his office. Many of the ideas for the models used in this dissertation came from Andeanist perspectives discussed in Dr. Berman's seminars, his insight and incisive questions were very helpful and am very grateful. Many thanks to Dr. Richardson for granting me access to the collection of Tairona artifacts from Gairaca at the Carnegie Museum, his bibliographic resources and good natured conversations on marine adaptations.

The 2004 and 2005 field seasons were financed by the NSF grant BCS-0431705 and a grant from the Instituto Colombiano de Antropología e Historia (ICANH). At the time the director Dr. María Victoria Uribe and the director of Archaeology and Patrimony Dr. Victor Gonzalez Fernandez where devoted to maintaining the highest research standards possible with the limited resources of the ICANH, and I greatly appreciate all their input and support in the field and analysis phases. During the dissertation fieldwork at Chengue the team of 4 to 7 workers lived in tents and hammocks, had the best attitude and made the 6 months we stayed in Chengue a pleasant experience. Three of the workers endured the entirety of the field seasons and became proficient excavators, Juan Carlos Chavez, Abel Chavez, and Leonardo Villanueva. Doña María, Abel and Juan Carlos' mother took care of all of us and was a prodigious cook and I am very grateful for their hard work and positive attitude. I would also like to

thank my parents Federico and Elsa Dever and my cousin Nicolas Grajales for their support during the whole research, the cases of Bon Pate products we enjoyed at Chengue and their help in transporting and storing equipment and the almost 2 tones of ceramics, stone artifacts and lagoon sediments from Santa Marta to Bogotá. The topographic survey was made possible in part by Fernando Schlessinger manager of Andamios Equipos y Encofrados that provided the theodolite.

During the first 3 months a fellow archaeologist, Alejandro Patiño, assisted me in the survey and shovel probe phases and endured the rigors of the mosquitoes during the rainy season of Chengue, and tough living conditions for which I am most grateful. Our stay in Chengue was also possible thanks to the hospitality of the Parque Nacional Natural Tairona, and the Davila family. Rebeca Franke, scientific coordinator of the PNNT who shares a rare passion for scientific research and the environment, she was especially helpful in facilitating the access to the park and the research as a whole. Many thanks to several members of the Instituto de Investigaciones Marinas y Costeras (Invemar) especially Jaime Garzón, and Alberto Rodríguez who were very open in providing information about Chengue's environment that was unpublished at the time. Very special thanks to my cousin Andia Chavez for lending me her apartment in Santa Marta during the last phase of the project.

All the data found in this volume is the result of a group effort of very well qualified individuals that turned the remains from Chengue into useful data. Marine biologists Nadia Santodomingo and Adriana Gracia identified and classified the sea shells, and I am grateful for their work. Gaspar Morcote, from the Instituto de Ciencias de la Universidad Nacional de Colombia processed and identified phytoliths and seeds, his work can be found in Annex B. Dr. Juan Carlos Berrío was of immense help in processing the sample from Excavation 16, his help was moved out of dedication and passion for the natural history of our environment. Professor Mark Abbott and Dr.Broxton Bird provided invaluable aide in the radiocarbon dating of the samples. Dr. Abbott also provided permits for bringing the sediment samples, coring equipment, laboratory space and advice that allowed the paleoclimatic reconstructions in this volume. The ceramic analysis team: Alejandro Patiño and Beatriz Rincón was devoted, persistent and careful beyond my expectations. Alejandro Bernal, Alvaro Bermudez, Hernan Ordóñez and Diana Villada were also assisted in the ceramic analyses and later in cataloging and organizing the collection. Beatriz Rincón and Angelica Guzman helped in the identification of the faunal remains. Very special thanks to Abigail Tubio who digitized much of the data from the ceramic analyses and Tatiana Santa that classified the lithics collection.

The idea of doing research in Chengue came was the result of fortuitous and planned events. In the summer of 2000 after a long research season in the outskirts of Medellín Carl Langebaek and Santiago Giraldo invited me to Santa Marta to start a regional project in the Parque Tairona. The project had rented a small pickup truck to move the 7 or 8 members of the team around as we had done in Tierradentro, and half a dozen other regions of Colombia where we had been doing research since the early 90's. We took our satellite images, backpacks with a light lunch, shovels and GPS and took off to map out the Tairona villages in the area. When we arrived to Gairaca, the middle of the road between Chengue and Nehuange we looked at our satellite images and split up the place in three, one for each group. Carl took Gairaca, Santiago took Nehuange and I was left with Chengue, the last pick. The rest two other teams left and I was left with two volunteers, my cousin Andia Chavez who was at the time a marine biology student, and Camilo Saenz, at the time an anthropology student. The place that was seldom mentioned in the archaeology of the region, it didn't even appear in many regional archaeological maps and to my surprise did not have access roads. In fact, we didn't even know how to get there from the small fishermen village of Gairaca. So I asked the first local person I found, Mr. Clemente Cayón who still lives on the shore of Gairaca. He told me that some 27 years ago there used to be a trail that would lead to Chengue, and that he hadn't been to Chengue since the late 70's when he was a young man. Then I asked him if he could show me the way, the day was going by quickly and we hadn't even started our survey area for the day. Next thing I know, Clemente and my team are trekking, or rather hacking, through the dense vegetation over the ridge that separates Chengue from Gairaca. It seems that he had been the last person to go from Gairaca to Chengue by land and the trail had been eaten by the forest. After traveling less then a kilometer in two hours we arrived to the eastern section of Chengue, somewhat bruised and mangled by the thorny bush. To my amazement, Chengue was a far more beautiful bay than Gairaca. From our point of view it looked pristine, far more diverse and relatively untouched. In some ways it appeared to be 1000 kilometers and 1000 years from anywhere. It was a microcosm, a tiny stream with a few small valleys and a wide range of ecosystems and no one in sight. After doing the first set of shovel probes, that to our amazement were always positive even though we saw no ceramics at first, we got to the camp of the caretaker of Chengue. There we witnessed how Jairo Varela extracted salt on his askew but sturdy "Pechichon", the dugout canoe had a 75 hp Johnson engine. It was close to the end of the day and we feared another couple of hours of traveling through the forest to Gairaca in the dark, so we asked for a ride. Jairo was about to finish loading his Pechichon up to the rim with salt He saw that we were four, so he unloaded four sacks of salt and told us to hop in.

The next thing we know we are slowly but surely riding a top a mountain of salt around the choppy cove of Chengue into Gairaca. In May, the sea is calm and while we traveled the workers dropped a couple of fishing lines in the hope of catching dinner, the often did. Over the next few weeks we decided to stay two or three nights at a time in Chengue, catch a ride on the Pechichon when possible and continue exploring Chengue, systematically making samples and measurements. It was a surprise, almost everywhere there were buried artifacts and stone structures. Some areas were terribly looted but others seemed unaltered. We camped and got to experience the place in a very complete way helped loading the Pechichon and learned how Jairo's family lived almost off the land. Later in the season we found the Tairona trail that leads to Chengue and that intersects the modern paved main road of the park so we made the long an abrupt hike to the site several times. We found long sections of the ancient trail still in good shape but also felt the physical isolation of Chengue having to transport all our drinking water on our backs. In the dry environment of Chengue there are no sources of fresh water other than rainfall and a brackish well dug in the middle of the floodplain of the main drainage. Here the few dogs and a donkey are forced to drink this water and once or twice we did as a last resource. During the following years the research at Chengue followed the path of the first field season. The people I first met in 2000, the Chavez family and Jairo were involved in the project in different ways over the years and I witnessed the small changes in their lives and in Chengue as time moves on, slowly but surely in the tiny bay of Chengue.

Finally, it is important to note that the databases compiled for this dissertation are available as comma delimited text files at www.tairona.net. The material collection is cataloged at the ICANH in Bogotá, information on the archaeology lab may be found at www.icanh.gov.co.

CHAPTER 1: THEORETICAL BACKGROUND AND METHODOLOGY

INTRODUCTION

The following research aims to refine our knowledge of the social and economic mechanisms that were involved in the development of the Tairona political economy and will address some general questions on how complex societies develop and investigate the role of economic changes in the emergence of social complexity. More specifically, this dissertation will attempt to characterize and identify economic and hierarchical relationships within the community of Chengue, located in the Parque Tairona (officially: Parque Natural Nacional Tairona or PNNT) in the middle of the Tairona area (Figures 1.1 and 1.2). Consequently, this research intends to identify the causes and process that led to the changes in social organization that resulted in a complex socioeconomic system. The analytical approach to reconstructing the changes in the coastal Tairona villages is to attempt to reconstruct plausible scenarios, clearly identifying their components and eliminating those that are less likely. These scenarios are intended to reconstruct from multiple lines of evidence some aspects of the socioeconomic history at Chengue and evaluate the plausibility of a top-down process, a situation in which socio-cultural change is primarily the result of the actions of an overarching politically dominant actor; or a bottom-up process at Chengue, a situation in which socio-cultural change is the result of the emergent complex interactions between micro scale interaction between agents moved by rational decision making process and cost benefit analysis. Although the evidence may not show a “pure” top-down or bottom-up process it will allow for the scenarios to be used as components for a more synthetic view of the process.

THE TAIRONA

Although the term Tairona may be an inaccurate way of naming the societies that inhabited the Sierra Nevada de Santa Marta during the contact with the Spanish empire, it has become the most common name for a hierarchical network of villages that developed after ca. 800 AD. (Oyuela-Caycedo 1986a, 1986b, 1987a, 1987b; Reichel-Dolmatoff 1965,1978; Cárdenas 1996, Langebaek 1991,1996; Drennan 1995). Early on in the 16th century the term Tairona was used in reference to the inhabitants of a valley and probably a chiefdom named Tairo on the northern slope of the Sierra Nevada de Santa Marta. In time the Spanish used the term to classify the whole group of chiefdoms in the area as Tairona early on in the 16th century. To the eyes of the Spanish the groups within the northern and western part of the Sierra Nevada were indistinguishable from each other in great measure; in a similar way they have become indistinguishable to archaeologists in more modern times. The archaeological sequence of the region spans from approximately ca. 2000 BC to the 1600's when the Tairona villages and chiefdoms were forcibly dispersed, and their populations integrated into the Spanish encomienda system. The available C14 dates show that the coastal sites started to be occupied much earlier than the ones at higher elevations (Cadavid and Herrera 1985; Oyuela 1986; Groot 1985; Langebaek 1991, Langebaek and Dever 2002). It would seem as if the largest centers, located at 1200 m above sea level, only emerged in the later part of the sequence around 1000 AD. The coves and inlets on the Caribbean coast, where villages have more modest architecture, show the longest occupations, spanning the whole 1600 years of the sequence (Wynn 1974, Cadavid and Hererra 1985, Langebaek 1991).

The Tairona have been studied archaeologically since at least the late 1920's, which has resulted in relatively good knowledge of their gold work, ceramic and stone portable art as well as their architecture and are currently regarded as one of the most complex chiefdoms of northern South America and Southern Central America (Drennan 1995, Mason 1931). Since the 1950's some archaeological projects in the region were oriented towards mapping the stone contours of the larger highland villages and characterizing the Tairona in terms of their social organization and building a ceramic chronology for the region (Herrera 1985, Langebaek 1987, Oyuela 1998, Reichel-Dolmatoff 1953, 1954a, 1954b).

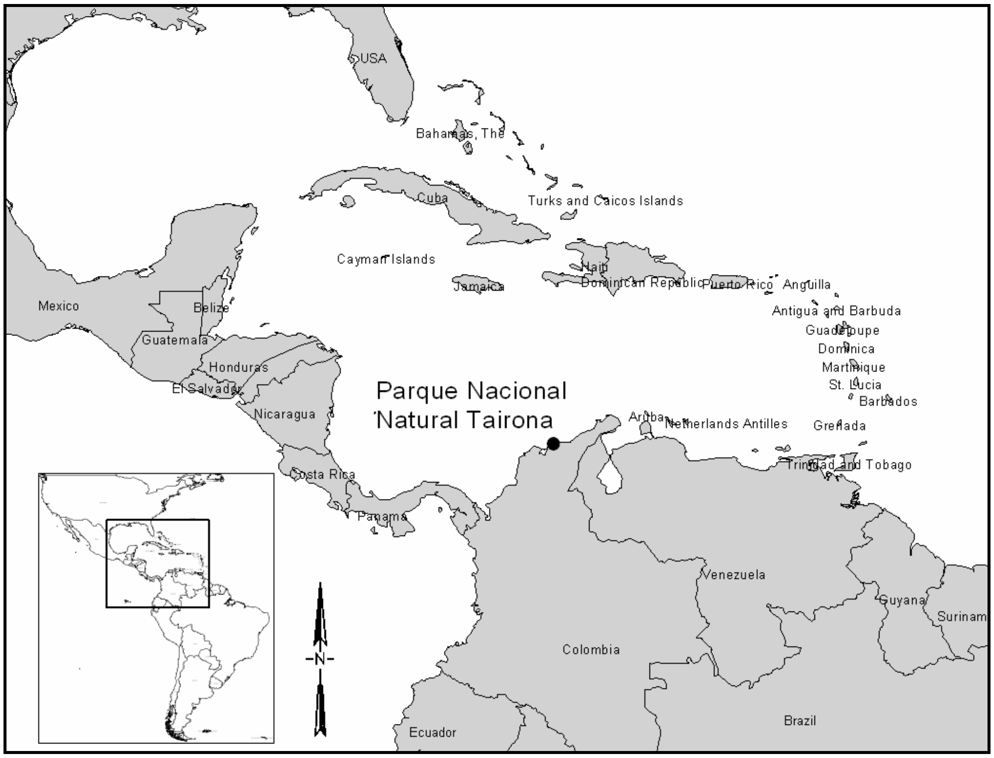


Figure 1.1 Location of Parque Tairona

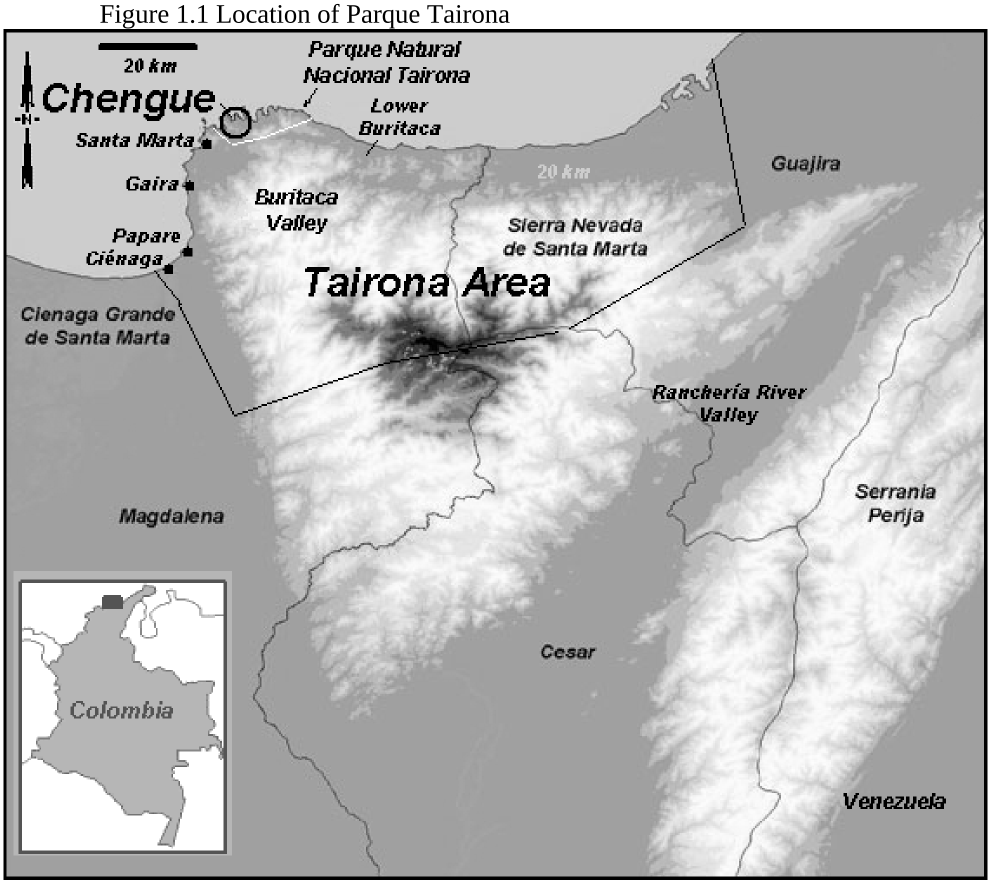


Figure 1.2 Tairona Area, Parque Tairona and Chengue.

However, much of what we know about the Tairona social organization is the result of ethnohistoric research, where there seems to be little consensus on the specific characteristics of the Tairona political system. The historical records of the Tairona lack some of more detailed, yet often biased, historical information that is often taken for granted in other areas where the relationships between the colonial and native political entities was less belligerent. Some chiefdom social organization dominated politically over most of an ethic group and maintained some degree of cohesion that seems to reflect aspects of their pre-colonial social organization, such as the Muisca, this does not seem to be the case of the Tairona chiefdoms (Tovar 1988,1993, Reichel-Dolmatoff 1951). Although some relatively late primary historical sources do suggest a considerable degree of economic integration of between communities, it is difficult to establish through them the specific ways in which production, distribution and consumption were structured, how these economic relations affected their political system or how they came to be. The problem of how they developed and changed over time is still an open and somewhat controversial subject (Cardenas-Arroyo 1988, 1996; Oyuela-Caycedo 1987a, Drennan 1995). Furthermore, there is little consensus on the nature of the political system other than stating it must have been a series of complex chiefdoms. The Tairona chiefdoms have been described as belligerent, ruled by warring chiefs, as a theocracy dissected by factions or houses; as a federation of chiefdoms with a form of consensual power over segments of territory, or as completely disarticulated politically but with a degree of ideological homogeneity, a single economy and to some degree a single language or at least a lingua franca (Langebaek 1991, Bischof 1982, Redmond 1994, Oyuela-Caycedo 1998, Reichel-Dolmatoff 1954a, 1965 1978, 1986, Tovar 1993, 1997). The picture that is formed by the various approaches and theories regarding the Tairona can be confusing, however, most of them are not exclusive to the other and actually show the many different aspects of a complex and sophisticated society.

SPECIALIZATION AND SOCIAL COMPLEXITY

Specialization and trade have been key elements in the development of the economies of many societies. In fact specialization may be used as a way to understand or compare the level of complexity of economies because it involves increasingly complex forms of interaction, rules and differentiation. In a chiefdom it would be expected that specialization was closely related to distribution mechanisms like exchange, feasting or plunder. However, the politics associated to production and exchange may vary greatly (Brumfiel and Earle 1987, Sahlins 1958, Service 1958, 1962, 1975; Fried 1967). Within this variation there may be some trends that may on occasion oversimplify the role of trade and exchange in the development of a political economy. This research will focus on the factors that drive the formation and change of a community, taking into consideration that the community, in this case Chengue, is in no case an isolated or monolithic entity (Yeager and Canuto 2000, Isbell 2000).

Several theories have been offered to explain economic specialization in relation to environmental complementarity, emphasizing the role of exchange in the household economy. Utilitarian theories, such as Service's (1962), argue that exchange develops as a result of environmental diversity where communities can be naturally more effective in producing only a few kinds of goods with the particular resources available to them locally. In time, as production differentiates, a redistributive mechanism which facilitates interchange of the goods produced by the specialists develops. This mechanism tolerates the cost of an elite due to the benefits redistribution brings to the group of producing and consuming communities. In this model specialization is a causal factor for institutionalized social inequality.

In a similar tone, Andeanists have developed models that suggest that the social organization in this region was determined, to a degree, by the material needs and the flow of goods (Alberti and Mayer 1974; Masuda, Shimada and Morris 1985). The great environmental variation in small areas in the Andes would produce locally specialized goods, and patterns of exchange would follow patterns of local production efficiency and transportation costs (Murra 1972, 1995). These political systems would increase in complexity and size, and the exchange of goods would increase in efficiency, further integrating communities into a single economy, a similar situation could be easily imagined for the Sierra Nevada de Santa Marta. In these models the institutionalization of political inequality could have preceded economic specialization, but it is not clear if specialization could have been a cause for institutionalized social inequality because many of the examples these models are based on are ethnohistoric sources, and therefore from a time when political differences in the population studied were already firmly established. However, Aldenderfer (1993) suggests that economic complementarity can occur in very early societies, ca. 5000-4000 BP, although the causal forces are not clear he suggests complementarity occurs at a domestic level first. Domestic verticality has also been suggested for the Tairona, a model frequently called microverticality suggests that in the more locally diverse environments of the Northern Andes individual households are capable of accessing a wide range of environments while investing only a day of travel (Oberem 1981; Bischof 1982, Reichel Dolmatoff

1978, Langebaek 1996). These models have assumed that economic specialization and exchange are normal human cultural adaptations that follow an ecological pattern where political entities attempt to control the widest possible number of environmental niches due to the resulting economic advantages.

Other models have postulated that exchange of staple goods occurs in ceremonial contexts related to feasting that leads to the increase in prestige of an elite (Dietler 2001; Potter 2000; Rowlands and Kristiansen 1998). In this case social differences would be preceding economic differences as in the case of long-distance trade in objects of wealth (Helms 1979) or that of manufacture of wealth goods (Brumfiel and Earle 1987). In many of these models the causal relationships between institutionalized social differences or political power and economic power are not fully explained. For this, identifying the sequence in which these aspects of society appear and the conditions in which they happened is very important for the improvement of explanatory models of socio-cultural change.

A similar approach is based on constant competition for prestige, influence, and control over the production and distribution of craft goods to increase political assets and contribute to aggrandizement. A vehicle for the acquisition of prestige is the control over items suitable for trade, generally craft goods such as: stone tools, pottery vessels, metal ornaments and textiles, which would have given the specialist families an edge over non-specialist families (Arnold 1984; Brumfiel and Earle 1987; Clark and Parry 1990; Hirth 1993; Smith 1987, Costin 1991:13, Cardenas 1996). The capacity to accumulate can be translated into capital, material or symbolic, which can be used in political enterprises; this may result in the creation of a monopoly or a relative monopoly of certain families over the production of a few widely consumed staples, leaving the non-specialist families in a dependency relationship. The effect of this is the formation of a political elite which actively seeks its own further aggrandizement by extending its control over larger areas, populations, and economies. The causal relationship in this case is similar to the Marxist chain of cause and effect in which technological progress and improved production creates surplus that leads to trade and to the formation of economic inequality (Service 1975). The formation of institutionalized political differences follows as a structure of coercive force that intends to perpetuate the economic differences; or in simplified terms economic specialization precedes and is a causal factor of institutionalized social inequality.

THE VILLAGE OF CHENGUE

The Tairona has been seen as a complex society with a relatively sophisticated political structure with multiple levels but a very diffuse political head. Within this social structure the community may be better understood from a perspective that takes into consideration not only the relationship between kinship groups but also, moieties or houses and institutionalized hierarchies within each of these groups (Oyuela-Caycedo 1998, Langebaek 1991, Reichel-Dolmatoff 1954a,1954b). Archaeologically, the differences and commonalities between households in a community and how is it that these households interacted with each other and with the neighboring communities is a key element in approaching the seemingly enigmatic nature of the Tairona society, its origins and development. Therefore, this research is designed around several independent lines of evidence that will be presented over the following chapters and will help produce not only an accurate reconstruction of some aspects of the history of Chengue but also the degree to which the factors that create the community vary in importance in time.

The settlement of Chengue might have been the result a bottom-up strategy arising in a situation in which an area convenient for the production of a few staples is exploited by a few households. In such a bottom-up scenario, regional elites would emerge only later to help manage and guarantee the viability of the intercommunity networks of interchange of specialized products. This situation would leave utilitarian and verticality models as a result of entrepreneurial households (Service 1962; Fried 1967; Murra 1972, Costin 1991). Although this endeavor is risky for individual households in an environment where competition is ever increasing (Carneiro 1981), the highly localized resource in combination with a network of supra-family relationships increases the relative surplus of a few families and provides the fundamental means for increasing household prestige and the endemic formation of a political and economic elite (Chayanov 1986; Earle 1991; Gilman 1981, 1991; Boserup 1965; Cohen 1977).

On the other hand, Chengue might have been a top-down administrative enterprise of aspiring local elites, actively seeking to enhance their own position by expanding their economic and political might by controlling production of highly circumscribed staples, and using redistribution of these staples as political leverage. Elite control of production would have been intimately involved in the settlement of Chengue and the development of its specialized economy from the beginning. In this case the specialized community would have been the result of an elite that emerged in a separate process previous creation of the community of Chengue and more related to economic control and redistribution at a regional level.

A History of Specialized Salt Production in Chengue

In either case specialization at Chengue may have been concentrated in salt production and possibly fishing and salted-fish trade. Salt would have been an ideal trade item because it is not perishable, in high demand, and could have been traded with virtually anyone but produced by only a few, under specific environmental conditions (Langebaek 1991; Oyuela 1987; Langebaek and Dever 2002). Salt production occurs today in Chengue as a seasonal activity that depends on precipitation, as fresh water from rainfall mixes with seawater in a coastal lagoon that is unusually protected from the sea. This limits salt extraction to roughly eight months a year in two seasons, although modern extraction is done only in February. During the dry months of January through April and June through August precipitation is between 0 mm and 3.7 mm; during the remaining four months, the remainder of the scarce 317 mm of annual precipitation falls, half of this in the month of May. This level of precipitation is insufficient for reliable agriculture and its acute seasonality leaves the landscape as a dry tropical forest for most of the year (Garzón- Ferreira and Rodriguez-Ramirez 2003a). A regional survey conducted during the summer of 2000 showed that Chengue has an archaeological site much larger and older than expected, one whose apparent population would substantially exceed the local agricultural potential (Langebaek and Dever 2002). At the time of the Spanish Conquest, the indigenous population of Chengue produced salted fish and exchanged this product for maize and other agricultural products (AGI 1607). Several documents show that at the time of the Spanish Conquest, the indigenous population of Chengue produced salted fish and exchanged this product for maize and other agricultural products (AGI 1607). A late account from a letter of the Bishop of Santa Marta, Fray Antonio to King of Spain dated to the 24 of December 1717 describes an episode of salt production in Cienaga, a town to the west of Santa Marta (Figure 1.1). He pleads for better and more just distribution of salt to the Indians under the encomienda system because they couldn't afford the salt produced by the king's salt flats. In the letter he also mentions that the Indians were hardly ably to cure fish to sell in the market, and mentions how some had started producing it themselves. The salt production process is described as "foam salt" that is formed overnight in pits that are often demarcated with a small wall, often as large as a fanega (similar to an acre) in size filled with seawater by Indian womenThe salt was then sold at a price, that according to the bishop, had been increasing continuously since he arrived, suggesting a successful supply of the demand. He then continues to say that this production is so effective that the king's salt flats were suffering because the price of salt has gone down from 40 pesos to 6 or 8. The Bishop argued that in order to be fair with the poorest Indians, free salt should be provided from the Salamanca salt beds (a sand bank further west of Cienaga) and if that is not enough that they should serve themselves from the salt flats of Chengue and Santa Marta (AGI 1717).

The description of the salt production method closely resembles what I observed in Chengue throughout the year; after the time of the year when the lagoon is flooded (see Figure 1.3), from January on as it evaporates salt can be easily collected as foam each morning. Once all water dries up a thick layer of salt can be scraped off with a shovel (Figure 1.4). The lagoon changes color during this process, due to growing densities of Artemia Salina (brine shrimp) that give the last few inches of water on the lagoon a distinct reddish color (Figure 1.5). This method may have been in use since pre-contact times in Pozos Colorados (Red Pits), Santa Marta, Chengue and Dibulla (Oyuela-Caycedo 1987b). The process in Chengue is much easier than the one described by the Bishop of Santa Marta because there is no need to artificially fill the lagoon with sea water. The process resembles many salt bed techniques in the world; it however does not require additional evaporation or further processing as is found archaeologically in other places such as in the Maya area where water from coastal lagoons was evaporated in ceramic pots (McKillop 2002, 2005).

Figure 1.3 Chengue Lagoons During the Beginning of the Rainy Season.
July 25, 2005 (Digitalglobe).

Figure 1.4 Chengue Lagoons during Dry Season.
IKONOS Satellite Image, March 30, 2003 (Digitalglobe). Note the salt deposit in the eastern lagoon (Sector 1).

Figure 1.5 Coastal Lagoon in Chengue, Sector 1.
October 2004, rainy season.

It is uncertain the extent to which the salt lagoon has been used since the Tairona village was destroyed by the colonial government; however another account suggests that Chengue had been abandoned long before 1744 when de la Rosa wrote his accounts (Rosa, 1974). Modern mythology of the Ijca, Wiwa, Kaggabba and Cancuamo Indians mention Chengue as part of their ancestral territory as the place where the spiritual mother of salt lives, and thus the place still has a degree of mythical or religious and political importance. Although mythical sources are controversial and may have problems in relation to their accuracy because they may be tainted by the modern land conflict and political expectations of the Indian organizations, it remains as an important piece of evidence (Organización Wiwa Yugumainum Bunkwanarrwa Tayrona et al, 1999).

The disappearance of Chengue as a village does not imply that salt ceased to be extracted seasonally by people living nearby; it is evident that it is not necessary to live in Chengue to extract salt from its lagoons. In 2000 I witnessed and participated in modern salt extraction or harvesting. People from the town of Bonda organized by the watchman of Chengue, Jairo "el roba sal" Varela, camped out on the beach and extracted salt for a few weeks during March. In a single season 20 to 30 workers extracted 1500 sacks, 40 kg each of pure salt crystals, totaling 60 tons of salt in a single season. I was told by Mr. Varela that in one occasion they extracted 3000 sacks of salt, so it is likely that the lagoon of Chengue can produce between 60 and 120 tons of salt a year although salt is not necessarily extracted every year. However, it is likely that the construction of pits and better management of the lagoon could increase the production.

The salt harvesting process is simple. The salt is left to dry on the lake bed and then scraped off with shovels and piled up. Most of the scraping of the salt is done at dawn when the air is cooler and the sun is lower on the horizon. The salt is piled up and then transferred into sacks that are transported out of the lagoon by the workers and piled up on the shore and covered with a tarp. Later, the sacks are loaded into cart pulled by a donkey and hauled about 500 meters to the shore, where they are stored under a bohio (round house with a thatched roof and no walls), that protects them from the rain. Whatever salt does not fit under the roof is stacked under tarps. This is done during the months of February to May, that are very dry. By May most of the salt has to be taken out of Chengue; otherwise rain is likely to dissolve it. All the salt is transported by sea, in a large dugout canoe built from a single tree; about 8 meters in length and 1.3 meters wide, powered by a 75 hp gasoline engine and capable of 40 sacks of 40 kg or 1.6 metric tons plus two or three workers (see Figures 1.6 and 1.7). The salt is carried out in 40 kg sacks of PVC thread and driven around the cove of Gairaca. Usually the passage around the cove is difficult; the sea is rough before entering the neighboring Bay of Gairaca. Here the salt is unloaded and stacked under tarps where it accumulates until it is loaded into trucks and hauled away. The transportation of the salt sacks goes on well into the month of June and is done by two or three loaders and a pilot. According to Mr. Varela, his family has been extracting salt since the early 70's and they recall the first time they extracted salt as a memorable event because the layer of salt was so thick that the donkey and cart could ride on it without sinking into the lake's mud, "It was paved with salt". According to former salt workers, Juan Carlos and Abel Chavez, extracting salt is "hard work". As it can be imagined working in

40 to 50 degrees centigrade temperatures and a highly corrosive environment and a low wage has discouraged many from this enterprise. Most if not all the workers come from Bonda and are only interested in extracting salt as a last resort and few women go into the business. The workers are paid by the sack about 200 pesos in the year 2000 which means that a person would have to extract, pack and carry a short distance 43 sacks or 1720 kg a day to get the 8,600 pesos a daily minimum wage was at the time. Access to the bay by the "Bonderos" (people of Bonda) occurs mostly through the old Tairona trails. Still in fairly good shape they are practically the only way to get to Chengue by land although the use of a donkey and some cows have eroded or destroyed sections the archaeological stone paths. This strongly suggests that the paths were useful only to pedestrians; hoofed animals have a very hard time on them, especially in the narrower and steeper sections or when they are wet. Modern salt extraction also stimulates looting and illegal excavations in Chengue, it is well known that in their free time the caretaker of Chengue and other workers have created enormous holes and extracted ceramics and stone implements from archaeological contexts producing severe environmental damage. Recently, the low price of salt and the high expense of extracting it and particularly transporting from Chengue has made the enterprise less profitable, so salt extraction in Chengue is now less frequent than a decade ago.

Determining Specialization.

By the sixteenth century, the ample documentary evidence describes Chengue as a community that had specialized to a high degree in salt and fish production (AGI 1607). Its location in a protected bay with very limited possibilities for cultivation suggests that its inhabitants might have specialized in exploiting marine resources and relied on their trade for subsistence in precontact times as well (Oyuela 1986, 1987). Before attempting to determine how such specialized production developed, it will be necessary to provide stronger evidence that it, in fact, existed before the sixteenth century. In the following chapters evidence of the surviving artifacts assemblages and refuse of the residents of Chengue will be compared to those of other villages where agriculture was evidently the prime economic activity, particularly larger villages like Pueblito and Buritaca 200, excavated during the 20's, 40's and 70's respectively, (Mason 1931; Reichel-Dolmatoff 1954a; Herrera and Cadavid 1985; Herrera 1985). Specialized toolkits at Chengue include net and string weights for fishing, various types of stone hammers and knives for shell-fishing. These artifacts are found in much higher proportions than those of agricultural toolkits, which would ideally, show higher proportions of tools such as stone axes, spindle whorls and hoes. The village's layout may also provide clues towards its economic life, including modifications of the landscape that may contribute to the salt production industry. Although very little archaeology on salt production has been done in the Tairona region, in other regions of Colombia and coastal Costa Rica salt production is closely related to specific ceramic forms. However, the ceramic forms that are associated to salt production in the northern Andes or the Maya area are related to evaporation techniques which would be unnecessary in Chengue (Cardale 1976, 1981; Bonilla 1982, McKillop 2005).

As it was shown in ethnohistoric documents salt was the primary staple produced in Chengue by the 16th century. Presumably, the 40 to 60 metric tons of salt currently produced in a year were not consumed solely by a local population, or even by the neighboring villages. It is also likely that the excavation of small pools, control of sediment, year round management and care could have increased the productivity of the lagoon. Modern extraction techniques take absolutely no care of the lagoon or surrounding area between harvest seasons so prehispanic production may have been over the modern figures. Assuming a conservative estimate for salt consumption by modern populations of between 11 and 7.5 grams per day means that it would require 22,000 to 15,000 people to consume the salt produced by Chengue in a year. It is likely that each resident of Chengue would be able to produce enough salt for 15 to 22 people by ca. 1500 assuming a population of about 1000 people for Chengue. Evidently, Chengue could produce sufficient salt to satisfy the needs of all the neighboring villages like Bonda or Pueblito, which combined had 5 probably times the population of Chengue. However, many of the villages along the coast could also be salt producers, which presumably created an even larger surplus of salt in the region and a relatively low value for it in the vicinity. Furthermore, it is unlikely that if the coastal populations were in dire need of salt and would require a partially specialized community for this task. As it was mentioned in Castellanos (1944:136), salt's value increased as it became scarcer inland; this suggests that chiefdoms with some degree of control over distribution of salt would be benefit greatly from a long to medium range staple exchange network. Yet Chengue is by no means the only salt producing lagoon, the bay of Nehuange and possibly Cinto have or had in recent times lagoons similar to the salt lagoon of Chengue that were or are known to produce salt. This suggests that salt production and exchange are not purely local or domestic tasks, it also requires some mechanisms for distribution that would be hard to conceive as the result of the efforts of a few isolated households. This means that perhaps more or equally important than the lagoon and its capacity to produce salt is the mechanism to distribute, transport, exchange and the need to develop a network of social relationships. This network would have to exist prior to an intensified process of salt extraction to be meaningful because the salt economy is consumer driven and its value is directly related to the distribution costs because the production costs are very low. However, in resources with extreme seasonality, like salt production, there may be an opportunity cost generated by the need to control the resource, which would require part or all of the population to remain in Chengue while it is not producing salt. It would be conceivable that fishing and other crafts, probably associated to the production of coarse textiles, cotton and rope, which are associated to the xerophytic vegetation and dry forest that thrive in the dryer coastal environment. The long range distribution of salt has a relatively high cost, at least in Chengue's case, because it is located in a naturally isolated cove. From this perspective the building of the distribution infrastructure visible today, basically narrow roads or paved paths that connect multiple communities, could have been an accretional process, propelled by the immediate residents but organized by elites via mechanisms such as feasting along the trading routes. The most obvious route for a large volume of anything would be the marine route. Large canoes have been known to have been used by Tairona fishermen and traders, even today the salt extracted from Chengue is transported in batches of 3 tons in a dugout canoe made of a single tree, yet propelled by a gasoline engine. The same transit between the bay of Gairaca or the Bay of Concha could have been completed without modern technology and with relative ease as it is frequently seen today (see Figure 1.6 and 1.7). However, the terrestrial route is very evident in the layout of trails and villages in the vicinity of Chengue; this network produces a complex scenario that ultimately suggests that there was some political organization in the region that would have managed the construction and maintenance efforts. This organization does not imply necessarily a centralized, authoritarian or overarching agent; it may be the result of interaction between small scale political entities or communities.

Figure 1.6 Dugout canoe in Chengue.

Canoes like the one above are frequently used for fishing, in the bay, the lagoon and up to several miles off shore. Similar canoes were observed in transit from one bay to another, particularly from Concha to Chengue. Photo taken in August 2003, Sector 2 lagoon.

Figure 1.7 Dugout Canoe with Gasoline Engine.

The canoe shown above is frequently used for deep sea fishing; the gas lamp contraption is used for night fishing. Photo by: Santiago Estrada, November 2004.

THE TAIRONA ECONOMY

The Tairona societies and economies may be viewed as a cluster of complex chiefdoms and specialized communities that the effect of optimizing the overall output of the regional economy by intensifying production. This however, maybe seen as a truism, something that is close to a simple observation of the end of the Tairona historical sequence and the beginning of the Colonial era. It clearly does not answer the initial question of how is it that this society comes to be. There have been however, several approaches to describe the Tairona evolution.

A model that has been used to explain the Tairona settlement pattern is an adaptation of the verticality model for pre-Inca polities in the South Central Andes (Murra, 1972). This model explains how a highland core population would establish a series of small disperse settlements in a variety of ecological and productive zones; a pattern analogous to what is found in the Tairona region. This model has been used based on an ethnographic analogy of the Kogui ethnic group, modern inhabitants of the Sierra Nevada de Santa Marta (Langebaek 1996:161-163). Murra's model is useful for dealing with the Tairona settlement distribution because of its structural implications, not necessarily its functional and specific aspects. The microverticality structure and the idea of an archipelago of Tairona settlements does not mean that the Tairona were members of an Andean tradition, and does not explain the process of formation of this type of economy but it does provide a framework for the final phase of their economy that is compatible with the historic and archaeological record.

Other models have postulated that exchange of staple goods occurs in ceremonial contexts related to feasting that leads to the increase in prestige of an elite (Dietler 2001; Potter 2000; Rowlands and Kristiansen 1998). In this case social differences would be preceding economic differences as in the case of long-distance trade in objects of wealth (Helms 1979) or that of manufacture of wealth goods (Brumfiel and Earle 1987). In many of these models the causal relationships between institutionalized social differences or political power and economic power are not fully explained. However, in the village of Chengue it is likely that feasting was an important part of the mechanisms employed by the local elite to create and maintain institutionalized social differences, alliances and trade.

Elite control over resources.

If this is the case for the Tairona the process of control of the disperse resources by an elite would have taken place at some point before the Late Tairona period (900 to 1500 AD) in the coastal villages. The management of diverse resources and the resulting specialization of production have been used to explain the emergence of more complex sociopolitical structures, such as the chiefdom (Service 1962). For the Tairona region there are two scenarios that could explain some level of specialization without a centralized political system or a paramount chief that centralizes or administers the production of various villages. The distribution of settlements that is observed for the Tairona shows that the largest "centers" are not the oldest settlements. Therefore, microverticality as an economic "program" organized by a paramount chief is unlikely, without the previous integration of the older coastal communities creating a settlement pattern that does not follow the evolutionary sequence found in other areas of the world where the older settlements are transformed, in time, into the largest population and political centers and eventually states (Flannery 1976). In some form the peripheral villages, like Chengue, were probably the parent populations of the later central villages during an initial stage where the social differentiation characteristic of a chiefdom must have taken place. This implies that the economy relied on environmental complementarities but did not require a form of centralized management or redistribution suggested in the vertical archipelago model, therefore limiting the capacity of elite wealth accumulation and allowing it to maintain a small economic difference between the elite and the commoners (Drennan 2000, Langebaek 1996, Drennan and Quattrin 1995).

At this point two scenarios that can model the process of community formation have been introduced: one is the possibility of having the Tairona settlement pattern being the result of decisions of a central polity that extends its control over a larger area by creating colony like extensions of its central community. The second scenario is that this specialized form of production is not the result of a centralized decision-making process but rather the exact opposite. It is in fact the result of a collective sentiment, a social organization where horizontal structures such as kinship or moieties type are predominant, even when it does not imply co-residence. This type of community may be involving neighboring villages with very different economies that developed common goals and sentiments due to ethnic similarities, proximity, and complementarities of their economies through a slow and accretional growth pattern (Isbell 2000).

TWO SCENARIOS FOR THE EMERGENCE OF TAIRONA CHIEFDOMS

At this point it should not be unreasonable to think that the village of Chengue was heavily involved in salt extraction, it is quite likely that it was truly specialized in this industry. Furthermore, it is likely that the village's economy is the result of some form of control over the production and distribution of this commodity. The following are the detailed components of two opposing scenarios that outline the role of specialization and the emergence of a complex political system in the Tairona society.

Scenario 1: Community Specialization as an Entrepreneurial Bottom-Up Strategy

A pattern of communities specializing in the production of particular goods that were then distributed to residents of other communities specializing in different products might have emerged as a strategy adopted by individual families attempting to satisfy their own needs in the social, political, and economic context in which they found themselves (Netting 1990, 1993). Such strategies might involve the establishment of direct trading relationships with members of other communities through such non-hierarchical structures as moieties, houses, clans, or kinship connections (Mc Kinnon 2000). A bottom-up strategy may originate in a domestic economy. This sets the stage, however, for classic notions of redistributive economies, with centralized organization functioning as a mediator or manager of the distribution of goods produced in specialized communities spread through a region (Service 1962; Sahlins 1958; Earle 1977, 1997, 2001; Kirch 1984; D'Altroy and Earle 1985; Polanyi 1957). Economic differentiation would eventually promote a dependency relationship that would lead to the formation of a more permanent social hierarchy and a chiefly society (D'Altroy and Earle 1985; Helms 1979; Renfrew 1986).

Scenario 2: Community Specialization as a Centralized Top-Down Strategy

A pattern of communities specializing in the production of particular goods that, on the other hand, were then distributed to residents of other communities specializing in different products might have emerged as a strategy adopted and pursued by leaders or elites to further the aims of a centralized political structure (Trigger 1974, Brumfiel and Earle 1987). In this case the situation where an institutionalized form of political inequality and centralization emerged may have occurred very early in the Tairona society and allowed a few chiefs to dominate territories and control several communities in an attempt to obtain control over a greater range of economic resources.

A top-down logic would suggest that the leader who formed a new dependent community would have a greater capacity to manage its production in the benefit of his own interests. The essence of such a top-down scenario is that the impetus arises at the top levels of a centralized political system (Leonard 1989). In this scenario, even at a relatively small scale, the formation of complex economic relationships may be the result of a highly centralized form of decision making process where hierarchical social organization is the cause and motive for specialization in the production of a staple.

EVALUATING THE SCENARIOS FOR CHENGUE

. The two processes formed by either of the scenarios might produce a similar pattern towards the end of the sequence in the sixteenth century, a specialized community within a complex chiefdom. The processes that lead to the formation of increasingly complex social systems can be different and requires that the study of the evolution of complexity considers a formation processes with multiple variables and an empirical method (McGuire 1983, Sawyer 1993). The order of the events is very important in the evaluation and elimination of the components of the scenarios. The collection of archaeological evidence at Chengue focused on the way the community was formed and on the identification of patterns that would establish whether the village is the result of a mandate from a chief or of the independent actions of entrepreneurial families.

Evidence for a Bottom-Up Process

If the community of Chengue was formed by families as an entrepreneurial or bottom-up strategy then the following evidence would be expected:

1) No elite control initially.

No elite residences should be found at the beginning of the occupation. Households should be homogeneous in terms of status, size and wealth; very few differences between them should be found early in the sequence of occupation. Competition and the different production capabilities of each household might, however, allow different degrees of prosperity that would be manifested in the progressive differentiation of households later on.

2) Management of production at the household level.

If the salt lagoon appeared to show evidence of partitioning into individual pools for salt production then individual household production would be expected. These partitions are simple rows of stones that would allow water to flow between pools but maintained limits over where a group could extract salt. Such partitioning has been described ethnohistorically and observed in modern Wayuu families that exploit marine salt in the neighboring Guajira Peninsula. In bottom-up development, these individual pools would be smaller and more numerous than in a top-down development, where production might have been organized by larger corporate groups or as a single village. By the same token, a bottom-up strategy would show more storage at the household level and an absence of communal storage. Smaller storage vessels would be expected in all households, at least in the initial segment of the sequence, and larger storage structures would not appear.

3) Dispersed settlement during the earliest stages of the occupation.

Non-elite households would tend to disperse through the available coves and beaches throughout the bay in order to make efficient use of the little land that is available and avoid social conflicts (Drennan 1988; Earle 1991; Gilman 1995). There would be no administrative centralization of productive activities to pull households more closely together.

4) An abundance of small water reservoirs.

Individual households would build their own private reservoirs in the most convenient location and size, appropriate for the size of the household and its labor capacity. At least two water wells have been observed at

Chengue and many other reservoirs. If the centralization of a top-down process did not exist, wells would not likely be constructed by larger corporate groups, so they should be especially small and numerous in the early part of the sequence at least.

Evidence for a Top-Down Process

If the community of Chengue was formed in a top-down process by an elite living in another village, there would have been greater integration of the activities of different household productive units and the following evidence would be expected:

1) Status differences from the moment the community was founded.

Differences in size and architectural elaboration between residences, a sharp division in the distribution of wealth items, such as ceremonial axes, staffs, gold items, semiprecious stone figurines and necklaces, or ceramics destined for service would identify an elite residence. There might also be differences in diet or food preparation detectable in floral or faunal remains. While such differences might emerge gradually in a bottom-up process, they would show clearly from the beginning with a top-down strategy.

2) Management of production by groups larger than a single household.

The salt lagoon would not be partitioned into small pools. Very large storage vessels or structures associated with only a few households or in non-household context would reflect centralized control over the goods stored. Such evidence would occur from the earliest period of occupation.

3) A very compact settlement during the earliest stages of the occupation.

This pattern would facilitate centralized elite organization and control of labor and/or the produced goods.

4) A small number of large well-constructed wells for use by more than a single household.

In the western part of the Parque Tairona there have been multiple reports of cisterns for rain water collection or wells that collect fresh water from phreatic reservoirs. (Mason 1931; Reichel-Dolmatoff and Dusán 1955; Lleras 1985). There were multiple structures found in Chengue that will be discussed in chapter 5.

THE PROGRAM OF RESEARCH

The site of Chengue can be divided into two sectors according to surface conditions and stratigraphy. In Sector 1 (see Figure 3), located on the northwestern shore of the bay, Tairona materials are found along the perimeter of a coastal salt lagoon. Sector 1 contains what appears to be a predominantly late Tairona occupation, closely associated to the salt lagoon, with midden deposits that occasionally exceed 2 meters in depth, extremely high densities and considerable architectural remains. House terraces, water wells, and other stone structures are visible on the surface and can be measured and located once the dense thorny forest is cleared. In parts of Sector 1 and 2 the forest density is very high and the reduced visibility of the surroundings calls for sampling techniques that are appropriate for the conditions, which will be described in the next few paragraphs. Looting is a big problem in the Parque Tairona and pretty much all of Colombia, however the Bay of Chengue is less damaged than most of the surrounding areas. Unfortunately, it has been damaged by treasure hunters over the last few centuries, but not to the point of erasing all traces of architecture, middens, or even burials. The area can be considered in relative terms as a very well preserved archaeological area; with virtually no damaging modern activity damaging it, the Bay of Chengue is practically uninhabited and contains no modern structures or roads. Sector 2 has a few ha with similar characteristics to those of Sector 1 but in most of its area there is very little visibility of archaeological remains. It is also different from Sector 1 in that most of the archaeological site is located around a shallow coastal lagoon that is a very dynamic part of the local ecosystem.

The sampling program is composed of 3 phases. The procedure is designed to obtain a fairly large sample of artifacts and ecofacts from a densely forested area using transects, surface collections and shovel probes. Phase 1 is a simple surveying procedure that is intended to have a basic understanding of the most salient features of the site, and locate datums that were used in phases 2 and 3 to locate the samples. The following is a more detailed description of the procedures.

Phase 1: Archaeological and Topographic Base Map

The features visible on the surface were be mapped in a detailed topographic survey divided in two sectors 1 and 2 (see Figure 1.8). In Sector 1 there were 835 topographic points were taken and 178 datums located. In sector 2, 600 points were used and 200 datums were located and marked with wooden stakes as well. The result of this was a topographic map with a resolution of one elevation curve every 2 meters (Figure 4). This base map will be used in the following chapters for spatial analysis and household characterization. In turn the datums were used to locate the 260 samples obtained from Sector 1 and 315 samples obtained in sector 2. The topographic surveying team was composed of 4 people, 2 who operated the theodolite and 2 others who carved their way through the dense vegetation.

Phase 2: Detailed archaeological survey of Chengue

This phase has the objective of obtaining a large number of small samples from the entire site using shovel probes, profile collections and auger tests. Based on the data from Phase 1 a systematic sampling program was followed. The work group was divided into 2 or 3 teams and shovel probes or profile collections were made at a distance no greater than 10 meters from any of the 178 datum located in phase 1. Each team used measuring tape and a compass to locate each sample with azimuth and distance; this gave greater flexibility to each team so that they could work better in a difficult environment full of obstacles and pitfalls. Profile collections were made on the pits left by looters and shovel probes were made even in places were there were surface materials. The surface remains found were usually very large fractured pots that were left out by looters seeking for treasure in their contents.

The shovel probes were excavated to sterile ground and their depths were registered in standardized lot forms. During the process of obtaining the samples some stretches of forest were cleared were terraces or other features were identified, these structures were then located and measured. The sampling process often required cutting paths through the forest which slowed down the sampling program considerably. The objective of these probes is to obtain a small sample that contains subsurface materials and to obtain data on soil stratigraphy. If the deposit exceeded the depth of the shovel probe, a 20 inch soil auger was be used to gauge the depth of the cultural deposit and recover small samples of artifacts from lower deposits. This procedure was important so as not to miss locations that have early ceramics as well as to gauge the potential for successful stratigraphic excavations. Auger tests were used to obtain data up to 1.50 m in depth and it was routinely used under conditions where shovel probes are difficult or impossible to perform, such as the mounds around the salt lagoon where the water table is very high, samples in the floodplain of the lagoon or artificial mounds. Auger-shovel test produced data that is convenient for the identification of deep deposits because it allows fast and small samples to be extracted in which stratigraphy can be monitored.

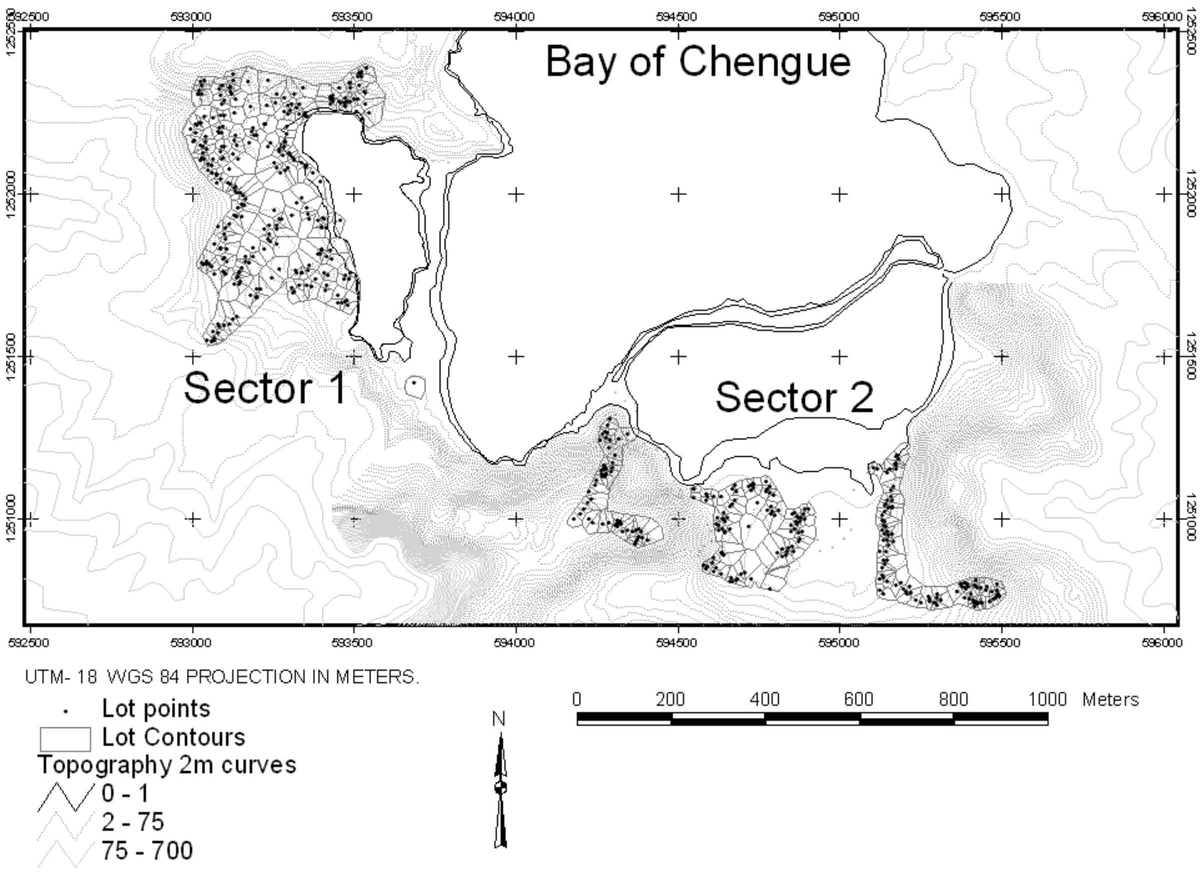


Figure 1.8 Distribution of Samples and Lot Areas.

Phase 2 was based on a map constructed upon the data from Phase 1, where the location of all samples was be recorded. The artifacts and ecofacts from the profile collections shovel probes, and auger tests will be analyzed in the following chapters.

Phase 3: Test pit excavations

The objective of this stage is to determine whether differences between elites and commoners go back to the earliest occupation, refine the ceramic chronology and obtain larger and more refined artifact and ecofact samples. Although this can also be determined to some extent with samples from phase 2 the larger sample sized of 2x1 or 2x2 m excavations is highly desirable. Most of the Tairona households are expected to be composed of several houses and to have several middens, however, the density and intensity of the occupation suggested that Chengue was inhabited continually for many centuries and that many house floors were reused intensely while others where buried and reoccupied several times. It is expected that only some of these households have remains that date back to the very first occupation of the site. The objective of the research program was to excavate in areas with high potential for stratified remains in both sectors, 34.8 m^3s were excavated in 17 pits. These excavations are the primary way of obtaining firmly dated evidence on the structure of early households due to the reoccupation of house sites. A wide range of materials were recovered, that include not only ceramics but lithic artifacts, plant remains, animal remains and the remains of buried structures.

The maps and data from Phase 2 were used to determine the candidates for careful 1x2 m excavations with stratigraphic control. The excavation method used arbitrary levels of 10 cm, although natural stratigraphy was followed for defining levels where it was detectable and a strong trend. Each excavation recorded soil color, texture, plasticity and structure from each soil horizon according to the parameters for soil profile description from the FAO. Soil samples from all levels for phytolith extraction and identification. Seeds were obtained which provide a glimpse of the local diet and the use of foods not produced locally. All the soil was filtered through 5 and 2 mm meshes. The descriptions of these features will be addressed in chapter 3.

Phase 4: Analysis

Ceramic analysis was based on Wynn’s (1977) ceramic chronology, although other data from other projects was considered—particularly those on elite wares (Mason 1939; Reichel-Dolmatoff 1954a), the systematic and clear descriptions of Wynn’s work proved to be the most useful and will be discussed thoroughly in the chapter 2. Lithic analysis was a simple approach of monitoring changes in lithic tools though time when these are under conditions that can be associated to datable ceramics and organic materials in clear stratigraphic contexts. The changes in tool use and distribution through time are expected to be related to changes in economic activities that may be identified as specialization in production and trade. Ecofact analysis was done primarily by Adriana Gracia and Nadiezdha Santodomingo, biologists working at Invemar, and was centered in the mollusks recovered. Chengue has been the subject of a rigorous study by Invemar and SIMAC (Colombian National Coral Reef Monitoring System) since the early 1970's. Thus there is abundant information on the species that currently inhabit Chengue and the ecology and environment of the bay in general (Garzón-Ferreira and Rodriguez-Ramirez 2003, Diaz and Puyana 1994). Fortunately, Chengue is among the best preserved ecosystems in the region which suggests that most of the species found today may have been found 500 or 1000 years ago.

Evidence of economic specialization at Chengue involves the distribution of the specialized toolkit discussed above. In a specialized economy, the residents of Chengue would be producing a narrow range of products (salt and fish) yet processing and consuming a wider range of goods brought from other villages. The distribution of storage vessels and structures will be discussed in chapters 2 and 3.

Among the analyses that were performed are those that of the distribution, size, and construction materials of houses, the quality and type of ceramics associated with house remains and their spatial association with lithic tools intended to identify elite residences and determine whether they existed in the earliest period of the settlement. The distribution of food remains and food preparation artifacts also provide valuable data, particularly the location of residences specialized in specific tasks, residences with evidence of a disproportionate use of a particular resource or residences with evidence of a pattern of communal consumption of a particular staple (such as chicha or coca) that may be produced outside the village and administered by a few families during feasts. The Tairona ceramics includes very large vessels were clearly used for storage, grinding stones and food processing ceramics, these artifacts were mapped and produce differential distributions of each that can be interpreted as differential activities for households within the village. In turn these activities are likely to be status indicators.

CHAPTER 2: CERAMIC CLASSIFICATION

INTRODUCTION

As stated in chapter 1, the primary goal of this investigation is to test the proposed scenarios by eliminating components of each and create a synthetic scenario that could explain the formation process of a community in a relatively long time frame (1800 years). Measuring the changes in household distribution in the community in time becomes an important aspect of the research, and a reliable ceramic chronology becomes a useful and necessary tool. The ceramic chronology proposed and explained in this chapter is not an end of itself; it does not intend to produce a chronology for the Tairona region but only to obtain a fairly reliable way of dating the materials that are scattered over a sizable portion of the shore of the Bay of Chengue. However, exchange of ceramics at a regional scale and similarities with other sites will be addressed. There have been multiple typologies for the Tairona region proposed by a dozen archaeologists over a period of more than 80 years (Mason 1939, Dolmatoff 1953, 1954a, 1965; Bischof 1969a, 1969b, Wynn 1975, Murdy 1986, Oyuela-Caycedo 1986a, 1986b, 1987b; Langebaek 1987, 1992; Groot 1987, Herrera 1985; Cadavid and Herrera 1985, Langebaek and Dever 2002). Their objectives have varied as well as the scale of their conclusions and in general terms there has been a considerable advance in the understanding of Tairona ceramic materials over this period. However, there are many questions that have remained unresolved over the last 50 years regardless of a relatively high volume of research done in the area that although valuable, seems insufficient considering that the Tairona were a group of chiefdoms with one of the most robust archaeological records in Northern South America. As it was outlined in the previous chapter the ceramic analysis for this investigation has two purposes, one is to create a typology that is time sensitive. The other is the classification of ceramics based on function and to some extent, style. The data from Chengue compiled in this chapter comes from

19 test pits of various sizes and 25 shovel and auger probes and 3 sediment cores from the coastal lagoons of Chengue.

The remaining shovel probes and profile collections were not intended to produce much insight on chronology; they provide a relatively detailed corpus of spatially referenced data that is intended to identify patterns of domestic use and disposal of ceramic materials. Some of the ceramics in the collection do come from burials, although when possible they were treated independently from the rest of the shovel probe and excavation data. In a few occasions shovel probes did find burials and it is very likely that ceramics from these burials is part of the shovel probe. This does not seem to be problematic because most of the forms found in burials were domestic, had “kill” holes, soot, and wear that suggest they were used for everyday tasks and were probably not exclusively funerary uses. On other occasions looted burials may have been unearthed in such a way that their contents were destroyed and redeposited in seemingly undisturbed middens that have been subjected to erosion over the past decades to centuries. This pattern of disturbance may not be restricted solely to modern or colonial looting but also to construction and landscape modification during colonial (1525-1650 AD) and precontact times (before 1505 -1525 AD). However, as it will be shown in chapter 3, in many occasions disturbed remains may provide a rich and useful sample. The procedure for selecting a site for a stratified test pit took this into consideration.

A Typologically Oriented Analysis

The ceramic chronology in this particular case is a tool intended to date the distribution of household remains at Chengue. This objective demanded identifying each individual shard collected to period of manufacture. Therefore the ceramic typology had to be precise enough to identify manufacturing variations that would be chronologically distinct. Some types are expected to be less time “sensitive” than others implying that to some extent only part of the ceramics will be actually useful in a chronological sense. The types that were redundant, or have a similar stratigraphic behavior are thus classified in a single group, even if they are very dissimilar in appearance.

It must be stressed that the intention of the typology is to map manufacture time over deposition time. This may seem problematic in appearance because the evidence collected is not necessarily from a manufacturing site, but predominantly from domestic middens. In other words, most of the ceramics collected were refuse. However, it is reasonable to assume that although a ceramic vessel can have a very long life because it can be kept as a family heirloom for centuries before it finally breaks, the probability that this occurs with a large volume of ceramics is small. Hence, the intention of the chronological analysis is to identify the period when a certain characteristics in the production of ceramics were more common, not necessarily its presence or absence. The typology was also intended to concentrate on the more robust traits of ceramics, such as temper, paste, resistance and surface treatment. Shape and decoration were not ignored but were used in a separate analysis discussed in chapter 5 so that the typology would be useful in the classification of most of the shards, even those that had no decoration or identifiable shape.

A CHRONOLOGICALLY ORIENTED ANALYSIS OF CERAMIC ARTIFACTS

Jack Wynn's dissertation provided the most comprehensive and useful ceramic analysis for the objectives of this research (Wynn 1975). There are several properties of Wynn's study that differentiate the data he provides from other investigations. Primarily, his clear intention to outline a comprehensive chronology based on time sensitive traits of ceramics; he clearly isolates shape or decoration from other components such as temper, surface properties, color variation and other traits that do not require complete or even partial reconstruction of a vessel. His initial intentions were to use seriation based on proportions of types per level as described by Ford (1962), but finally used "The Marquardt Method" (Wynn 1975:45) which compares levels of all his excavations and was successful in describing the most pronounced differences between what he called Tairona and Buritaca periods.

There has been some consensus on which of the styles or clusters of ceramic traits in the Tairona period were time sensitive but the data sets found in the literature are relatively small or poorly described and their conclusions are consistently described as tentative. On the other hand Wynn's data set is particularly robust and appropriate for chronological testing of ceramic variation. The sample size of Wynn's data set from Buritaca from 50 excavations is of 53,000 shards, although a random sample of 20% of the shards per level was analyzed. The most useful part of Wynn's dissertation, for the objectives of this study at least, was the clear confirmation of two broad and clearly identifiable ceramic periods, a Tairona and Sub Tairona that he also called Buritaca and a detailed description of ceramic types for each period. Although no dates were obtained from Wynn's investigation at Buritaca, he places the Buritaca period between 500 AD and 750 AD and the Tairona period (850 AD to 1600 AD).

According to the evidence from Wynn's excavations, there was a period of abandonment between the Buritaca and Tairona occupations (Wynn 1975:123).

Jack Wynn's classification describes 32 types, 18 Tairona classes and 14 Buritaca phase classes. However, there were several types that were not found in Chengue and a few that did not fit the descriptions in Wynn's typology. Some ceramics from profile or surface collections were used because they offered a more complete example of classes that were present in small fragments in the stratigraphic excavations. All the ceramics were classified using 43 classes (see Annex A).

For the purpose of this explanation there will be a difference between class and type. The term ceramic "type" will be used as a more general compendium of classes that share a series of traits and tend to occur in similar contexts. For example, the Tairona ceramics can be recognized by most archaeologists who have worked in the region, yet the local and temporal variations within this broad group may not. These subtler variations are called classes that once the chronological value has been established may be grouped into phases. A type, on the other hand, would be Tairona wares in general.

The actual process of classification of the shards demanded that the ceramic classes were identifiable by anyone who observed the ceramics with a minimum amount of training (about 4 days), furthermore there had to be consensus between the analysts to accept the classification of a batch (excavation level or lot). The procedure for classifying is that no batch was to be classified by a single person; rather the analysis was performed by a team of at least 3 who would have to agree on being capable of identifying and differentiating the classes within a batch. The whole collection was classified by 3 to 5 archaeologists with considerable experience in classifying ceramics. The intention was to have a critical approach to the classes proposed by Wynn and to reject any class that was not consistently recognizable by the team. The shards on which no consensus was reached were classified under the name "unclassified".

The 43 classes were aggregated into 9 groups that contain ceramics with characteristics that tend to coincide in their stratigraphic placement, but a group almost invariably contains ceramics that have very different shapes and pastes (See Figure 2.2). Tairona ceramics are notable for having a fairly high proportion of small vessels with many decorations and a considerable range of variation in surface treatments. As it will become evident the thin or fine types are not exclusive to a single phase, to some extent color and surface treatments coincide with changes that are time sensitive and occasionally paste hardness and temper in more utilitarian types. For this reason a considerably large number of classes had to be used; oversimplifying the classification in the initial stage of analysis would have made the detection stratigraphic variations of style impossible.

Ceramic a Classification Method

The initial approach to the classification was to lay down the material from the 17 excavations in stratigraphic order. The shards were grouped according to temper size, frequency, paste texture, paste color, surface color, surface treatment and thickness. Then classes and names were assigned based on correspondences found with Wynn's (1976) classification. Some shards were found to have characteristics that coincided with a stratigraphic position that was not described by Wynn. These ceramics were given a new name and new classes were created accordingly. The names used are in most cases identical to Wynn's typology that in turn resembles the ones used by other archaeologists because they describe an outstanding trait of the surface or paste, such as Red Slip or Coarse Sand. For the stratigraphic seriation analysis, the names were arranged alphabetically and numbers were assigned to the classes as to reduce the effect that descriptive names may have in creating groups. However, the seriation showed that some groups had some characteristic that was so obvious and predominant it was actually an outstanding feature of the names of the component classes (such as plain, burnished, red and black). The analysis was meant to be macroscopic based on the most evident characteristics of ceramics to the naked eye. For this reason temper, as described in Annex A, is meant to guide a classifier using no other tools than a magnifying glass and a well lighted environment. The result is that the most outstanding features of the paste are used, not the proportions of minerals, or an exhaustive mineralogical classification of the temper. Although these detailed approaches are useful in many cases, the analysis used in this case is intended to date the distribution of large numbers of fragments, not to understand all aspects of the manufacture of the ceramics found at Chengue. Once the artifacts from the excavations were classified and the classes were firmly established the material from the Lots was classified. Once this step was completed the results were compared to the classified samples from the excavations materials and tested for consistency.

Creating Ceramic Types for Chengue

The following ceramic types are composed of classes that were identified by Wynn (1975) and by the ceramic analysis of Chengue. The principal component analysis is similar to Wynn's "Marquardt's Approach" analysis, and the results regarding the Buritaca ceramics were similar as well. However, the main difference of the analysis for Chengue is that the individual properties of the shards were not tested statistically; it was decided that since Wynn's analysis had discarded the relation between a single characteristics and time, the focus went to measuring the tendency of ceramic classes to occur in the same level in similar frequencies. This resulted in some clear patterns for the Tairona phase that had not been identified with Wynn's analyses. The result of the principal component analysis is basically the formation of ceramic types as aggregates of ceramic classes which were found to have a common stratigraphic distribution and tend to coincide in their placement when analyzed by excavation level. Wynn's approach had focused in part on the idea that temper may had varied in time variation, and this is true for the Buritaca phase, however it was not consistently important for the Tairona period. As a whole Wynn's results suggested that using a single material property for the whole range of Tairona ceramics was a strategy that would not produce a more detailed chronology because no single property is consistently chronologically sensitive.

The Principal Component Analysis was chosen over other equally valid multivariate analysis because it provides a fairly compact result that can account for a large number of cases. The cases were 110 levels from the 17 excavations and the values used were the counts of shards of each ceramic class. In order to simplify the analyses and focus on differentiating Tairona ceramic phases the Buritaca period classes were separated in part of the analyses. Two principal component analyses (PCA) were performed, one using all 39 classes and another using only 22 classes which were all the non Buritaca phase classes occurring in the excavation. It was found that all classes could be grouped in 3 to 5 groups according to a Scree plot (see Figure 2.1). The clearest results were obtained with 3 and 4 components. The groupings resembled what had been observed in the stratigraphic distribution, and although this analysis does not consider the stratigraphic position of the ceramics but rather how often the frequencies of the classes coincide in the 110 levels of 17 excavations. The PCA readout in Tables 2.1 and 2.2 show the results with 4 groups with the high values are in bold type for easy reading. This is a result that considers all types simultaneously and the results tend to be consistent with Wynn's grouping, although it also shows that there are other ways to aggregate particular Tairona and Buritaca groups. The second analysis was focused on the Tairona types alone, and 3 groups of types were obtained with high values (Figure 2.1). In turn these groups were used as a strict guide for the stratigraphic description of the Tairona and Buritaca phases in chapter 3. This analysis and the stratigraphic characteristics of the excavations constitute the basis for the creation of three Tairona ceramic phases (T1, T2 and T3).

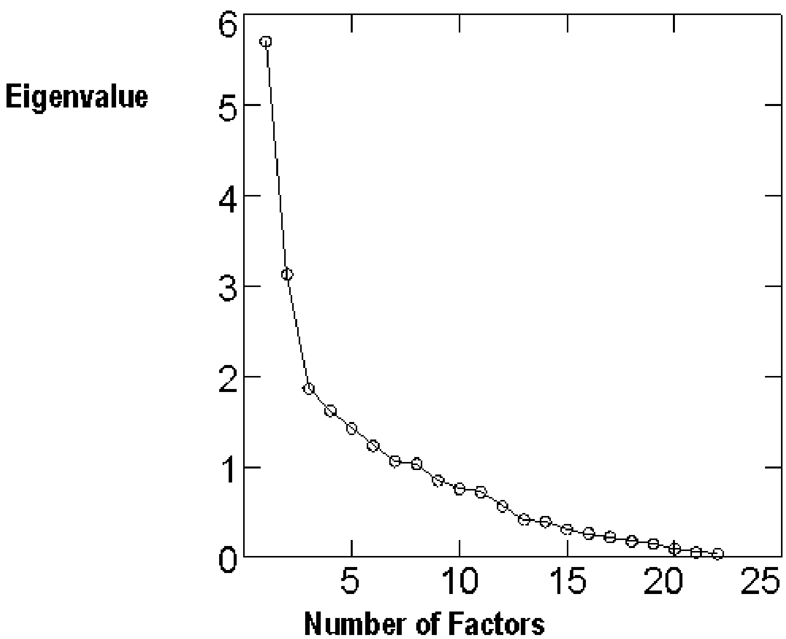


Figure 2.1 Scree Plot for PCA for 22 Tairona Ceramic Classes.

Rotated Loading Matrix (EQUAMAX, Gamma = 2.0000)

	1	2	3	4
BLACKSLP	**0.453**	-0.118	0.346	0.277
BOTIJA	0.142	0.065	-0.153	**0.445**
BRNBTN	0.038	-0.007	-0.045	0.009
BRNBRWN	**0.750**	0.033	-0.146	0.146
BRNGREY	-0.006	**0.409**	-0.120	-0.005
BRNTAN	**0.664**	0.132	-0.304	-0.150
BTBRWN	-0.005	0.029	*0.126*	0.039
CARAMEL	-0.098	**0.681**	0.191	-0.046
CRSBTN	0.001	-0.020	-0.045	-0.085
CRSPGY	-0.020	0.149	-0.066	**0.554**
CRSBBK	-0.014	-0.022	-0.044	**0.251**
CRORG	-0.086	**0.718**	0.221	0.033
CRSSAND	-0.047	**0.621**	**0.463**	-0.083
CREME	0.101	-0.054	**0.407**	-0.158
DNSCRME	**0.270**	-0.080	0.058	0.056
DLLBRWN	-0.085	**0.731**	0.322	-0.057
DULLTAN	-0.042	0.236	**0.410**	0.018
FINEBLACK	0.197	0.099	**0.575**	-0.060
FINBRWN	-0.003	0.217	**0.469**	0.030
FNBBWN	**0.523**	-0.067	0.010	-0.198
FNBGY	**0.370**	0.233	-0.295	-0.026
FINBORGE	**0.289**	-0.089	0.094	-0.072
FNBTAN	**0.569**	-0.046	-0.069	0.041
FINEGRY	-0.048	**0.488**	0.141	-0.025
FNPGRY	**0.431**	0.104	-0.114	0.095
FNPTAN	-0.026	-0.056	0.014	**0.296**
FNRORG	-0.029	0.097	**0.436**	-0.048
FRRDPT	**0.317**	0.105	-0.193	-0.187
FINESAND	-0.061	0.321	**0.324**	0.098
FINETAN	**0.413**	-0.098	0.069	0.153
HRS	**0.732**	-0.072	-0.050	-0.109
ORANGECREME	0.030	0.048	**0.358**	-0.204
PLNBROWN	**0.538**	-0.165	0.225	0.206
PLINGRY	0.239	0.227	-0.273	-0.109
PLNTAN	**0.571**	-0.013	-0.090	0.175
CRRDBRWN	0.235	-0.047	-0.029	**0.713**
REDSLIP	**0.675**	-0.140	0.033	**0.466**
REDNCRME	0.016	**0.341**	-0.082	0.186
VFBK	**0.598**	-0.128	0.197	0.039

"Variance" Explained by Rotated Components

1	2	3	4
4.741	2.944	2.370	1.858

Percent of Total Variance Explained

1	2	3	4
12.157	7.549	6.077	4.763

Table 2.1 PCA for All 39 Basic Ceramic Categories.
Bold numbers show high values used for grouping.

Component loadings

	1	2	3	4
BLACKSLP	**0.607**	0.064	0.130	**-0.571**
BRNBTN	**0.461**	0.259	-0.273	0.247
BRNBRWN	**0.765**	0.273	0.116	-0.017
BRNTAN	**0.738**	0.337	-0.153	0.220
CRSPGY	0.064	-0.244	**-0.682**	-0.082
CRMEPNT	0.449	0.273	0.056	**0.476**
DNSCRME	0.230	**-0.885**	0.103	0.044
FNBBWN	0.366	0.144	0.082	**-0.564**
FNBGY	0.321	**-0.505**	**-0.738**	-0.001
FNBTAN	**0.586**	0.146	-0.353	-0.275
FNPGRY	**0.591**	0.083	-0.221	0.097
FNPTAN	0.111	0.089	0.011	**0.596**
FINETAN	**0.552**	-0.340	0.310	-0.177
GLAZED	0.122	-0.027	0.235	0.137
HRS	**0.792**	0.314	-0.076	-0.076
HEAVFINEGR	0.096	**-0.670**	-0.216	0.133
PLNBROWN	**0.409**	0.038	0.173	0.198
PLINGRY	**0.719**	0.007	0.223	0.216
PLNTAN	**0.571**	-0.305	0.301	0.068
CRRDBRWN	0.204	**-0.632**	0.394	-0.005
REDSLIP	0.456	**-0.689**	-0.000	0.110
VFBK	**0.761**	0.066	0.008	-0.113

Variance Explained by Components

1	2	3	4
5.706	3.126	1.861	1.618

Percent of Total Variance Explained

1	2	3	4
25.938	14.211	8.458	7.357

Table 2.2 PCA for 22 Tairona Period Ceramic Categories.
Bold numbers show high values used for grouping.

CONCLUSION

The process of classifying the totality of the collection from all samples from Chengue has resulted in the fusion of 43 ceramic classes into three clearly identifiable ceramic periods and 6 phases. The procedure was very systematic and was greatly aided by Jack Wynn’s analysis. It should be noted that the results presented here only consider the material of the ceramics not the form; those aspects of the ceramics will be considered in a separate analysis with a different objective. The refinement of the Tairona chronology for Chengue, using a relatively large sample can be considered as a step in the direction of reconstructing the changes in the settlement patterns. Being able to differentiate between Tairona and Buritaca periods is very useful, but differentiating between two stages in the Tairona sequence can provide insights on the changes that occurred during this 700 year period. The association of Tairona 3 ceramics with Contact ceramics suggests that Tairona 3 may include the 100 years that the Tairona coexisted with Europeans, not only Spanish but traders from France, and perhaps England and Holland. This would suggest that the Tairona 2 phase was probably the longest and most prosperous for the village of Chengue because the majority of the ceramics is from this phase, and it would be reasonable to assume that either this is caused by a larger population or by more time (See Table 2.4). Although the T2 peak could be caused by a combination of both factors, in chapters 3 and 4 with the aide of carbon dating and a detailed study of the stratigraphic relations and spatial distributions it will be possible to determine which of these two factors was prevalent.

Colonial	Tairona	Period		Buritaca and Nehuange	
Botijas	Tairona 3 (T3)	Tairona 2 (T2)	Tairona 1 (T1)	B1	N1
Olive Jars	Dense Crème	Black Slip	Burnished Black Tan	Burnished Gray	Burnished Thin Brown
Glazed	Heavy Fine Gray	Burnished Brown	Coarse Plain Gray	Orange Crème	Dull Brown
	Coarse Red-Brown	Burnished Tan	Coarse Burnished Black	Coarse Sand	Crème
	Red Slip	Coarse Burnished Tan	Coarse Burnished Brown	Fine Brown	Dull Tan
		Crème Paint	Fine Burnished Gray	Fine Red-Orange	Burnished Thin Brown
		Fine Burnished Brown	Fine Burnished Tan	Fine Sand	Caramel
		Fine Burnished Orange	Fine Plain Tan	Coarse Red orange	
		Fine Plain Gray			
		Fine Red Paint			
		Fine Tan			
		Hard Red Slip			
		Plain Brown			
		Plain Tan			
		Plain Gray			
		Very Fine Black			

Table 2.3 Summary of Ceramic Classification for Chengue.

For the N1 phase Dull Brown, Dull Tan and Thin Burnished Tan are by far the clearest indicators of this phase.

Period	Count	Proportion
Colonial	11	0.1%
T3	4322	21.1%
T2	11652	56.9%
T1	763	3.7%
B1	2489	12.2%
N1	1102	5.4%
Unclassified	136	0.7%
Total	20475	100.0%

Table 2.4 Proportions of Ceramics by Phase for Chengue.

From stratigraphic excavations alone. It should be noted that about 50% of the N1 ceramics are found in contexts with B1 ceramics, this will be clarified in chapter 3.

Chengue's Chronology in the Context of other Research Projects in the Region

In the past 80 years ceramics from the Tairona area have been used to identify the presence of peoples over the past thousand years. The approaches to the study of Tairona ceramics have been somewhat varied but the focus has remained on the chronological aspects of the ceramics. However, much of the effort in this section has been oriented towards integrating the very local ceramic chronologies to broader perspectives. The general literature for the area has as a result of this been a discussion on the distribution of styles and their presumed relation to migration of people over time and some ideas about trade and a few attempts to estimate population size and distribution. The chronological aspects of the discussion have produced a somewhat confusing picture that involves a mixture of very different questions. However, extracting the purely typological and chronological aspects of the work can help in the integration of the Chengue ceramics to a broader discussion. There is relative clarity in what is called Tairona, but the subdivisions of what has been called Sub-Tairona, Nehuange, Buritaca, or Bonda phases are less clear. Recently, it has been proposed that there are three broad periods in the sequence, Nehuange, Buritaca and Late (Tairona), (Langebaek and Dever 2002, Langebaek 2005). However what is called Nehuange (100-600 AD) and what is referred to as Buritaca (600 – 800 AD) in the Parque Tairona are not exactly the same things, time periods or ceramics for earlier authors. In the following pages a clarification and standardization of the terms will be attempted. The proposed chronology for Chengue uses the names Nehuange and Buritaca, but the evidence for Chengue does not show that the lengths of the periods are the same or that the ceramics have the exact same characteristics as Bischof's (1969a) description or Reichel-Dolmatoff's (1954a, 1955).

The initial approaches to the Tairona artifact typologies and chronology were made by Alden Mason after the 1922-23 expedition to some coastal sites in the Tairona region. The typology suggested by Mason is based on very evident characteristics of the ceramics such as color, shape and surface treatment and a more detailed technical analysis of the temper and clays made by Donald Horton (Mason 1939). The general conclusion useful for this investigation is the presence of three Tairona ceramic types and two “intruding” types. The Tairona types were described as Black, Red and Brown. There are several unusual types that are commented and presumed to be of alien origin, including a “light-colored ware” and a fine red-orange ware. Ceramics similar to those described by Mason and that were found in Chengue, but Mason’s publication is of little use for a chronology because no stratified sites were excavated. Mason has some insights on what was called at the time an early horizon of painted wares, based on a few vessels he found in Nehuange he assumes there is an earlier period but has little idea of the duration of the Tairona styles. Other than the idea that the deposits he excavated were occupied for a short time and the unsubstantiated idea that the Nehuange ceramics were from an earlier culture he provides very limited chronological tools.

In the 1940’s and 1950’s Tairona typology as described by Reichel-Dolmatoff explored a series of variations that were interpreted initially to have chronological value. He describes a Sub-Tairona occupation that he believed happened immediately before the Tairona phase (1954a:153). The initial typology was intended to resolve the chronological problems associated to the Tairona; therefore his excavations were dedicated to domestic contexts and middens. However, the shallow deposits of the Pueblito house floors, the type site he consistently selected, did not allow him to obtain a single clearly stratified deposit. Hence, the “Sub-Tairona” type is based exclusively on Reichel-Dolmatoff’s appreciation of what was a Tairona style and he is very cautious to leave the “Sub-Tairona” period only as a tentative possibility. However, later on he dismisses it (Reichel-Dolmatoff 1978).

Reichel-Dolmatoff suggests that a coarse variant of the Red ware describe by Mason(1939) may in fact be from a later phase than the other types. This Coarse-Red ceramics, it seems, was associated to deposits that had artifacts of European origin (iron, glazed ceramics). This observation would be the most useful chronological observation for identifying a late phase in the Tairona sequence that is not only produced by association with contact period foreign artifacts but also by the fact that most of the excavated deposits were house floors from the latest phase of the Tairona sequence. Based on Reichel-Dolmatoff’s data there is no reason to believe that the Coarse-Red ceramics is only a contact period ware. It may have existed towards the end of the pre-contact period but the evidence obtained at Chengue and Buritaca 200 (Groot 1985:84) coincide with Reichel-Dolmatoff's appreciation that it may be a marker for a late period in the Tairona sequence, which he calls Tairona II. Reichel-Dolmatoff also noted a small proportion of ceramics he calls *Gaira Amarillo Inciso* which seems to be a chronological marker of this period. The other elements he describes, the *Smooth-Red* (Roja Lisa), Coarse-Black (Roja Aspera) and *Smooth-Black* (Negra Lisa), are not clearly defined as a chronological marker (Reichel-Dolmatoff 1954a: 180). Curiously, Reichel-Dolmatoff's analysis for the Pueblito site shows an absence of tan, brown or gray wares which turn out to be the very abundant types in Chengue and Buritaca as noted by Wynn (1975), Oyuela-Caycedo (1986b), Cardoso (1986), (Groot 1985, 1987) and Mason (1931). This suggests that the sites studied by Reichel-Dolmatoff are from the same phase and are probably restricted to the latest parts of the Tairona period. There is now a considerable agreement that there is a Tairona period that starts around 900 AD and ends in the XVII century, although little work has been made towards understanding the process within this 800 year period (Langebaek 2005).

Henning Bischof agrees with Mason's idea that there were ceramics of a type similar to the Tairona, which he calls Nehuange. This phase which is believed to be located in a relatively narrow range between the 6th and 7thI centuries AD (500-800 AD) is based on the artifact collection of Mason (1939) found in a burial in the Bay of Nehuange which happened to be a particularly elaborate burial with very rare ceramics. In turn this is problematic because it is a ceramic type based solely on a painted decoration and vessel form that comes from practically a single context and therefore is of limited use for mapping early refuse at Chengue, where practically no painted ceramics were found and only a small percentage of shards have identifiable shapes (Bischof 1969a: 267). Some useful traits of the Nehuange phase ceramics can be obtained from Bischof (1969) and Mason (1939). The first is the indication of black, very thin micaceous pastes. The second is a double aisle of incisions on the rims of bowls, which are found in refuse contexts. Oyuela-Caycedo's excavations (1987a, 1987b) show that there is a similar type of ceramics in Mamoron, west of Santa Marta, dated between 572 AD and 679 AD (uncalibrated radiocarbon date 1400±70 BP, Beta 21799) similar to the ceramics found in Cinto and to those described by Wynn for the Buritaca phase.

Other archaeologist identify ceramic types with similar characteristics and also acknowledge the possibility of *Black Slipped* ceramics and Tan ceramics as chronological markers among these is Oyuela-Caycedo (1986a, 1986b) and Groot (1985) who excavated a midden at Buritaca 200, next to what appears to be the remains of a public ceremonial house or temple. The excavation by Oyuela-Caycedo showed large proportions of *Black Slipped* ceramics in the lower levels (17% to 29%, date calibrated to 1000± 70 AD) and crème or tan ceramics in low proportions at first (1% to 13%) that continuously increased towards the upper levels where he found it in proportions of up to 25%. Based on this he suggests that two phases could be identified through these proportion differences being Buritaca 200 I (B200 I) spanning from around 1000 AD to 1300 AD and Buritaca 200-II (B200 II) from 1300 AD to contact period. The B200 I and II division is not based on the disappearance of any of the types, but rather on changes in the proportions of Black Slip and Tan ceramics. He uses the date of a burial with a larger proportion of Tan wares to guide his interpretation. Dated to 1385± 50 by Groot (1985; GrN-9247) this burial had a 25% of *Tan* ceramics and a 5% *Black Slipped* which is very consistent with the proportions observed at Chengue. However, he assumes that Tan ceramics are not produced locally and that they come from the littoral, suggesting some sort of exchange that is not clearly explained by any of the archaeologists of the time. Furthermore, he describes ceramics with a double row of incised dots on the rim and what appear to be bird decorations similar to the early ceramics described by Bischof (1969a, 1982) that are likely to be from a "Sub-Tairona". Other research by Oyuela-Caycedo suggest that there is a "Nehuange" period between 500 and 1000 AD based on excavations and radio carbon dates associated to ceramics that resembles what appears to be a gray ware similar to that described for the T1 phase of Chengue (see Annex A).

Other reports coincide with Oyuela-Caycedo's observations. Ardila (1986) reported the excavation of an early deposit dated with two carbon dates (1400± 70 AD from above the strata of ceramics at .60 m from the surface and .75 m from under the strata dated to 1350± 60 AD). These dates would place the deposit at the end of what Oyuela-Caycedo calls B200 I or the beginning of B200 II and Ardila suggests that it is from a transitional phase. Furthermore, the dates suggest that the deposit was formed in a relatively short time which makes it a useful data set because it probably describes the proportions of ceramic types for one single household in a single life cycle. The deposit had 31.6% Black, 57.3% Reddish-Tan, and 11% Tan and no style variations and no "Sub-Tairona" ceramics, all of which is very consistent with the other reports. The proportions of Black and Tan would be consistent to the ones described by Oyuela-Caycedo for B200 I phase.

A detailed and useful description of a stratigraphic excavation for the region by Cardoso (1986) shows a very consistent picture in terms of the proportions of the chronologically useful types discussed above. Cardoso's excavation a fairly large proportion of Black (Slipped) ceramics (24%) in the lower levels, and an increasingly large proportion of Tan (Habana) ceramics in the upper levels, reaching a peak in level 3 (20-30 cm) with 30%, the inverse happens with the Black ceramics that drop to less than 10% in the upper levels. The remainder of the ceramics is classified as Red and is about 70% of the total count throughout the excavation. The lower layer of the excavation, which contains the highest proportion of Black ceramics is dated to 1000± 70 AD. Cardoso seems to agree with the idea of a Buritaca 200 I and II phases.

Other archaeologists do not agree with this chronology. Cadavid (1986) openly dismisses the B200 I and II but does not propose an alternative, even after excavating more than 50 house platforms. He does provide a date for the midden he excavated of (1090± 110 AD) but practically no information of ceramic types or proportions other than total frequency of shards per stratum, which is not a very useful figure. However Cadavid's excavation does not confirm or deny the B 200 I and II phases proposed above.

Research by Langebaek (1987) shows some of the trends observed by the researchers mentioned above but does not show the same variation in proportions of the B200 or Frontera excavations, except for the presence of Crème wares in the very top layers and somewhat high proportions of Black Slip in some levels. Langebaek's objectives are oriented towards a broader chronology and include ceramics of very different styles and times so a subdivision of the Tairona chronology is not his primary concern and he is one of the few archaeologists that published complete frequency tables from the excavations. A simple analysis of the proportions of the excavation from a site called Tigrera shows an initial trend of increasing proportions Black Tairona wares that peak at 37% in the bottom levels and then decline constantly until they reach 15% in the top level of the excavation. The level of the excavation that was carbon dated contained Black Slip in highest proportion (37% at level 6), and was dated to 970±80 AD which is consistent with the vast majority of early contexts for the Tairona sequence. Crème wares, which are consistently reported as late are found in the upper levels. The trend of diminishing proportions of Tairona Black wares is consistent in this excavation, except for the most superficial level (0-10 cm), which also shows a very radical increase in frequency and has ceramics from a "Sub-Tairona" phase, suggesting that the upper level contains materials that where recently redeposit possibly associated with recent irrigation works or looting. Langebaek's data is consistent with the data from the Buritaca basin, particularly with the trend associated with Tairona Black and Crème wares; it clearly shows that there is a "Sub-Tairona" occupation that could be before 950 A.D (according to a thermoluminiscence date), but that in the case of Papare, located to the east between Gaira and Ciénaga, is not the same ceramics described by Wynn or the "Sub-Tairona" wares from Pueblito, Chengue or the Buritaca river Basin. The early wares described by him for a second excavation at another site near Papare, called Loma del Quinto, also show a consistent trend of changes in the style of the ceramics that curiously, resembles the ceramics of both the

Magdalena river to the west and the Ranchería valley to the south-east of the Sierra Nevada de Santa Marta (Langebaek 1987).

The data presented above is useful for improving Chengue's ceramic chronology because it shows a very long sequence with some easily identifiable stylistic variations in the fabric, surface and decoration of ceramics which suggests that there is great potential detailed ceramic chronologies in the region. This is important in terms of the Tairona ceramic chronology because it shows that there are many Tairona and "Sub-Tairona" styles; that these styles may show variations that are chronologically sensitive. This has analytical and theoretical implications because it shows that ceramic variations for the "Sub-Tairona" periods should not be lumped into ceramic horizons with excluding chronologies. Widespread ceramic styles in the broader region of the Atlantic coast of Colombia and Venezuela may on occasion have somewhat broad geographic distributions and archaeologist should examine the implication of these variations beyond the reaches of chronological objectives without assuming that similar ceramic traits automatically imply similar ethnic or social entities. An example of this is the Malamboid style, which evidently was still in use in the western side of the Sierra Nevada prior to 950 AD, while the Buritaca and Nehuange styles were used in the North and the Horno in the East and Southern section of the Sierra, areas that would later become the Tairona region. The context of the ceramic is unknown in most cases, few early households have been identified and comparisons between household distribution, population distribution and size although very basic, are still very limited for much of the region (Ardila 1996, Langebaek, Cuellar y Dever 1998, Langebaek and Dever 2002).

Ceramic Phase Duration

The general conclusion that can be reached from the examination of the literature on ceramic chronology for the Tairona region is that there are good reasons to classify Tairona ceramics in two to six phases, depending on the particular location. Oyuela-Caycedo, Ardila, Herrera and Cardoso suggest two Tairona phases and provide grounds for a "Sub-Tairona" phase. Reichel-Dolmatoff suggests something similar but with different time ranges. Taking all this data into account the Tairona ceramics could be classified into 3 phases although none of the authors actually propose a chronology that considers all the time ranges. Tairona I (950-1350), Tairona II (1350-1500) and Tairona III (1505-1600); a "Sub-Tairona" phase immediately preceding Tairona I would last between 550-900 AD

(Wynn 1975, Bischof 1969a, 1969b) and an even earlier period with a phase that can be called Nehuange between 100-550 AD (Oyuela-Caycedo 1987a, 1987b). The Nehuange phase proposed here does not have the same duration as Bischoff's or Mason's Nehuange phase but it would be similar to Wynn's Buritaca. Oyuela-Caycedo also mention a group of very early ceramics that are not clearly described and that were found in two stratums earlier than 500 AD. This would be consistent with what is found in Chengue, although the earlier ceramics are called Nehuange and the later Buritaca as seen in Table 2.5.

Phase	Duration (calendar yeras AD)
Colonial	1505 - 1650
T3 (Tairona)	1505 - 1600
T2	1350 - 1500
T1	950 - 1350
B1 (Buritaca or Nehuange 2)	550 - 950
N1 (Nehuange 1)	100 - 550

Table 2.5 Tairona Chronology Based on the Examination of the Literature for the Area.

Comments on the Nehuange Period

Evidently the "Sub-Tairona" periods seem to have such variation in style and material that they could be classified into several independent ceramic sequences depending on the criteria. The Nehuange phase ceramics are poorly described in all documentation, there are very few examples that come from well stratified remains, there are few descriptions of the paste, surface, temper and a great deal of confusion related to the forms and decoration. Many of the typologies are based on funerary contexts that may be atypical and even contain objects that could have been exotic as a result from elite exchange networks (Ardila 1996). This is understandable due to the very small number of stratified excavations that contain Nehuange style ceramics. Furthermore, the spatial distribution of the excavations is considerable, which will increase the problem of identifying styles that may vary greatly from community to community, particularly in the early stages. Furthermore, there is the problem of sample size, many of the researchers attempt to unify the ceramics for the entire regions spanning 2 or 3 thousand years based on sample to small to be reliable. This problem does not invalidate all data and all interpretations, but it does require us to be very critical about interpretations that are based on little evidence, specifically the Nehuange chronology. In the following chapter the ceramic types described above will be put into stratigraphic context and the final chronology will be discussed.

CHAPTER 3: STRATIGRAPHIC EXCAVATIONS

INTRODUCTION

As it was explained in chapter 1 small scale stratigraphic excavations serve the double purpose of providing the means to the development of a relative chronology for the types and phases discussed in chapter 2 and indications of buried structures (Figure 2.3). The small auger excavations in the lagoon and the stratigraphic excavations of Sectors 1 and 2 were part of separate phases of the research program. Their intentions are different but complementary. The sites for the stratigraphic excavations were chosen based on data from the systematic sampling program that provided information on the depth of the deposits and the state of the stratigraphy. Based on the shovel probe data 17 sites were selected, although these sites are in not the only locations with the potential of providing useful data on the chronology and artifact assemblages of Chengue, several interesting areas, particularly of Sector 1 were not excavated due the limits imposed by time and resources. The initial intention was to excavate twice as many sites, but the presence of burials and the depth and detail required by some excavations created delays that were irrecoverable. However, the artifact density of the excavations is in most cases sufficient to provide a sample, large enough to provide a sound basis for a refined chronology of the ceramic types described in chapter 2.

The excavations provided a large sample of hearths, mollusks, vertebrate remains, charcoal, lithic artifacts, ceramics, botanical specimens and soil samples. Approximately 150 charcoal samples were obtained of which 10 were sent for AMS dating at the University of California at Irvine. All of these remains will be described and discussed, however, the chronological aspects of the excavations and their ceramic content will be given priority in this chapter.

EXCAVATION METHODS

Most of the excavations were 2x1 meters in area, although one was 6 m^2 and 2 were 1x1 m. At this stage of the project large area excavations would have been a step too far ahead; this should be reserved for a more advanced phase of this research, where more detailed aspects of household clusters can be integrated into the data and testing of theoretical models. The immediate needs of the research project was satisfied with smaller excavations, but not of the 40x40 sort, which are useful but rarely provide the space required for a deep excavation that recovers with detailed stratigraphy artifacts from a long time scale. The 2x1 m excavations were located where the least disturbance from looted and the deepest evidence was detected. Often, both requirements were met by covering up pits left by looters and exposing undisturbed ground found under the piles of backdirt left by illicit excavations. This was done only in cases where ceramics from all the phases were detected in the profile of the looters pit. However, this is not the norm but the exception, this procedure was done in only two occasions, excavation 2 and 7.

The initial step for the excavation was to set up a datum, and a level used to measure the 10 centimeters per level. Once this was set a small shovel and a trowel were used to scrape the first 10 cm, absolutely all the resulting material was dumped into 60 cm by 40 cm boxes with .5 cm and .2 cm mesh bottoms. The excavations were made during the dry season when the soil at Chengue takes a talcum like texture that easily flows through the meshes. The material from the .5 cm mesh box was sieved into the .2 cm mesh box and both boxes were examined. All the ceramics, shells, bones, lithics and charcoal was bagged and tagged according to material. Most of the excavations were done by scraping the surface of the excavation floor with a shovel; this allowed the surface to be easily observed while maintaining a fairly good rate of progress. However, many levels were excavated only with a trowel due to the extreme densities of bones, shells and fragility of the soil matrix, which occasionally was not soil but almost pure ash. The excavations were continued using arbitrary 10 cm levels until a change in the soil was detected. If this soil was indeed a new stratum, the level was closed and a new level was initiated. This meant that most levels were 10 cm deep but transitional levels would occasionally be less than 10 cm deep. To keep track of this seven standard measurement points were selected and a drawing for every level was made, one measurement was made on each vertex, one at the midpoint between vertices of the excavation perimeter and one at the center of the excavation. The drawing recorded starting depth and ending depth for every point. In some excavations the 10 cm level was not followed because one of two things happened: 1) The excavation seemed to end, virtually no remains would be found for more than a level, yet the excavation was continued to verify that the stratum was indeed the end of the excavation, only to find that a buried layer of ceramics lay underneath. 2) The soil-ash matrixes or large amount of gravel contained holes that would collapse under the slightest pressure; this evidently made up an unusually large level in excavation 7 and 12.

There were two and sometimes three excavations teams of two or three people excavating a pit each. One person would excavate, and keep measurements accurate for the current level; the other two persons of the team would sieve the soil, select all the artifact and ecofact groups into plastic bags and tag each bag according to excavation, level and type of material. Most excavations were deep and with extremely high artifact densities, requiring a relatively high level of detail in the excavation and an intense amount of sorting.

Due to the occasional poor structure and dryness of the soil all charcoal samples were easily recovered during the excavation. All of the samples were recovered directly from the excavation floor and immediately packed into aluminum foil envelopes avoiding excessive manipulation. The volume of charcoal in some levels was extremely high and complete segments of small logs were recovered, in several cases weighing over 400 grams each.

Soil samples were taken from each stratum of all deep excavations, occasionally a stratum would contain different colored ashes, so more than one plastic bag was used for each, and the average sample size for each stratum was 2 kg. In excavation 16 a column of soil 56 centimeters long was extracted, this sample corresponding to soil above the water table. A core 3 cm in diameter and 75 cm deep was obtained from the section of the excavation that was below the water table. Although not all soil samples were floated approximately 10% were, and 18 samples were used to extract phytoliths in an attempt to reconstruct the pattern of consumption of the flora. The core and soil column from excavation 16 was used to extract pollen with the double purpose of obtaining a paleoclimatic reconstruction and information on the use of domesticated plants. All the excavations were located using a GPS and a theodolite and were mapped into a detailed site map.

Some Assumptions and Facts about Soils in Dry Tropical Environments

The following excavation charts contain soil descriptions associated to the excavations and are intended to provide insight on two mayor aspects of the environment, agricultural productivity and environmental change along the archaeological sequence. There are two sets of factors that influence soil formation, the first are non-changing conditions that would be the edafic characteristics of the substrates, fauna, microflora and mineralization rates; the changing conditions would be atmospheric climate and level of human intervention. The intention of describing soils is not to associate a particular soil horizon type to a ceramic type, there are some useful coincidences of ceramics and soil properties at a very local scale that will be discussed in this chapter and chapter 6. The most outstanding characteristics are soil texture and the presence of large gravel and boulders associated to Tairona 1 and 2 ceramics. Under the assumptions outlined by the soil formation models applied to Colombian soils, the high temperature, low precipitation and the edafic components of Chengue suggest that soil formation would be strongly influenced by wind erosion and minimally influenced by chemical meteorization, pluvial or massive transport of materials (Malagón 1995). In the specific case of Chengue wind transported soil and its deposition would be relatively constant with the exception of dunes that have very fast formation rates. Since no dunes or purely sandy contexts were excavated this factor was not considered to be an important aspect of the sedimentology. The assumptions discussed above are very good at predicting and describing the soils associated to the early ceramics, where stable conditions produced well defined clayey soils that show little or no loss due to erosion. The formation of clays under these conditions would have been the result of biological agents, plants, insects, annelids and microbial life acting upon meteorized micaceous schist, sedimentary rock and possibly coralline formations. The more superficial horizons do show some kind of rapid transport of the soil, and gravel, something that could have been caused by increased precipitation, erosion induced by deforestation of the slopes and an increase in the construction of houses, mounds, burials, terraces and stone walls.

In order to contextualize the general characteristics of soils at Chengue, all of them with the exception of sand dunes, can be classified as *Calcic Mulls*, although the term is obsolete it helps illustrate the soil of Chengue. This means that they are very alkaline (pH above 7), have very granular texture, and have active calcareous presence (in this case from coral and sea sand) and a very high content of clays. Clays would be formed by the physical and chemical breakup of the minerals by organisms living in the soil under fairly dry conditions and relatively high temperatures (> 24oC). Some of these characteristics produce very thin humic layers that suggest a considerable limitation to intensive agriculture. The fairly low precipitation (273 mm a year) would also produce a considerable limitation for agriculture, considering irrigation in Chengue is almost impossible due to the absence of permanent streams and very steep slopes. Although Chengue is far from being a desert, its low precipitation and high temperature (28oC) would classify the zone as a Tropical Desert Bush Zone or a Tropical Thorn Bush Zone with

Super-Arid to Per Arid soil climates (Based on Holdridge's diagram of world life zones). Although it is conceivable that changes in climatic patterns could have modified the length of the dry season, the soil changes perceived in most excavations seem to be the result of human activity and less the result of changing climate over the past 2200 years (Malagón et al. 1995).

EXCAVATION RESULTS

The intention of presenting these results is to provide a compact explanation of the stratified evidence. The ceramic chronology proposed in chapter 2 is used to produce the data presented in this chapter. However, the presentation is meant to be sufficient to provide the necessary detail for the reader to critically evaluate the evidence backing up the chronology yet maintaining a summarized layout. The evidence is composed of battleship graphs that describe the proportions of ceramics for each phase and periods, soil texture description drawings, radiocarbon dates and raw shard frequency graphs.

Stratigraphic drawings are meant to show to what extent the soil structure is related to the distribution of ceramics and are labeled with letters to avoid any confusion with frequencies of proportions. It should be noted that the labeling is independent for each excavation; a level C in excavation 3 does not necessarily correspond to the same stratum in excavation 7 and so on, although there may be coincidences. The explanation of the excavations will tend to concentrate on the ceramic chronology, although some excavations have other elements that are an important for the climatic reconstruction and will addressed in chapter 6.

Sampling of the lagoon in Sector 1

As mentioned in Chapter 1 the unstable and wet sediments of the lagoon was sampled with a combination of shovel and auger probes. These initial tests served the purpose of providing an idea of the depth, stratigraphy and density of the remains found at Chengue. The first 25 samples were obtained from the lagoon in Sector 1 because it was expected to have a very clear natural stratigraphy, as is common with many lake sediments. Additionally, it was expected that the samples might provide a fairly compact example of all the sequence and give an idea of the age of the salt lagoon and how it had changed, hoping for some insight to the age of salt production in the lagoon and other environmental changes. These samples were a combination of a standard 40x40 cm shovel probe excavated by 10 cm levels, but once it reached the water table, an auger 20 cm in diameter was used to extract sediment in rough 20 cm levels. The stratigraphy was described for all shovel probes. The auger probes proved to be effective in extracting sediments and ceramics that were too deep for shovel excavation or were under the water table. The drawback of this method is that the probe can scrape the walls and mix the deeper deposits with ceramic shards from the upper levels, although this can be reduced by cleaning the bore hole walls and bottom of loose material and excluding the resulting shards from the sample before reinserting the auger. Although the auger probe produces a tricky sample when used with stratigraphic control, when done properly it is extremely effective in obtaining relatively large samples of ceramics from submerged contexts and registering presence or absence of cultural material in a sample. Once the sample was extracted the mud from the auger was emptied into .5 cm meshes and sifted; all ceramics and shells were collected.

The most important result from auger probes was the identification of Buritaca style ceramics in the deepest levels of the sample. Buritaca style shards were found right above a very evident lacustrine sediment that was deposited at a time when the lagoon was much deeper and had a more dynamic environment as it exchanged water with the sea. The samples showed that Buritaca style ceramics were present constantly above a grayish brown silty-clay stratum that is in fact a glay type soil. The proportion of Buritaca style shards was consistently small; from 25 shovel-auger probes, 2506 shards were obtained of which only 47 (1.8%) were Buritaca while 17.2% of all the ceramics from Chengue were classified as Buritaca. The combined ceramic and sediment evidence suggested that the salt lagoon in Sector 1 was not what we see today, but a more humid and dynamic environment at the time of the Buritaca phase. Furthermore, the presence of Buritaca period ceramics suggested that there was a small occupation around the lagoon and the Tairona village did not completely obliterate the Buritaca remains. Another valuable piece of information recovered from the auger probes was the presence of bivalve shells Mytilus sp. typically associated to red mangrove (*Rizophora mangle*), which are currently not growing on that section of Chengue, suggesting a considerable change in the environment (see Lot 2 in Figure 3.2).

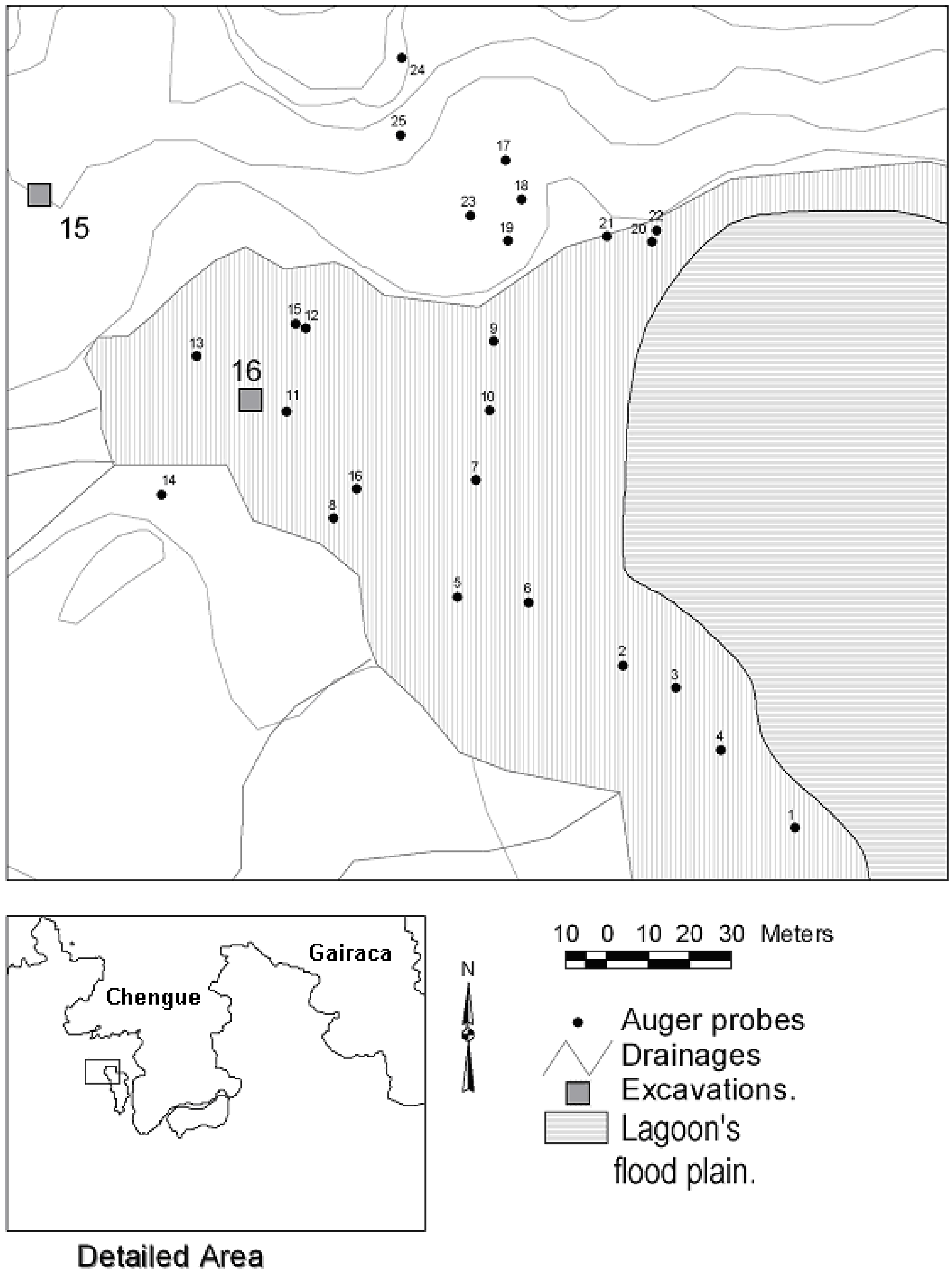


Figure 3.1 Auger Probes on the Floodplain of the Salt Lagoon, Sector 1.

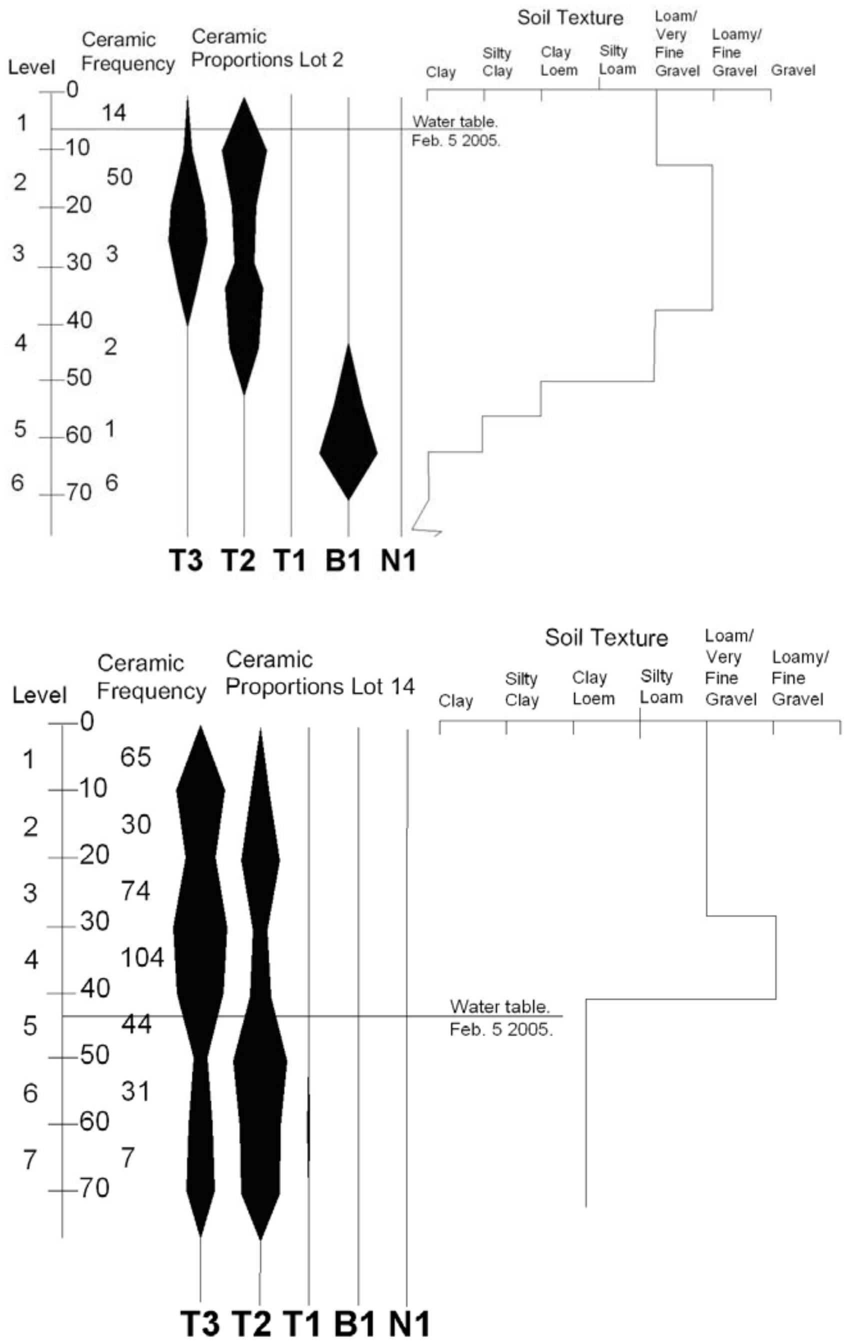


Figure 3.2 Auger Probes from Lot 2 and 14.

Auger probes provided the first indications of stratified material (Lot 2 shows 3 phases) that suggested Sector 1 had been inhabited from the Buritaca Phase on. Although on occasion the contexts were severely disturbed and provided data that was less clear they often maintain a consistent variation of proportions between types (Lot 14).

Excavation 16

This excavation is in fact a combination of auger probes, core samples and stratigraphic excavation. The combination allowed the recovery of a section of hard lagoon sediment 56 cm long and a wet core 64 cm long taken from the bottom of the excavation. The first six levels of the excavation were made with conventional methods. Once the water table was reached a 3 inch PVC tube was inserted into the bottom of the excavation, sealed at the upper end and the resulting core of wet sediment was extracted. A section of the excavation wall, 15x10x56 cm was extracted so that a complete 120 cm sample was taken for processing at the University of Pittsburgh Sedimentology Lab (see figure 3.2 and 3.3).

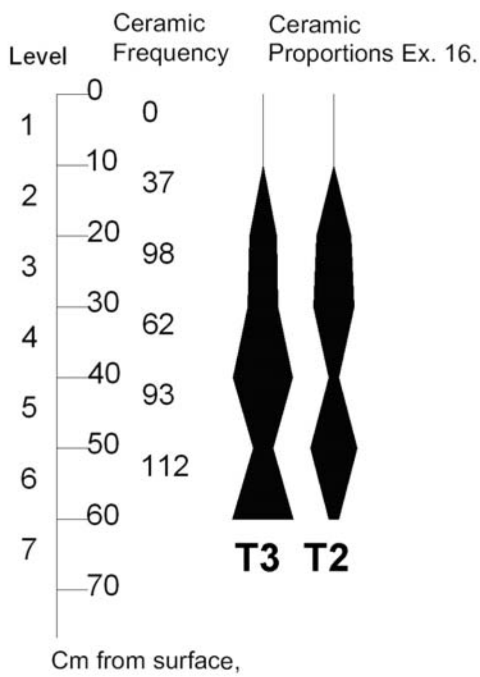


Figure 3.3 Excavation 16 Ceramic Proportions and Frequency.

The preliminary observations of the Excavation 16 core showed significant changes in the sediments that confirmed the initial impressions from the auger samples that there was some kind of cyclic variation in the environment of the lagoon during Tairona times and a very different set of conditions before this period. The core was photographed and described in detail; two sets of 3 cubic cm samples were obtained from it every cm for a total of 121 samples. One set was sent to the University of Leicester department of Geology, for a pollen analysis by Dr. Juan Carlos Berrío, another was used for running tests in Pittsburgh. Half of the core was placed in a storage facility for lake cores at the Sedimentology Lab of the Geology and Planetary Sciences Department at the University of Pittsburgh. About 17 charcoal samples were extracted from multiple sections along the core, but due to budget restraints only two of the samples were radiocarbon dated.

The samples were selected from points before and after a significant and very evident change in the lagoon sediment occurred. The sample obtained at 75 cm from the surface came from a stratum that contained Buritaca (B1) phase ceramics, the second sample was obtained from a dark stratum at 99 cm from the surface which turned out to be the only one that contained pollen. The lower stratum is clearly the bottom of a well stratified lagoon bottom, but contained no ceramic remains. Both strata were separated by a thin layer of very thick gravel. The core shows very evident variations in the grain size of the sediment, texture and structure. These variations were caused by changes in the atmospheric climate and the lagoons climate. Thicker gravel transport can be interpreted as periods of relatively high precipitation, when larger volumes of water were able to transport heavier materials that were then precipitated at the bottom of the valley once they reached the flat floodplain of the lagoon. Figure 3.4 shows oxic layers, or layers of oxidized iron, hardened by exposure to the atmosphere under dry conditions and separated from each other by layers of gray reduced silt (gley) produced by anoxic conditions under a very humid environment. This layering can be interpreted as a climate with extreme seasonality. The oxic layers indicate a dryer environment or very dry long seasons interrupted by wetter conditions in what appears to be a yearly cycle. This cycle can be observed and measured in detail today and corresponds to the first 7 centimeters of sediment which provided a model for the reconstruction of the local paleoclimate (Garzón-Ferreira and Rodriguez-Ramirez 2003b). The transitions to other patterns of deposition are less reliable because there is a considerable variation in the lithology, texture and structure of these sediments. In chapter 6 a more complete paleoclimatic interpretation of the data will be shown.

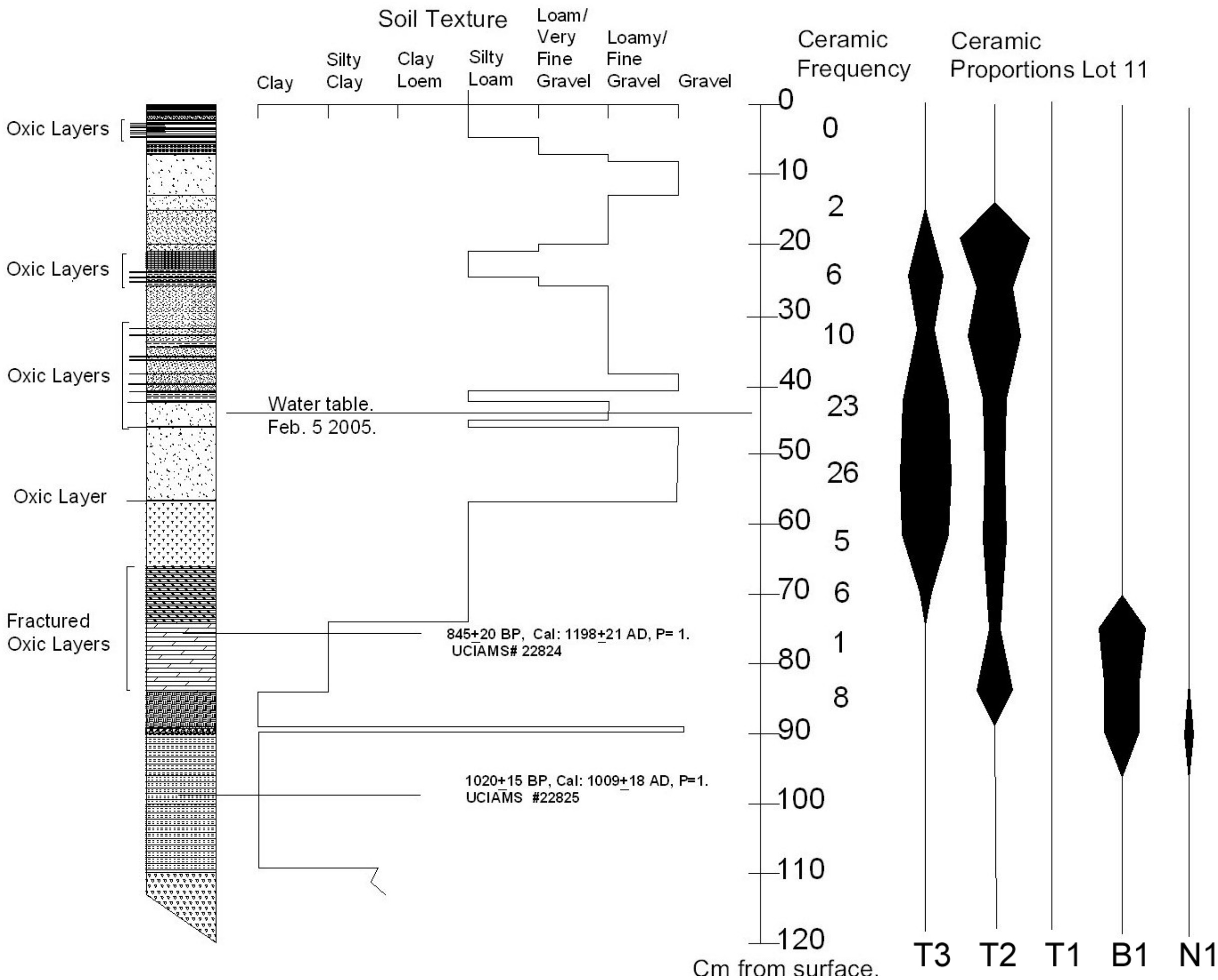


Figure 3.4 Excavation 16, Core.

Area 1x1 m, maximum depth 1.3 meters, 6 levels and a 3 in core below 50 cm. Excavation 16 was located on the floodplain of the lagoon of Sector 1, or the Salt Lagoon; is truly a combination of a stratified excavation and a core sample. The sedimentation process of the lagoon produced a very detailed signal of environmental change during a range of approximately 1200 years. The rate of sedimentation and radiocarbon dates suggest that the dryer conditions necessary for salt production did not occur until the stratum above 60 cm, placing it at well after 1200 AD. The ceramic proportions come from auger probe 11, made close to excavation 16, and although similar it seems to have some degree of variation from Excavation 16, the ceramic frequencies from the core are not shown because the ceramic sample from a 3 in core is too small to show reliable patterns. Carbon dates: At 99 cm. 845 BP, Calibrated: 1198±21AD, P= 1. UCI AMS # 22824; at 75 cm 1020±15 BP, Cal 1009±18, P=1. UCI AMS # 22825.

The shards from which the ceramic frequency and proportions graph (Figure 3.4) is derived, do not come from excavation 16 but from an auger probe excavated next to it. The reason for this is the elevated water table made excavation with conventional techniques impossible and the 20 cm auger seemed to do a better job at obtaining larger shards at the very deep levels. The auger probe, although limited in sample size did allow the extraction of a larger volume of sediment and ceramics. Although redeposition of ceramics continually depositing on the bottom of the lagoon is a clear reality in this context, the sample is though to be valid because it still allows for an evaluation of the level in which a certain ceramic group appears for the first time. Redeposition will only truly affect the stratigraphy of ceramic styles once they first appear; therefore, this type of sample is useful in estimating the moment when a ceramic appears and not its duration. Once this is considered, it becomes more evident that the Tairona 2 phase in Sector 1 tends to appear on or slightly after 1200 AD, which can be considered relatively late for the onset of the Tairona period where chronologies have suggested a 900 AD to 1000 AD start for early Tairona villages. Furthermore, the Tairona 2 ceramic group appears almost simultaneously with an acute sedimentological change, and it becomes increasingly popular only at the T2 and T3 phases.

Pollen evidence from the Excavation 16 core preserved pollen from 90 to 100 cm and there was good preservation only at a depth of 95 cm. This single sample, out of 120, showed positive for two cultigens, *Zea Mayz* (a couple pollen grains) and Ipomoea (*Convolvulaceae*) possibly a root crop (sweet potatoes) which would require an environment somewhat wetter than modern day Chengue. A third candidate for a cultigens were pollen grains from *Chenopodiaceas*, which could be a type of quinoa or amaranth but this pollen should not be considered a positive for cultigens because it could be produced by many wild weeds including species that thrive in sandy littoral soils. In the same sample there was pollen from *Avicenia Mangle* or *Rizophora Mangle* which shows an environment similar to modern population of mangrove forests. The specific species is hard to differentiate at this point but it does suggest that there was a coastal lagoon of some kind after ca. 1009 AD, which was sufficiently wet to allow for pollen preservation. Above 90 cm the conditions are too dry and there is no preservation of pollen, which also suggests exposure to an oxidizing environment, which coincides with the hard layers of oxidized iron mineral above. Based on this evidence the environment of the lagoon had a low level of water exchange with the sea, judging by the rapid sedimentation but still hosted *Rizophora Mangle* before ca. 1100 AD.

Other taxa identified in this stratum and that are associated to forest vegetation are:

- Asteraceae,
- Protium (Burseraceae),
- Cassia (Caesalpinaceae) and other species of the same family.
- Mimosa (Mimosaceae),
- Cordia (Boraginaceae),
- Capparis y Cleome (Capparaceae),
- Chamaesyce (Euphorbiaceae),
- Some species of Bignoniaceae,
- Sida (Malvaceae), possibly cotton.
- Many gramineas.

Sector 2 Excavations

Most of the Sector 2 excavations were made along areas where the shovel probes had high frequencies; there was evidence of stratified Tairona and Buritaca ceramics along profiles or shovel probes and in the case of excavations 8, 10 and 11, some indication of buried house platforms. As it may be noted in the following map, most of the excavations are along the edge of the terrace above the lagoons floodplain and along the main drainage. This is not a coincidence or product of a random distribution but rather and indication that the densest deposits are found along the areas more densely populated (See Figure 3.5).

Excavation 1

Area: 2x1 m, depth 42 cm, 4 levels with poorly defined stratigraphy. Sector 1 was the first area excavated because it contained very evident Buritaca and Tairona remains; therefore obtaining stratified samples was likely. Excavation 1 was a standard excavation along the piedmont of the southern section of the bay; it was a shallow deposit that contained mixed Tairona and Buritaca style ceramics. The stratigraphy is not clear and it seems to have been disturbed by some kind of excavation, probably a burial during the Tairona 2 phase. Some stones were found in a small circular arrangement that resembled a hearth but no evidence of fire or charcoal was found. An analysis of the proportions of the ceramic types and stratigraphy show that the deposit contained a balanced proportion of all the ceramic phases but not in stratigraphic order (see Chart 1). Consistently, there was little recognizable stratification of the soil; it was excavated until a sterile stratum was reached. Very small fragment human bones were found in a shovel probe contiguous to the 2x1 m excavation.

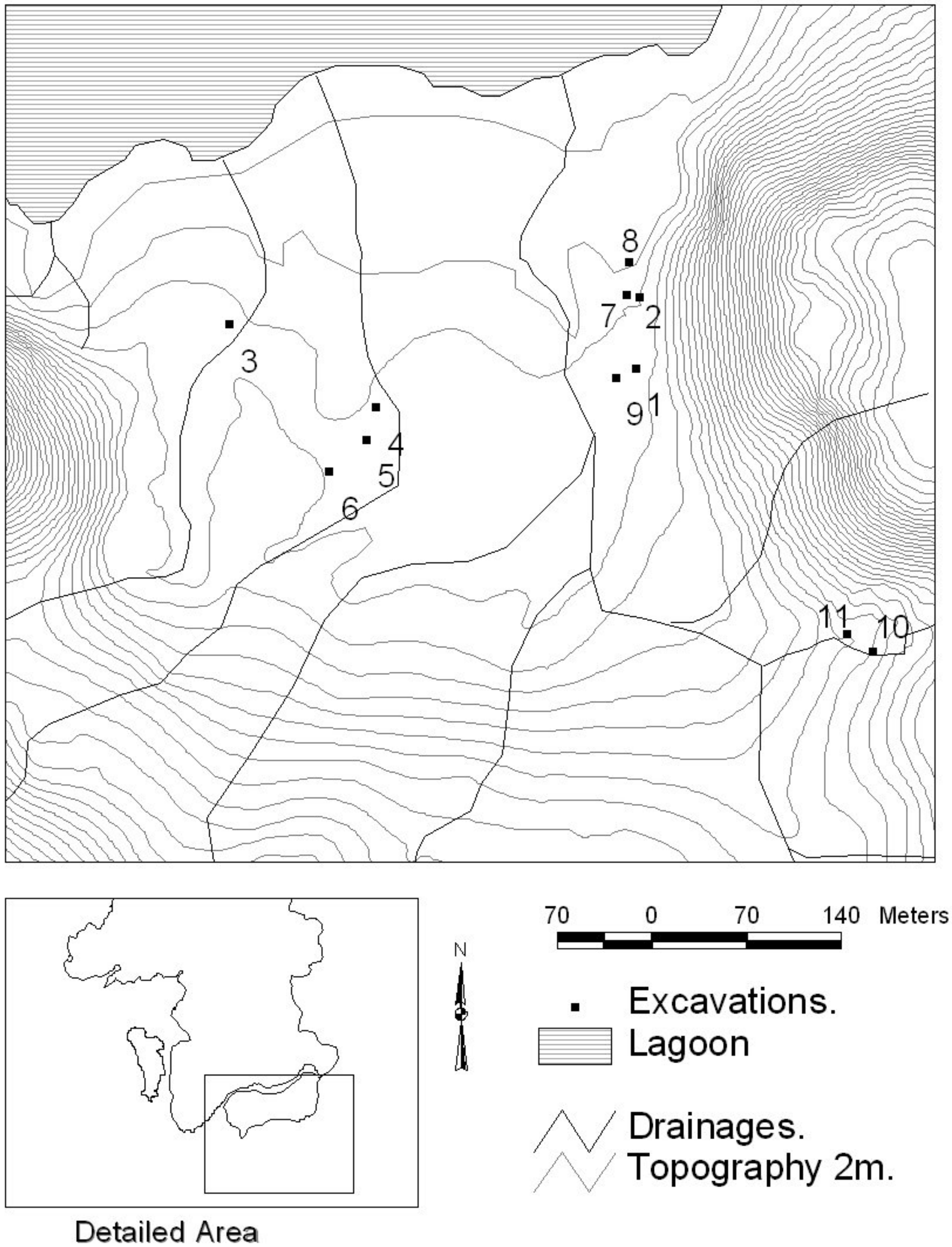


Figure 3.5 Sector 2 Excavations.
Topographic curves every 2 m, except for the first curves which are 0 and 1m above sea level.

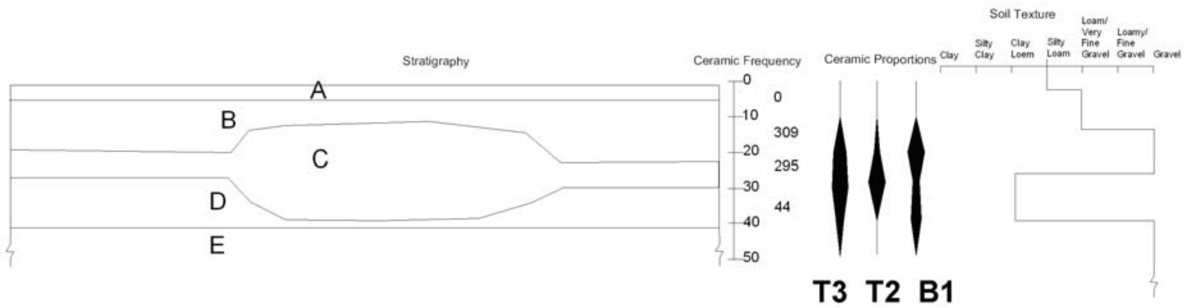


Figure 3.6 Excavation 1 Stratigraphy, Ceramic Frequency and Proportions.

Stratigraphy: A) Humic layer. B) Loamy soil with gravel and large angular stones arranged in a circle. C) Gravel, a particularly thick layer under the circle of stones. D) A thin layer of reddish brown silty loam. E) Large subangular gravel, similar to a river bed.

Excavation 2

Area: 2x1 m, depth 138 cm, 12 levels with very clear stratigraphy. This excavation contained very clear stratigraphy, clear changes in soil texture and color that suggested an undisturbed deposit. Although most of the immediate vicinity was heavily looted during the past decade, the excavation was performed in an undisturbed patch. The stratigraphy showed very radical texture and color changes. The ceramic distribution along the 120 cm excavation shows very clear divisions between Tairona 2 and Buritaca phase ceramics. The vertical distribution of ceramics shows two strong peaks, one Tairona 3 ceramics and another of Buritaca phase ceramics, the ceramics from the Tairona 1 phase are relatively scarce but clustered. A very noticeable stratigraphic characteristic is the empty level between 70 and 80 cm; this level coincides with a very marked stratigraphic change that suggests a short abandonment of the site, probably caused by a shift in the small drainage that flows near the excavation site.

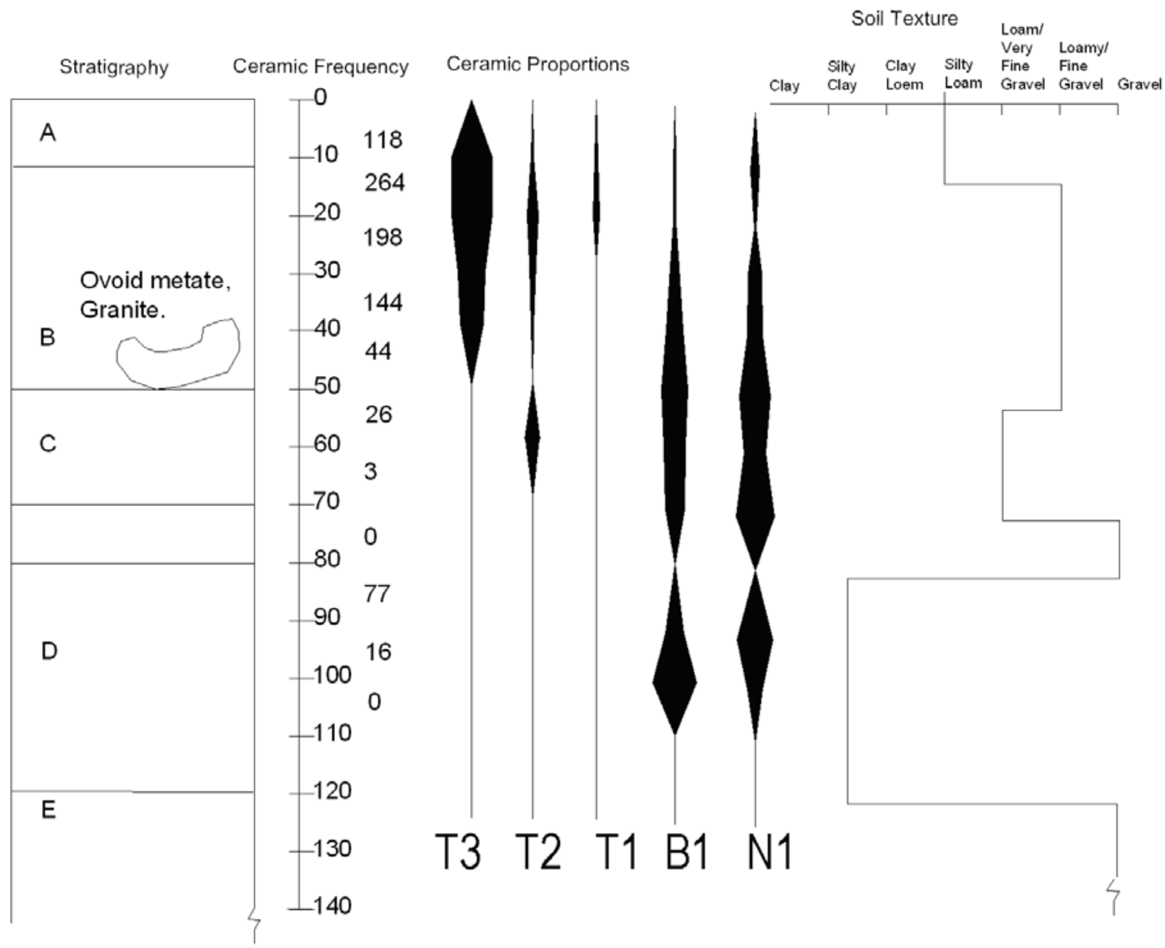


Figure 3.7 Excavation 2 Stratigraphy, Ceramic Frequency and Proportions.

Stratigraphy: A) A very thin humic layer (<2 cm) and a thicker A stratum, few or no stones. B) Very disturbed stratum containing a very clayey soil and a very large amount of boulders and angular gravel made mostly of schist. Poor agricultural potential. C) Similar to stratum B, with less gravel and few boulders, better agricultural potential during the end of Buritaca phase and Tairona 1 phase. D) Very abundant small to large subangular gravel, typical river bed gravel. E) Reddish brown soil with no gravel or boulders, good structure with high levels of clay, high agricultural potential. F) River bed gravel, culturally sterile.

The soil variations suggest that there was a faster process of soil formation during the Tairona 2 phase, at least in that side of the valley. The first 50 centimeters of soil have a very large amount of angular schist and gravel, boulders and a no visually recognizable stratigraphy. This suggests that the soil was severely modified during the Tairona 2 phase resulting in the destruction of the natural structure of the soil layers. The following strata contain stones between 3 and 35 cm in diameter (stratum D). The soil in the following stratum had very good structure that suggests a very well drained soil with high organic content and sufficient depth to be agriculturally useful. However, the high contents of clay in the soil would pose a threat during the dry season changing the mechanical properties of the soil and strangling small roots, although the chemical properties of clay would make it highly productive. Soils similar to stratum E are commonly associated to Buritaca phase ceramics. Lithic artifacts were recovered, including an simple ovoid metate made of coarse grained granite, associated to Tairona ceramics found in level 5. It should be noted that granite is not found in Chengue, which is exclusively a metamorphic formation.

Excavation 3

Area 2x1 m, maximum depth 44 cm in 4 levels. Although fairly shallow, this excavation showed clear stratigraphy and a very high density of Buritaca ceramics. The size of the shards and the fact that several vessels were partly reconstructed from the shards collected, suggests the deposit is undisturbed by the Tairona occupation. The site is located at the very edge of a flood plain for the southern lagoon in sector 2 amidst a fairly dense forest. This deposit suggests that there is great potential in this location for excavations oriented towards understanding Buritaca phase houses, which have completely eluded archaeological research in the area. Although the excavation progressed into level 4, no ceramics were found at this depth and a very clear soil change occurred. The first 10 centimeters or surface level showed no ceramics at all. Furthermore, no ceramics at all were found on the surface. The site was located by the systematic shovel probe sampling protocol. Although the deposit is very shallow no remains are visible on the surface at all and shard size was very large. Several large fragments were glued together and a few vessels were reconstructed to about 60% of the complete form. This may be related to the fact that the area has not been used for living or agriculture in historical times and possibly Tairona times.

From the agricultural perspective there were few of the most notorious agricultural problems observed in the Tairona strata in Excavation 2. All strata were completely devoid of stones, boulders or other obstacles for root growth; with the exception of a very high content of clay and the somewhat elevated PH (above 7) levels common to the coastal soils of Chengue. The soil characteristics were similar to those found in stratum E of excavation 2.

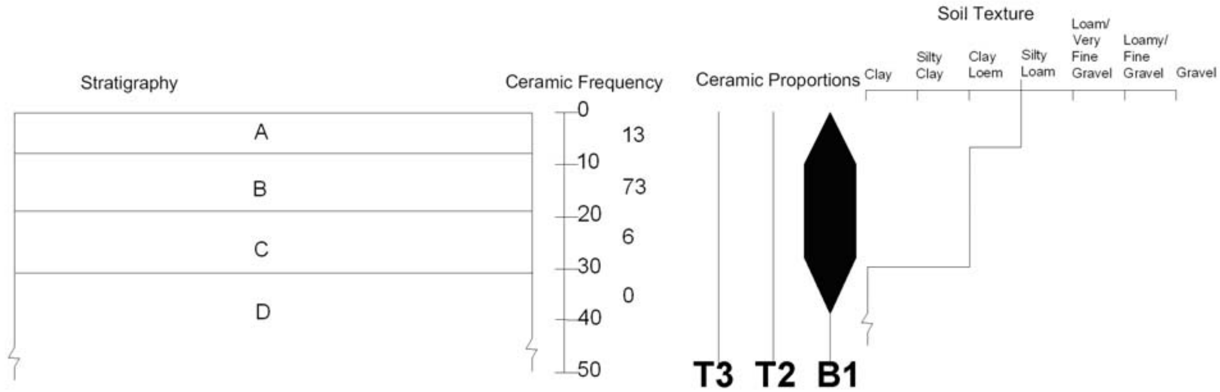


Figure 3.8 Excavation 3 Stratigraphy, Ceramic Frequency and Proportions.

Stratigraphy: A) Thin humic layer (O type stratum) and A type stratum dark reddish brown. B) Reddish brown, a very homogenous soil matrix easily excavated when humid but very hard under dry conditions. C). Similar to B, very poor soil structure slight color variation towards a yellowish red. D) Red clay, very high plasticity, homogenous hard dense clay with few or no roots.

Excavation 4

Area 2x1 m, maximum depth 30 centimeters in 3 levels. This excavation is similar to Excavation 3 in that it is a shallow deposit composed exclusively of Buritaca ceramics. Some remains were visible on the surface, produced by the erosion of the soil along a small drainage nearby. The excavation site showed no ceramic shards on the surface or any other indication that the place had archaeological remains. Like Excavation 3 it is located near the flood plain of the southern lagoon on Sector 1. The first level contained very few shards, however the second level was marked by a few flat stones under which most of the ceramics in the excavation was found. The ceramics were not evenly spread in the level, but concentrated in a small area about 40 cm in diameter under the mentioned flat stones. As level 2 ended, so did the ceramic count, the culturally sterile stratum soon followed in level 3. The deposit showed the same stratigraphic variation as Excavation 3, and similar potential for Buritaca phase house excavations in the future.

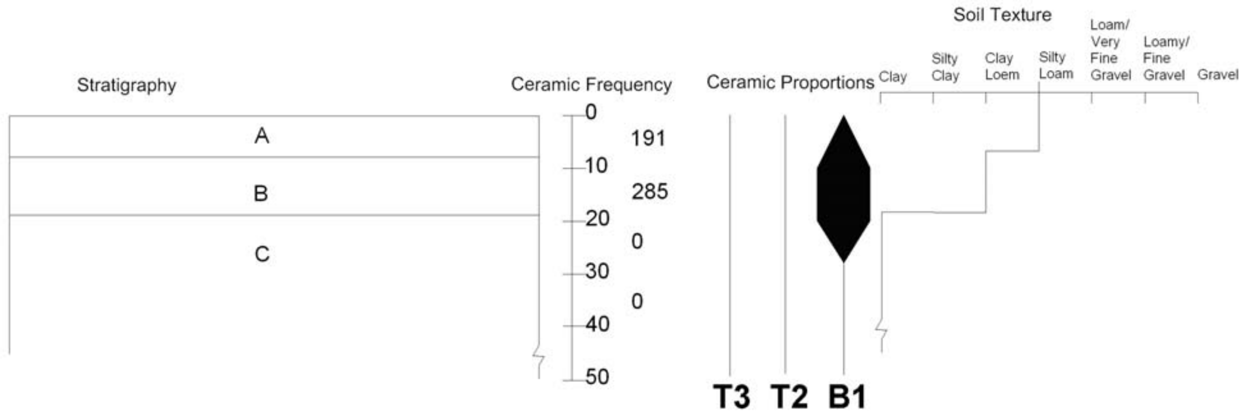


Figure 3.9 Excavation 4 Stratigraphy, Ceramic Frequency and Proportions.
Stratigraphy: A) Thin humic layer (O type stratum) and A type stratum dark reddish brown. B) Reddish brown, a very homogenous soil matrix easily excavated when humid but very hard under dry conditions. D) Red clay, very high plasticity, homogenous hard dense clay with few or no roots,

Excavation 5

Area 2x1 m, maximum depth 30 centimeters in 3 levels, level 4 (up to 40 cm in depth) , sector 2. This shallow deposit would appear to be a midden. The final level was excavated but produced no surface remains at all and the absence of material was accompanied by a transition to a stratum full of gravel. There were no salient features in this excavation, when compared to 3 and 4. It is located in the same section of Chengue as Excavation 4 and had similar surface characteristics, depth and stratigraphy.

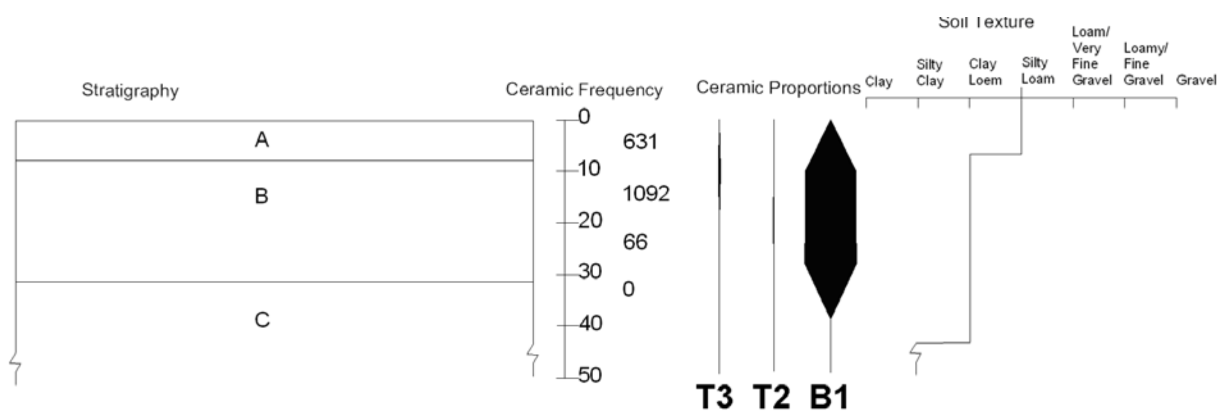


Figure 3.10 Excavation 5 Stratigraphy, Ceramic Frequency and Proportions.
Stratigraphy: A) Thin humic layer (O type stratum) and A type stratum dark reddish brown. B) Reddish brown, a very homogenous soil matrix easily excavated when humid but very hard under dry conditions. D) Red clay, very high plasticity, homogenous hard dense clay with few or no roots

Excavation 6

Area 6x1 m, maximum depth 32 cm in 3 levels, level 4, sector 2. This site is located near one of the main drainages in the southern valley of Chengue. This excavation was located in an area that suggested a deep Buritaca deposit, which may be a Buritaca burial that was not excavated. However, the remains in this excavation are somewhat complex because although it is shallow it does contain both Tairona and Buritaca remains. Only two excavation units (1x1x.32 m) were used for the seriation because the others were found to have been disturbed by the ancient residents in the process of building an offerings chamber (See Figure 3.11). The excavation showed house remains in the form of a hearth and a Tairona offering urn. The urn was composed of a Red Slip (Tairona 2 phase) cooking pot with a bowl as a lid, all covered by a long stone slab. The stone slate covering the urn was only 10 cm below the surface; the urn was found immediately under it and the deposit ended right under the urn at 32 cm. The urn contained a single stone tool, very rustic in appearance, made up of fairly weak slab of chloritic andesite, which is not very hard and fragile stone, hardly the best choice for a stone tool. The stone was broken in 2 pieces and has a single cutting edge, with some wear marks. It measures 25 cm in length and it is unlikely that it would have been used as a hand tool. It can be speculated it could have been a hoe or a tool used for cutting some kind of cactus fiber or soft bark that are known to be used as a source material for making rope and fishing line. It is also possible that it was related to green beads commonly found in burials. The least undisturbed section of the excavation showed a very weak stratigraphic transition. The hearth and the urn make up what seems to be a Tairona 2 domestic context right over a Buritaca domestic context.

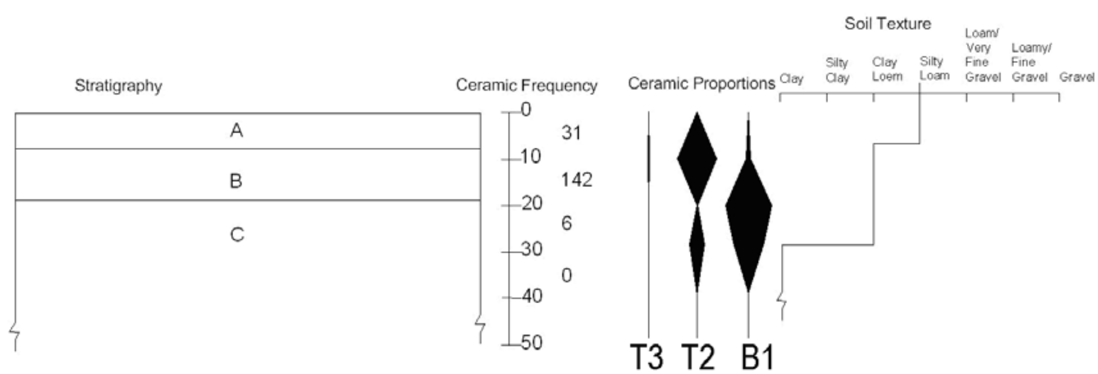


Figure 3.11 Excavation 6 Stratigraphy, Ceramic Frequency and Proportions.
Stratigraphy: A) Thin humic layer and A type stratum dark reddish brown. B) Reddish brown C) Red clay, very high plasticity, homogenous hard, dense with few or no roots

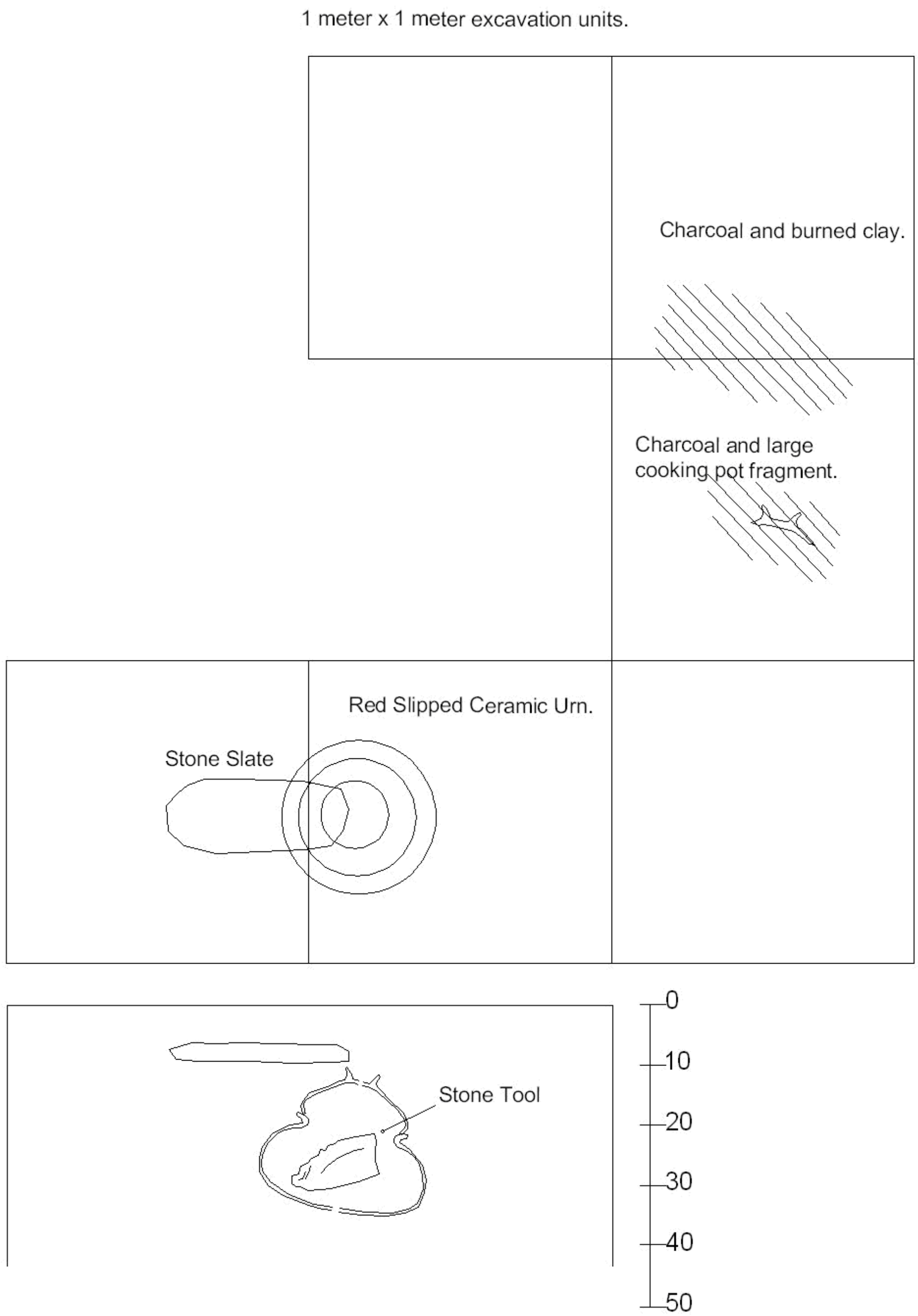


Figure 3.12 Excavation 6 Plan.

A Tairona 2 offering urn was found with a green sandstone scraper tool inside. The excavation layout suggests that a very simple domestic unit, with no stone foundations, a small amount of B1, T2 and 3 shards. The stone slate could be part of a low status Tairona 3 house floor.

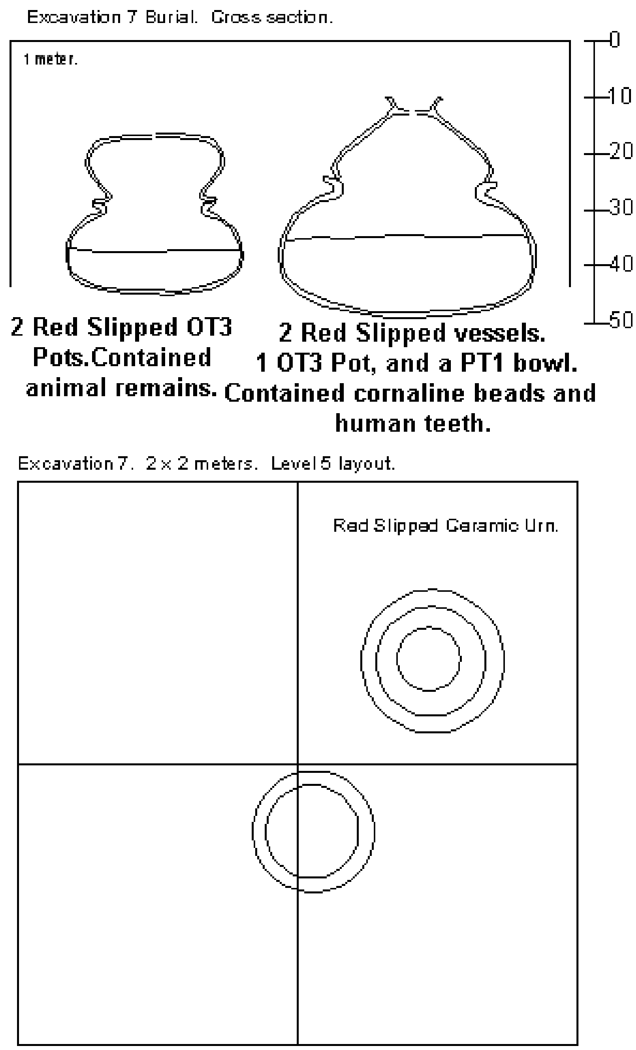


Figure 3.13 Excavation 7, Burial.

All vessels contained identical perforations at the base and the side that suggests they had an alternate use and were "damaged" to transform them from culinary objects into funerary objects, being now useless as cooking pots. All 4 vessels were Tairona 3 (Red Slip).

Excavation 7

Area 2x2 m, maximum depth 200 cm in 17 levels, sector 2. This excavation was located near Excavation 2 because a larger sample of ceramics from the stratigraphic pattern found at Excavation 2 was thought to show the entire ceramic sequence with very clear stratigraphy. Initially, Excavation 7 was though to be a 2x1 test pit, but a burial was found at the end of level 2 that forced the excavation to go another 2 meters in area. The immediate vicinity had been looted heavily and the excavation was continued regardless of the presence of the burial because of the importance of this deep deposit. The burial was found to be composed of 2 urns, one similar to the one found in

Excavation 6. Both urns were made of cooking pots (judging by the soot in the interior); one had another semispherical cooking pot as a lid, the other had a large bowl with base as a lit. The one with the bowl as a lid contained human teeth, necklace beads, a loose coralline fragment and a whistle. Two necklace stones were made of red coralline and carved into animal shapes: one as a frog and the other resembles a phallic object or an abstract figure in a style similar to other objects found in the region (Mason 1932). The other beads are simple rounded discs made of green andesite. The whistle is in the shape of a very small bat with its wings folded and incised features in an unslipped black ware typical for Tairona ocarinas and whistles (see Figure 3.14). A similar whistle was found in excavation 14 in a Tairona 2 stratum which suggests that they are common to Tairona 2 style. The urn that had an inverted cooking pot for a lid contained the remains of a bird. All vessels were Red Slip, which is a Tairona 2 type, and had signs of wear (soot on the bases). The burial ended between 40 and 50 cm from the surface. Below this was a thick layer of gravel and under this a concentration of Buritaca phase ceramics.

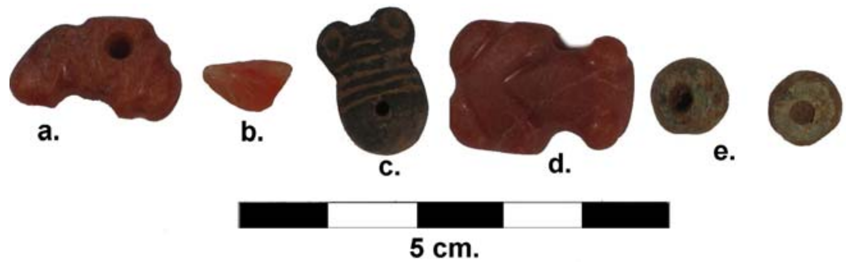


Figure 3.14 Excavation 7, Artifacts Found in Burial Urn with Human Remains.
A) Cornaline figure, probably phallic. B) Cornaline fragment. C) Bat whistle in black ceramic. D) Cornaline frog with perforation. E) Two green andesite beads. There were teeth fragments associated to the objects.

The gravel is the same stratum was found in Excavation 2 but in this case the layer of gravel is 60 cm deep. Within these 60 cm very little ceramics were found, however, a Buritaca style grinding stone or hammer were found. Once the gravel ended a very thin stratum of reddish brown silty-clay made up most of the soil associated with the remains found in this stratum. A thin layer of gravel was found at the end of the stratum and another layer of reddish-brown silty-clay continued under the gravel which followed interrupted by another thin layer of gravel although no ceramics were found for another 40 cm.

There were ceramics of all phases with a proportion variation that supports strongly the possibility of a 3 or 4 phase ceramic chronology. Furthermore, a small amount of shards with Nehuange style decoration were found between levels 7 and 8 (120-130 cm). Two shards that resemble the earlier Nehuange phase decoration are practically the only evidence of painted ceramics commonly named Nehuange recovered in Chengue by this investigation. The location of this sample coincides with the data from Langebaek and Dever (2002).

A single radiocarbon date was obtained from the deepest level containing ceramics, level 9 (130-140 cm), and can be interpreted as the initial date for the small peak in Buritaca phase ceramic counts. The charcoal associated with ceramics was very scarce but the shards were in a concentrated area contact with the charcoal. The date (508±25, calibrated to 1 sigma, P= .7, UCI # 22816) would place the ceramics at the end of the range previously proposed for the Nehuange occupation. However, the style and pastes coincide clearly with Buritaca which dominates the assemblage and its frequency and proportions peak in the level above 120-140 cm. The chronological implications will be discussed in conjunction with the evidence from excavation 2 and 9 that show an almost identical pattern. The excavation continues for 6 levels after ceramic artifacts cease to appear because small amounts of very sharp quartzite scrapers and burins continue to appear for several levels.

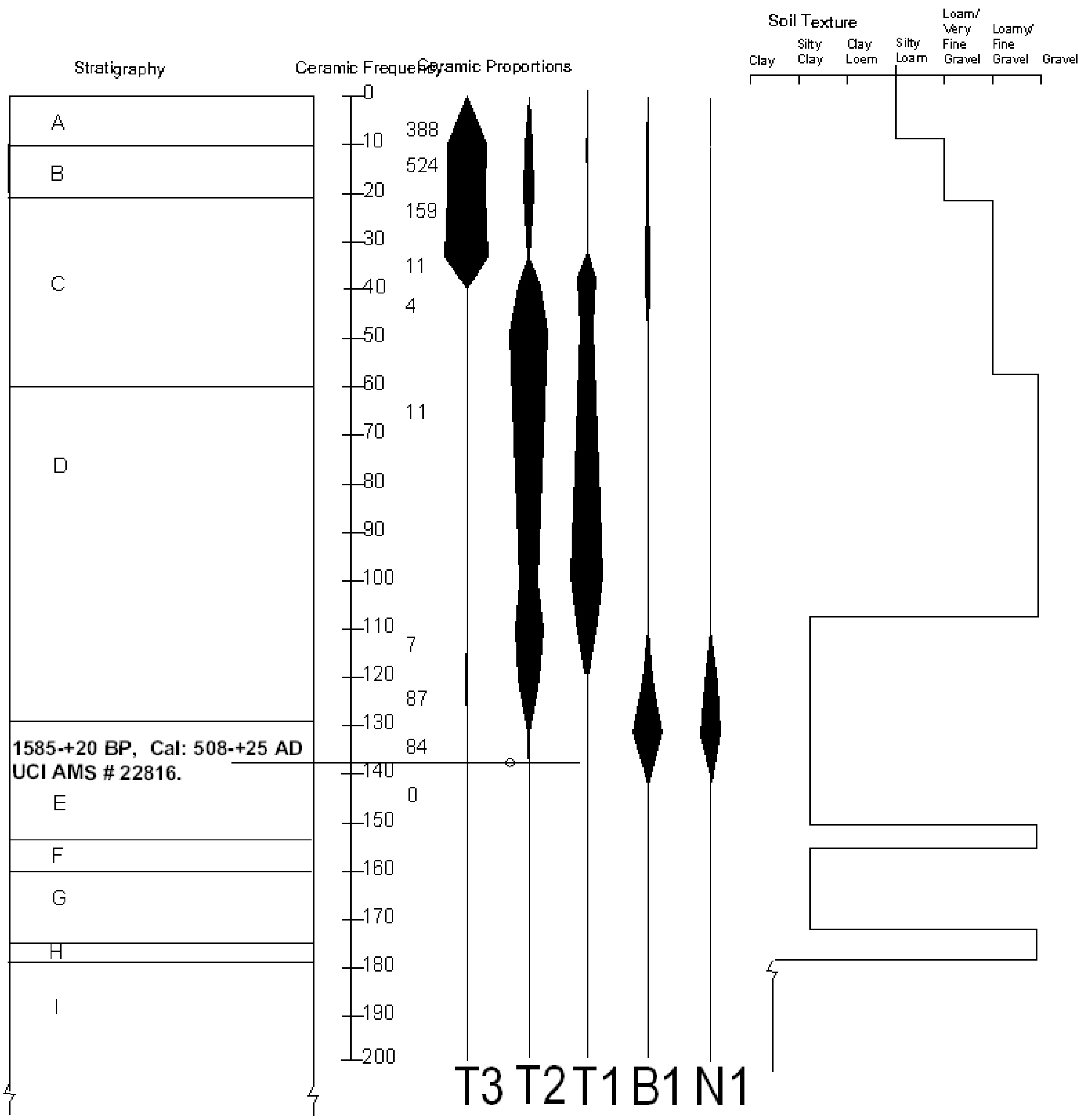


Figure 3.15 Excavation 7, Stratigraphy, Ceramic Frequency and Proportions.

A) Humic Layer. B) Light reddish brown, loamy with very fine to medium gravel. C) Brown fine gravel, loamy clayey and high frequency of stones and large gravel D) A large amount of very thick and large gravel, similar to a river bed. Some Buritaca style sand stone tools were found. E) Reddish brown silty-clay with no stones a charcoal was found concentrated in a small area of the level between 130 and 140 cm. F) A narrow stratum of subangular gravel. G) A stratum very similar to E, no gravel at all, reddish brown with silty clay texture. H) A narrow layer of gravel similar to stratum F. I) Reddish clay with a small amount of silt, very little structure in the soil. Stratum F to I contained no ceramics and D contained almost no ceramics. Lithic artifacts were found in strata G and H.

Excavation 8

Area 2x1 m, maximum depth 30 cm in 3 levels, sector 2. This excavation was located along the bank of one of the main drainages of a rivulet near the flood plain of the lagoon and the remains of reservoir. It is a shallow deposit with little visible stratigraphy, but at the edge of what appeared to be an ancient house platform. The end of the excavation was reached at a stratum of thick loose gravel common to the zone.

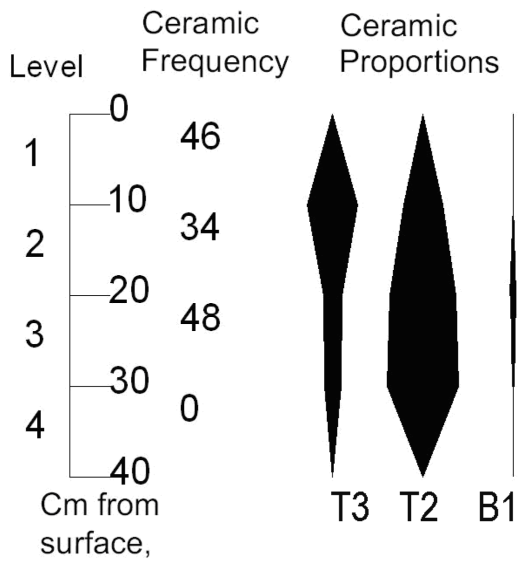


Figure 3.16 Excavation 8 Stratigraphy, Ceramic Frequency and Proportions.
Although shallow provides a hint of the Tairona period stratigraphy and shows trace amounts of Tairona 1 ceramics.

Excavation 9

Area 2x1 m, maximum depth 160 cm in 16 levels, sector 2. This deposit was chosen for excavation because the shovel probes made in the vicinity showed a very deep deposit with a notoriously clear stratigraphy. Although it is very close to Excavation 1, it seems to have been a midden that had no visible signs of disturbance; in fact, there are no ceramics visible on the surface. The excavation showed a similar stratigraphy to Excavation 2 and 7, with different size of the strata, yet with an analogous pattern of alternating layers of gravel and reddish brown silty-clay soil. Level 6 contained no ceramics; coincidentally it correlates perfectly with the Excavation 2 and 7 that had peaks in ceramic shard frequency and proportions of Buritaca ceramics below levels with little or no ceramics and strata with coarser soils. A large flat stone similar to the one found in Excavation 6 was found at the end of level 5, immediately below this level ceramic frequency drops to 0 for level 6 (59 to 60 cm from the surface) that seems to mark a short period of abandonment of the vicinity, perhaps of 100 to 150 years. Above the schist slate (see Figure 3.16) the frequency of Tairona 1 and 2 ceramics peak which suggests that the site was densely inhabited at the end of the Tairona 1 and beginning of the Tairona 2 period. Without larger excavations it is hard to tell what part of the house or household these flat slates were used for, but it is likely that they are part of a floor or a small trail within the village, as slates similar to these have been reported in Pueblito as part of domestic contexts. In Chengue they are also found on or near the surface as part of paved trails.

In Excavation 9 the peak in the Buritaca ceramics also occurs after 500 AD (Calibrated 509±25 AD, 1 sigma, P=.7; UCI-AMS# 22818), and it would be consistent to think that the Buritaca period starts around 500 to 550 AD considering the rate of soil formation is around 15 years/cm (40 cm in 700 years). If we consider that the time needed to form the soil between 100 cm and 140 cm was approximately 700 years, the peak of Buritaca occupation ends in Excavation 9 about 750 AD (Figure 3.17). The situation in excavation 7 and 2 is analogous and suggests that the site was abandoned for some time between the Buritaca and Tairona 1 occupation; it also suggests that the beginning of the Tairona occupation may be somewhat later than in other Tairona sites, perhaps by as much as 200 years. The carbon date associated to the ceramics found between 100 and 150 cm is consistent with what has been though about the Nehuange phase, the initiation of the Nehuange phase is in this case is somewhat earlier than expected (189±15 BC, 1 sigma, P=.72; UCIAMS# 228218), but the amount of dates for this period is so small and from such poorly defined contexts that it should not come as a surprise. Considering that the soils are fairly similar in color and texture it is likely they were formed by similar environmental conditions. A way to approach the length of the periods in question is to roughly extrapolate the length of the mentioned ceramics styles based on the time it took the soil to form between the most conspicuous peaks in the ceramic counts. Further consideration of the speed of the formation of the deposit suggests that the soil formation process associated with Tairona ceramics tends to be faster because of the abundance of angular and sub angular gravel which may have been transported by people or larger torrents of water and high ceramic shard counts. However, if we considerer that the last 30 cm of the deposit were formed in 700 years and that the 70 cm of soil between 30 and 100 cm took about 800 years the rate of formation of the deposit would be 1.14 mm/year. Based on this, the peak of the Buritaca occupation would have lasted approximately 450 years between 500 and 900 AD. The radiocarbon dated charcoal associated to the strata with lower frequency of ceramics is about 15 cm deeper than the beginning of the peak of the Buritaca deposit and it seems likely that 15 cm of soil took about 200 years to form it is likely that the following levels may have taken a similar amount of time to reach the culturally sterile stratum between 50 and 60 cm. This means that the abandonment of the site would have happened about 900 AD, but this does not mean that there was an abandonment of the entire bay just this very small section of sector 2.

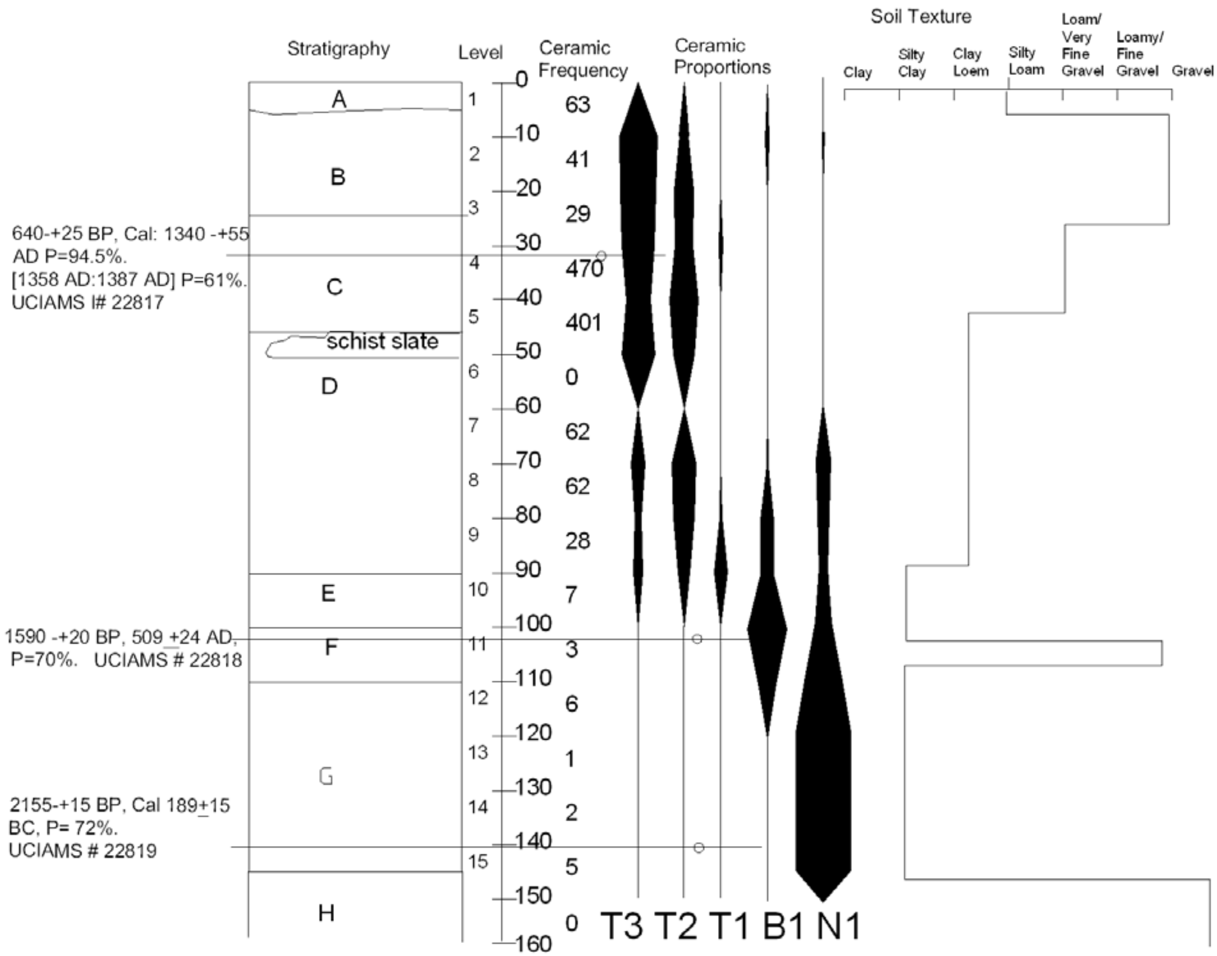


Figure 3.17 Excavation 9, Stratigraphy, Ceramic Frequency and Proportions.
A) Humic Layer. B) Light reddish brown, loamy with very fine to medium gravel in high frequency. C) Brown fine gravel, loamy clayey and high frequency of stones and large gravel in low frequency D) Silty-Clayey soil with small gravel. E) Reddish brown silty-clay with no stones, charcoal was found concentrated in a small area of the level 11 immediately before the end of the stratum. F) A narrow stratum of subangular gravel. G) A stratum very similar to E, no gravel at all, reddish brown with silty clay texture H) Very large stones and gravel, no ceramics.

Finally, based only in the data from Excavation 9, the Tairona 1 phase would have lasted no less than 300 years between 1000 AD and 1300 AD and the Tairona 2 and 3 no less than 300 years between 1300 and 1650 AD. The evidence for the length of the Tairona 2 and 3 phases will be better explained by excavation 12, 14, 15, 16, and 17 but increasing proportions of Tairona 2 ceramics above 30 cm suggests is fairly consistent with the evidence from other excavations from Sector 1. However, the majority of the ceramics of excavation 9 is Tairona 2 and it would be expected that this part of the ceramic deposit would have been formed fairly late in the sequence, most likely after 1200 AD.

Excavation 10

Area 2x1 m, maximum depth 20 cm, in 2 levels, sector 2. This shallow excavation was made on the sloping side of a house platform in Sector 2. It is so shallow that is no stratigraphy by the surface level was present and a very hard yellow, sterile level that seems to be the hardened soil floor of a residence.

Excavation 11

Area 2x1 m, maximum depth 20 cm, in 2 levels. A context similar to Excavation 10 also associated to a house terrace contiguous to the one from Excavation10. It contained a figurine head of what appears to be a man chewing coca leaves with his face heavily decorated and a well groomed head dress. Another figurine fragment was found close to the head and it may be part of the same figurine. It is a leg made of the same material as the head (Figure 3.18). This shallow deposit may have been part of the floor immediately surrounding a house judging by the change in level of the ground. The relative location of the excavation was identical in excavation 10 and 11 (see Figure 3.19).

Figure 3.18 Excavation 10 Figurine. *Black Slipped* on red paste.
The head shows a bulge typical of coca consumption, a perforated nose and bottom lip, facial painting and a form of head band or hat. Similar figures were reported by Mason (1931).

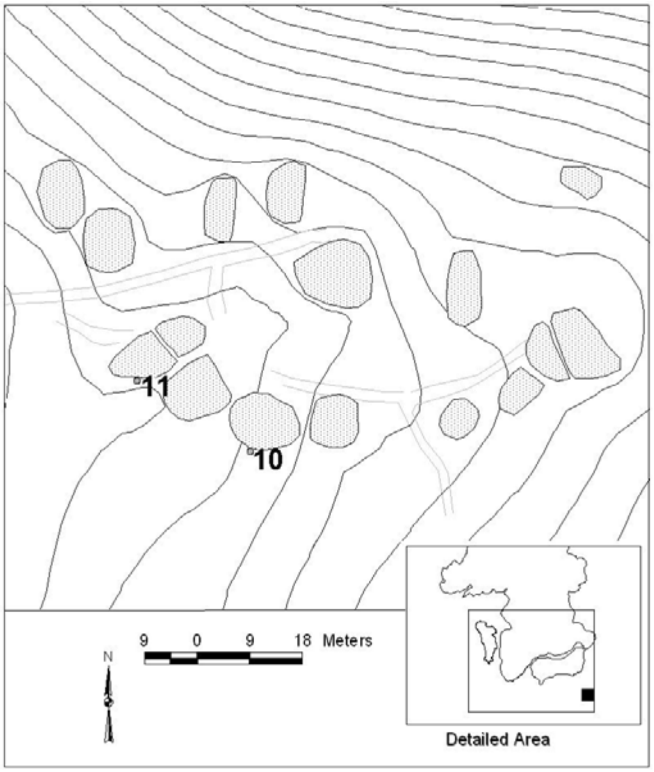


Figure 3.19 Detail of the Location of Excavations 10 and 11.

Sector 1 Excavations

Sector 1 excavations are mostly concentrated towards the northern section of the lagoon. During the 2000 fields season it was believed that this part of Sector 1 contained the earliest deposits, the opposite conclusion can be reached with the current data. Although most excavations show relatively late remains there is evidence from shovel probes that there are a few Buritaca deposits in this section. Even though the evidence is overwhelmingly from the Tairona period in this part of Chengue it should be noted that this sector's coastal lagoon was very different to that of sector 2, and it should be regarded as a separate ecosystem even though it is only 400 meters apart. This implies that the assumptions made on the domestic economy for households of Sector 1 are not completely valid for sector 2. In map 3.3 it should be noted that the floodable area of the lagoon may have been less extensive in the recent past although Excavation 16 has shown it was flooded periodically in varying degrees of intensity through most of the last 1000 years and may have been constantly under water before ca.1000 AD.

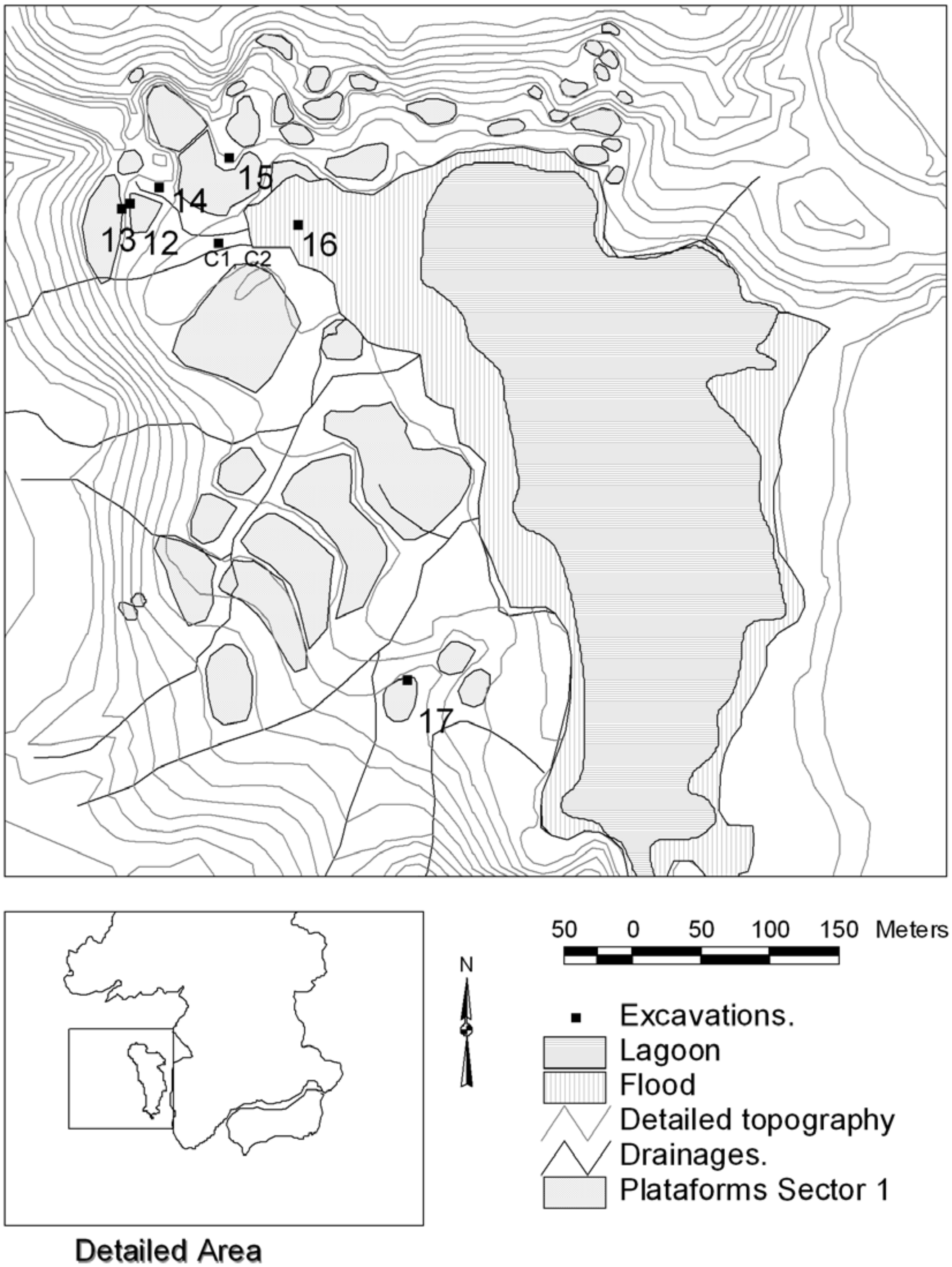


Figure 3.20 Location of Sector 1 Excavations.

The distribution of platforms suggests that the sites of excavations 14 and 15 may have been quickly formed in the process of building terraces and mounds. Most platforms may have contained more than one structure. C1 and C2 were excavated by the author and Santiago Giraldo in June 2000 (Langebaek, 2005).

Excavation 12

Area 2x1m, maximum depth of 134 cm in 9 levels. A profile close to the a large platform, upon which the buried remains of several round house foundations are barely visible, showed a considerable depth with large frequencies of ceramics and the frequent appearance of ash. This was interpreted as telltale signs of a deep midden associated to a large residence. The house platform itself is completely covered by soil and some looting in the vicinity has destroyed part of the midden, but it is clear that the midden is between a large house terrace and the bank of what seems to be an artificial drainage (see Figure 3.20). The midden is very different to the deposits described until now. All the levels excavated, except for the superficial and the last contained an extraordinary amount of artifacts, shells, animal bones and ash. Some stratigraphy was evident, although changes in the soil were really a matter of degree, not a radical change in texture or color as in the excavations from Sector 2. Rather outstanding characteristic were the softness of the soil and its talc-like texture. Level 4 contained a very large number of large Strombus Gigas shells and coral. Most of the shells had the orifices that would have allowed them to be used as trumpets. Several of these were tested and they are still capable of producing good quality sound. These large remains occupied such a high proportion of the levels that it was decided to excavate the whole stratum, not the level. For this reason level 4 is 30 cm deep (Figure 3.21).

There were a few shards of glazed ceramics in the upper levels which strongly suggests the upper levels, associated to T3 ceramics are contemporaneous with the Colonial period. There is also a very small amount of T1 ceramics along the whole excavation. It is likely that the whole deposit was formed from 1200 AD to ca. 1550. However, the elevated proportions of *Black Slipped* ceramics (34%) in the deepest levels, strongly suggests that these deposits are older than those found in excavation 14 and 15. The high proportion of this type of ceramics is commonly associated to early deposits in other Tairona contexts. Langebaek (1987) and Oyuela-Caycedo (1987b), among others show that very high proportions of *Black Slipped* ceramics are common in contexts prior to 1200 AD. Although it is clear that *Black Slipped* ceramics are very common in the earlier Tairona contexts, it should be noted that there may be other reasons for the high proportion of the *Black Slipped* ceramics in Excavation 12. *Black Slipped* ceramics are often thin, decorated with thin incised lines and associated to forms that were prevalent in households with a higher demand for a more public life, hence probably a wealthier and more prestigious household which was probably the case of the households inhabiting the platform during the 12th and 13th centuries.

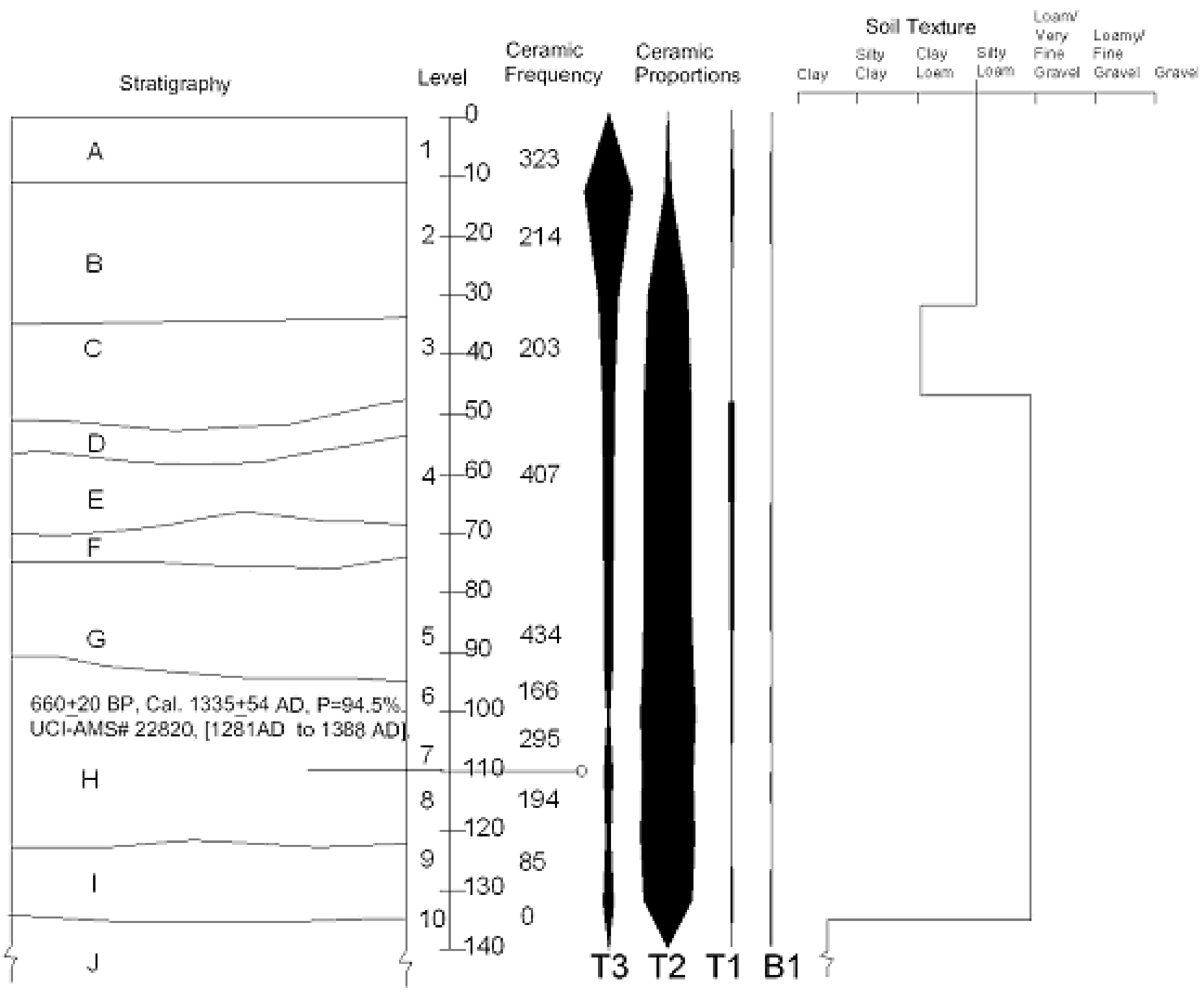


Figure 3.21 Excavation 12 Stratigraphy, Ceramic Frequency and Proportions.

Stratigraphy: A) Humic layer 3cm. and Dark Brown soil. B) Ashy soil, C) Ashy soil with finer texture, D, E, F) Ash, gray (2.5 y 7.3) with slight variation in texture, this stratum seems to have been deposited in very little time because it contained very large shells that were deposited vertically. H) Change in color (10yr 5/3). I) Similar color and texture, change in charcoal content. J) Color and texture change (10yr 5/3), no ash.

Excavation 13

Area 2x1 m, maximum depth 16 cm, one level. This excavation was made on a smooth slope immediately in front of the buried remains of a house ring in the same platform as Excavation 12. The deposit is extremely shallow but rich in lithic artifacts and ceramics and judging by the texture and soil evolution it was probably part of the house floor. The totality of the ceramics was Tairona 3 and Colonial. The excavation revealed what was evidently a hard beaten surface. It is not clear why the number of lithic artifacts was so large, but it confirmed that the terrace associated to Excavation 12 was occupied during the Tairona 3 phase. It would appear that the same house floor may have been swept clean many times and the remains from earlier houses piled off the edge of the platform. A few shards of glazed ceramics were found which suggests Tairona 3 ceramics were the most common types during the later part of the sequence (16th and 17th centuries). This however, does not eliminate the possibility that Tairona 3 styles were used prior to the Colonial period.

Excavation 14

Areas 2x1m, maximum depth 2 meters, 20 levels. The site for this excavation is located on the slope of an artificial mound that is adjacent to a large platform and appears to be part of a landfill. The effects of the slope are likely to have affected the stratigraphy of the whole excavation creating distortions on the proportions and age of the materials. However, on the North-Eastern wall of the excavation, which is shown in Figure3.16, there is a clear stratigraphic variation in the soil texture and appearance, including distinct layers of ash. It seems that the first 6 levels (the first 60 cm) are made of a mixture of soil with a large amount of Tairona 3 domestic refuse. Bellow this somewhat turbulent layer is what appear to be two large post molds, about 25 cm in diameter each. Around these post molds is a large amount of ash and charcoal. By level 9 all of the ash has disappeared, the post molds end and he color of the soil changes to a pale brown or mustard color. This stratum of silty soil continues until the end of level 11, at about 110 cm in depth. Below this level the soil changes dramatically to a layer of gravel which disappears quickly and reveals a very soft soil, mustard in color and with a high content of clay. In this stratum, and for the next few levels a hearth was found, composed of 3 stones, modified to produce a concave chamber like shape, where fire would be kept. The area between the stones is made up of almost pure ash and charcoal. A few seeds were found within this ash, and were identified as *Cassia Sp*. and *Manihot Sp*. (See Annex B). Several large bones were found in this context, including a dear antler, and other larger bones, probably peccary. Fish bones were present in very large numbers, charcoal was found inside the remains of a globular vessel and the hearth continues until the end of level 16. In level 17 ashes begins to appear once again, and a large amount of charcoal is found once again in a semicircular pattern near the hearth of level 11, but not corresponding exactly with it. From level 17 on, the soil matrix becomes extremely soft and fewer artifacts are found, this trend continues until level 20 which contains only a few centimeters of mustard silty soil with a decreasing frequency in artifact remains. Most of the stratum is made up of a reddish brown soil, with no stones or artifacts in it. The soil texture closely resembles the deeper levels of excavations 2, 7 and 9 of sector 2.

The changes detailed in the excavation suggest the presence of at least 2 structures, possibly 3 buried by about 60 centimeters of fill. The function of the mound that buried the structure is not clear, it has been partially destroyed by looting. The following 3 levels, (17 through 20) have characteristics that suggest a slower formation process. The large amounts of ash in association to post molds could be the remains of a burned structure or burned refuse. The proportions of the ceramic types that compose Tairona 3 and 2 phases tend to change in a very consistent pattern with the vast majority of the T3 phase artifacts in the first 3 levels and a consistently dominant proportion of T2 artifacts over the rest of the excavation. Trace amounts of T1 and B1 shards appear in the upper 75% of the excavation but increase consistently at the bottom levels. A very small increment in the proportions of Buritaca style ceramics occurs in level 18, which suggest a Buritaca 1 occupation in the immediate vicinity.

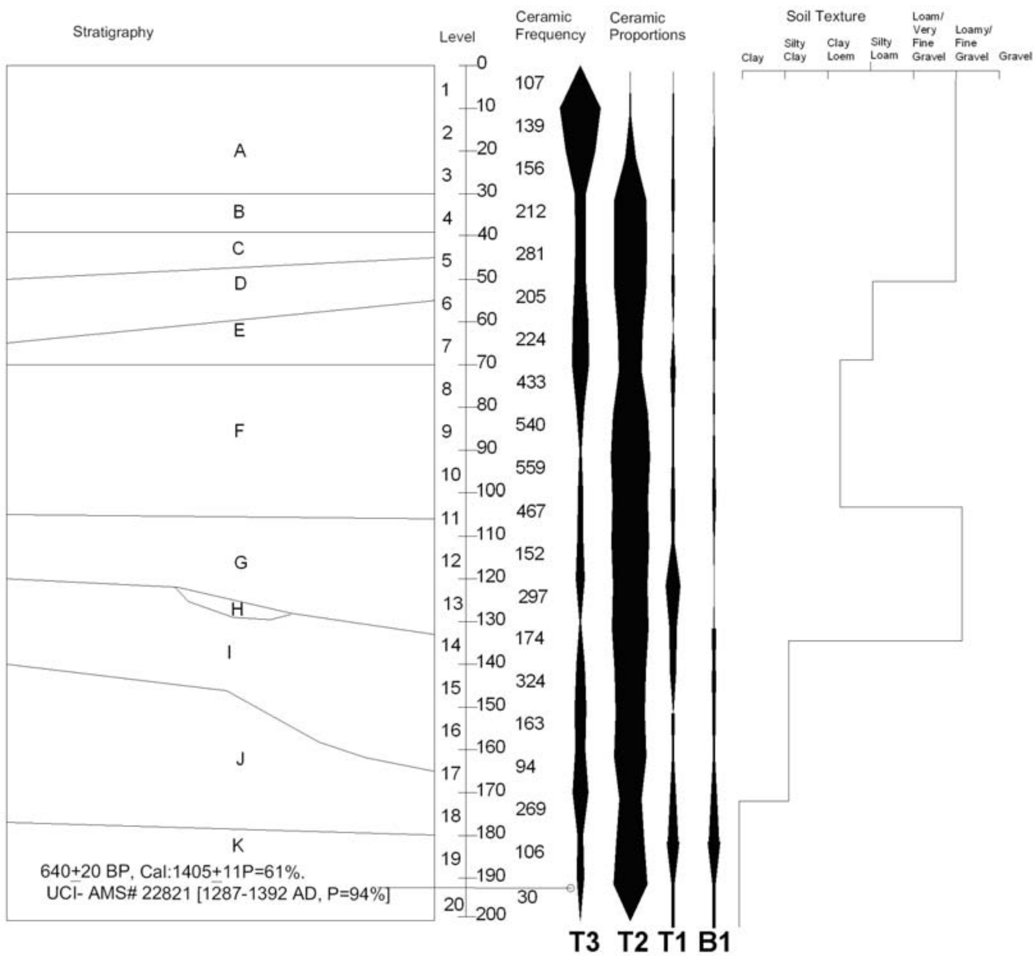


Figure 3.22 Excavation 14. Stratigraphy, Ceramic Frequency and Proportions.

Stratigraphy: Strata A to D show a large amount of angular gravel. E) Smoother texture and some ash. F) Pale mustard brown soil with large amounts of ash. G) Darker mustard brown, very homogeneous soil. H) Ash. I) Reddish mustard with some stones. J) Softer reddish mustard soil with very few stones. K) Reddish, very clayey, homogeneous soil with no stones or gravel, no ceramics. The charcoal although recovered in level 20, actually comes from the bottom of stratum 1.

Excavation 15

Areas 2x1m, maximum depth 1.6 meters, 15 levels. Excavation 15 was located in the vicinity of excavation 14 but very near a small reservoir-like structure in what appears to be a terrace a few meters above the level of excavation 14. The site for this excavation was selected because several profiles in the site showed strata of white ash, which suggested that the site was not heavily disturbed and was probably a midden. Although some looting had destroyed part of what seems to be a terrace, the area where excavation 15 was made looked undisturbed. The excavation showed a fairly clear stratigraphy, especially in the deeper levels and it produced large amount of charcoal. The strata of ash appeared and disappeared as the excavation progressed and some mayor changes in soil texture and color were detected that suggests the midden was produced slowly, probably as a result of depositing soil from the reutilization and rebuilding of houses. As in Excavation 14 a small increment in Buritaca 2 style ceramics is visible in the deepest levels. The two radiocarbon dates place the site exclusively in the Tairona 2 period, although it contains a small yet constant proportion of Tairona 3 ceramics that oscillates between 5% and 8%. A trace amount of T1 ceramics appears in the last 6 levels, oscillating between .5 and .8%. Overall, the excavation can be considered a Tairona 2 (T2) midden, the upper section of the excavation may have been deposited during the Tairona 3 (T3) phase. There is however, an interesting type of ceramics that was classified under Tairona 2, which appears not to fit any of the Tairona or Buritaca types and was called Burnished-Black Tan, that could have been a trade item from an undetermined source, although it has some traits that resemble Buritaca shapes, such as the T shaped rim. Stratigraphically speaking, it is associated with small proportions of Buritaca ceramics and chronologically it was classified as Tairona 1, although it shows some association with Tairona 2 ceramics and has surface treatments that resembled the Tairona 2 (*Black Slipped* and Hard Red Slip) surfaces.

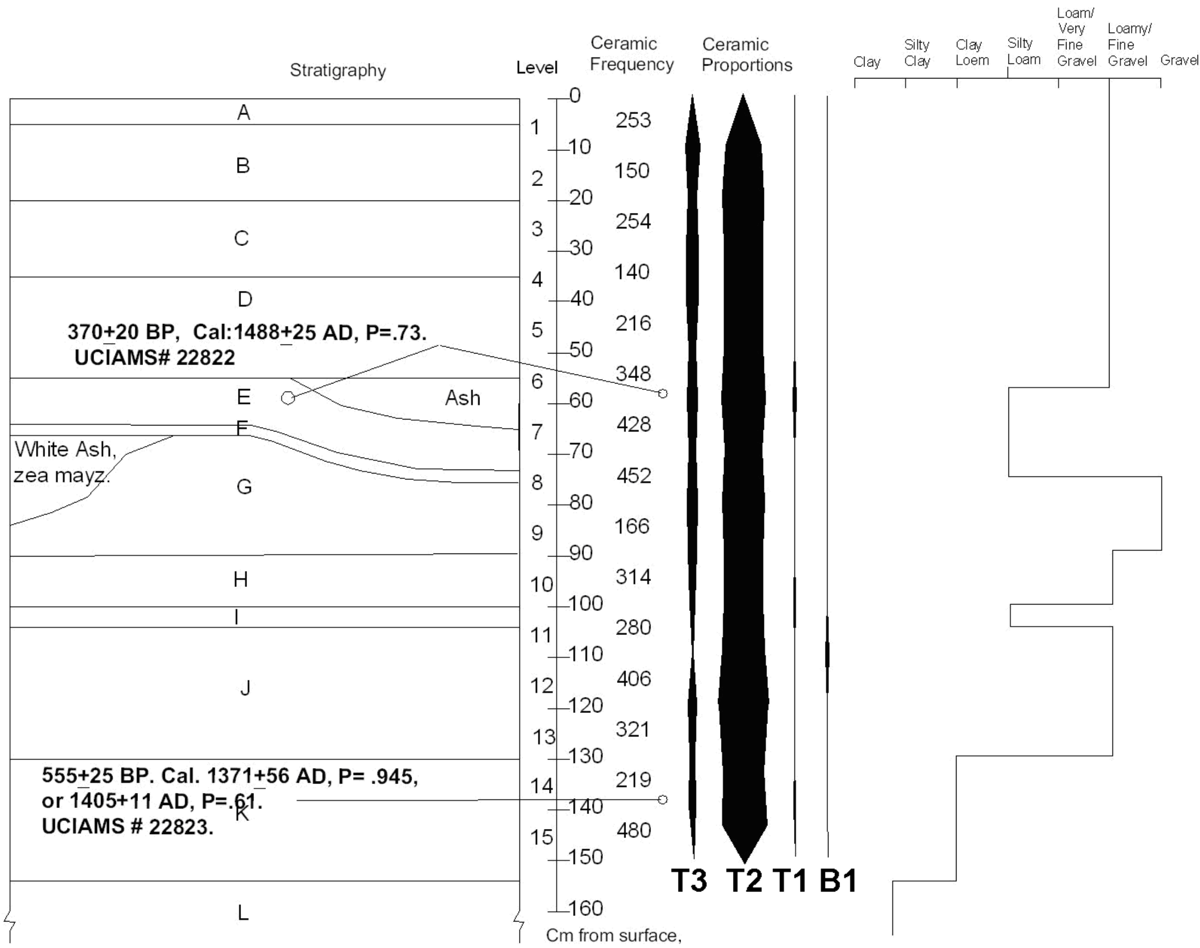


Figure 3.23 Excavation 15 Stratigraphy, Ceramic Frequency and Proportions.

A) Humic layer. B) Very compact reddish brown. C) Brown very compact soil. D) Reddish brown, less compacted. E) Reddish yellow with ash. F) Dark gray ash. White ash contained large proportion of *Zea Mays* phytoliths. G) Yellowish, gravel. H) Compacted stony soil I) Yellow brown,. J) Yellow brown, angular gravel. K) Yellow brown, soft few stones. L) No ceramics, reddish very little gravel, soft texture.

Excavation 17

Area 1x1 m, maximum depth 60 cm, 6 levels. This excavation was located between the only water well in Chengue and a house platform in Sector 1 (see Figure 3.20). There were no ceramic shards visible on the surface or on the first few centimeters of the excavation; however the deposit does show a considerable artifact density. Between the first level and the second level there was a thin layer of flat stone that could have been a floor. It is suspected, due to location of the pit, that the flat stones were part of a paved path around the water well. The excavation was relatively shallow compared to other excavations in Chengue, but it showed the most abundant Tairona types in a consistent stratigraphic order. The very small amounts of Tairona 1 ceramics suggest that the site was not densely inhabited before 1200 AD. A slight increase of *Black Slipped* ceramics towards the bottom of the excavation that does not exceed 10%, is similar to the proportions found in excavation 12, 14, and 15 for levels that were formed towards the 14th century.

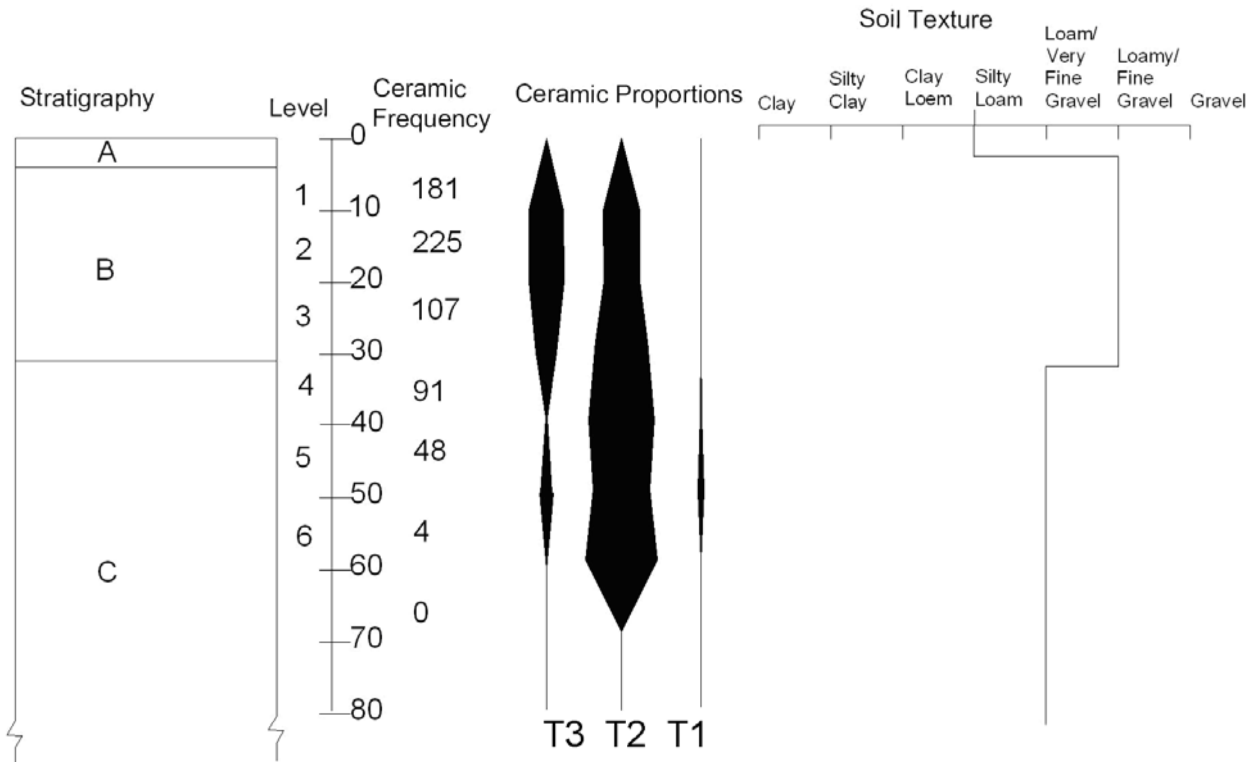


Figure 3.24 Excavation 17, Stratigraphy, Ceramic Frequency and Proportions.

The levels 4 and 5 contain a small proportion of Tairona 1 ceramics, 2% and 8% respectively, and no Buritaca ceramics.

Excavations from Past Field Seasons

Two small test pits were excavated in June 2000 by Santiago Giraldo and the author. The excavations are reported in Langebaek 2005:54. There are several problems that make these excavations less useful for chronological purposes than initially reported. The original intention was to excavate a 2x1 m pit but finally two 1x1 m pits were excavated only 4 meters apart to minimize disturbing a burial that was suspected lay in-between the test pits, although Langebaek´s (2005) map shows them several hundred meters apart (see Map 3.5). The site was chosen because surface collections showed it contained some type of tan ceramics that was suspected to be from an early Tairona phase. In 2002 the site was looted by the caretaker of Chengue, probably attracted by the 2 square depressions left by the archaeological excavations. On the site there were 2 very large urns (about 1 m tall) and at least 5 smaller cooking pots and jars about 40 cm tall and 5 small cups and bowls. All were illegally extracted and later photographed when in possession of Mr. Varela in 2003 and 2004. Five of the larger vessels that survived in situ were classified and reported to the ICANH. In February 2005 these urns and pots were taken to the park administration office but the small ceramic pieces had been sold by Mr. Varela, presumably to tourists, although photographs of the objects survive (see Figure 3.26).

Figure 3.25 Large TT1 Vessel, OT3 (Cooking Pots) and Cariform Jar.
Looted in the space between excavations C1 and C2 found in situ. All large forms are Plain Tan (T2), with the exception of 2 cooking pots and large bowl which are Hard Red Slipped (T2) and identical to those described in figures 3.12 and 3.13.

Figure 3.26 T2 Phase Small Tetrapod Vessels.
Vessels looted from the burial between C1 and C2 excavations. 4 are *Black Slipped*. The bowl on the far left has a white pigment inside the circular impressions of the bottom.

The C1 and C2 excavation reports contain soil descriptions that suggest that there was not a clear stratigraphy; the whole deposit is Tairona period and severely disturbed by a burial. Additionally, the site is at the very edge of the extents of the floodplain of the lagoon, which may account for some of the color changes observed in the first 20 centimeters of the excavation. The soil descriptions were made by the author and published in Langebaek 2005; when compared to the stratigraphy and sedimentology of the other excavations in Chengue it resembles the very late part of excavation 14 and 15. The ceramic classification is a little odd, the most outstanding feature is the total absence of *Black Slipped* ceramics, which is so common in the other excavation of Chengue, 5 of which were made only a few meters away, and that were dated to the same period. The dates for these excavations show that the deepest sample is around 300 years younger than the shallowest sample (Level 7 940 BP or Cal.1150±40 AD and Level 10 640 BP or Cal.1350 ±60 AD). These dates would place the artifacts in the T1 and T2 periods which are roughly consistent with the typology of the artifacts found in the burials. It should also be noted that the site is located further south of most of the Sector 1 excavations which suggests that the northern shore of the lagoon was inhabited after the western and south western sections.

CONCLUSION: AN ABSOLUTE CERAMIC CHRONOLOGY FOR CHENGUE

Although the ceramic chronology is a only an intermediate step in the elimination of the components of the scenarios discussed in chapter 1 it is particularly important because it helps identify variation in the distribution of the settlement. The initial Tairona period distribution is critical to identify the settlement that is first associated with salt production and develop proxies for its changes in size and density which will be discussed in the following chapters (Table 3.1). The contexts dated by radiocarbon and ceramics show that the proportion of Tairona 2 ceramics grows very fast between ca.1200 AD and ca.1350 AD. The 15th century would mark the end of Tairona 2 and the beginning of Tairona 3 that lasts until around 1650 AD which is heavily documented by colonial accounts specifically mentioning Chengue. The Tairona 1 period is a little more problematic but it would appear to be consistently before 1200 AD although there are only 3 contexts dated between ca. 1200 AD and 600 AD. This does not necessarily mean that there was a depopulation of Chengue during this 600 year lapse; in fact this is very unlikely as it will be discussed in chapters 4 and 5.

Some ceramic styles like *Black Slipped* ceramics have been thought to be the predominant types for an early Tairona phase, although they appear in Chengue in Tairona 2 contexts. The highest proportions (above 30%) seem to be associated with remains that are earlier than 1300 AD, therefore an indicator of earlier than 1300 AD lots can be very high proportions of *black slipped* ceramics (see Table 3.2). The Tairona 1 group, defined in chapter 2 is a consistent indicator of an earlier style in the Tairona ceramics, but it is relatively rare and defined mostly by gray wares. A similar approach can be used with *Black Slipped* ceramics, and to date lots with very high proportions of the ceramic group as from an earlier period. It seems that several of the Buritaca pastes are common in the Tairona 1 phase, and that some Buritaca forms appear in Tairona pastes. At this stage of the research it became evident that the *Black Slipped* types were equally useful if they were integrated into the Tairona 2 group than analyzed independently in the distribution maps. To simplify the chronology they were integrated into the T2 typology.

Period	Range	Duration
Colonial	1525 AD-1650 AD	125
Tairona 3	1450 AD -1650 AD	200
Tairona 2	1200 AD -1450AD	250
Tairona 1	800 AD - 1200 AD	400
Buritaca (B1)	500 AD - 800 AD	300
Nehuange (N1)	200 BC-500 AD	700

Table 3.1 Ceramic Chronology for Chengue.
Note: The Tairona 1 in Chengue seems to be more abundant towards 1100 AD.

The ceramic chronology for Chengue is based on the most common classes for each time range not absolute absence of presence of types. There are alternative ways to classify the ceramics that could produce different periods; it seems that some variants of *Black Slipped* could be allocated in the Tairona 1 or even the end of the Buritaca phase. The time ranges for the end of Buritaca and Tairona 1 are still very diffuse.

The Tairona 3 and Colonial period ceramics overlap almost completely; an alternative way of looking at the distribution would be to classify the two ceramic groups into a single period, but to separate them is useful because European ceramics are clearly exotic and can provide insights on the extents of the very last occupation of Chengue. The criteria for the divisions and the selection of the ceramic groups that compose the foundation for the chronological units proposed here is strongly oriented towards dating ceramic distributions from shovel probes and surface collections that often do not have large amounts of decorated materials. Other approaches, oriented towards more detailed analysis of domestic contexts are likely to benefit from other classification methods which may lead to more refined chronologies or different time ranges.

Ceramics.	Excavation			
Level	14	15	12	17
1	0.0%	0.8%	0.3%	0.6%
2	0.0%	1.3%	5.1%	3.6%
3	6.4%	9.1%	16.7%	1.9%
4	5.2%	4.3%	11.1%	9.9%
5	5.0%	6.9%	7.4%	4.8%
6	6.3%	12.4%	7.8%	0.0%
7	6.3%	4.4%	7.5%	
8	3.2%	7.5%	22.7%	
9	4.1%	8.4%	34.1%	
10	5.7%	26.1%		
11	18.2%	14.6%		
12	5.9%	8.6%		
13	1.3%	8.4%		
14	4.0%	4.6%		
15	4.3%	4.6%		
16	3.1%			
17	0.0%			
18	1.1%			
19	0.0%			
20	6.7%			

Table 3.2 Percentage of Black Slip and Very Fine Black ceramics.

Excavation 12, which appears to be the oldest deposit in the group (Cal. 1335 AD±54 at level 7), contained the largest proportion of Black Slip and Very Fine Black ceramics in levels 8 and 9 that could probably be dated to ca. 1200. Note that the excavations tend to show two peaks which may be variations of the *Black Slipped* group that were not differentiated in the current analysis. Future analysis and excavations have a good chance of producing refinements in the chronology. The spatial distribution of this ceramics in Chengue can be found in Figure 5.30.

FINAL CONSIDERATIONS

The excavations at Chengue result in relatively refined chronology for the Tairona period or Late Period and a pre Tairona period, yet the potential for a more refined Nehuange and Buritaca phase chronology remains. There are some trends that were detected but not pursued because the sample size for the ceramic classes was too small. However, it seems that the painted wares (see Figure 3.27), such as Red-on-Crème and Fine-Red-Orange or decorations that are usually referred to as Nehuange or first Painted Horizon appear in a very discrete vertical distribution (Langebaek 2005, Bischof 1969a, Reichel-Dolmatoff 1951). All of the wares that contain decoration assumed to be Nehuange appear in the stratum dated after ca. 500 AD and not below, but don't appear in purely Buritaca excavations. This suggests that there are grounds to a classification that includes a Nehuange 2 (N2) probably 300 to 500AD and a Buritaca (B2) phase or a more refined T1 phase that would account for variations that seem to peak between 750 and 900 AD. Excavation like 2, 7 and 9 seem to have the best range in ceramics for the purposes of enhancing the detail of the ceramic chronology although a more refined description or different criteria would be necessary. The same can be said about the N1 phase, which seems to be composed primarily of culinary wares that do show some variation in surface treatment but the sample size continues to be very small.

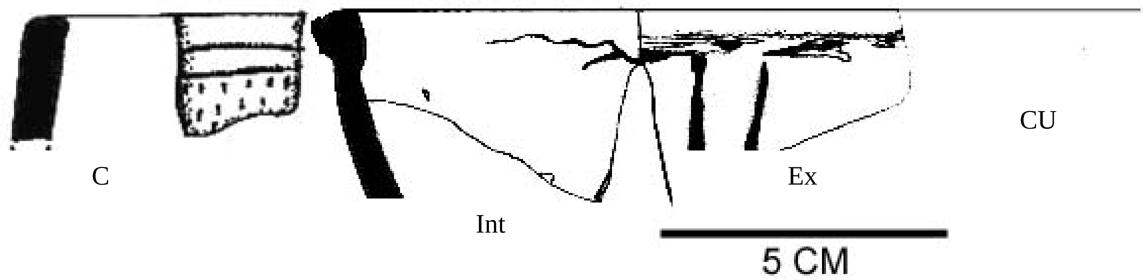


Figure 3.27 Nehuange Decorations.

Excavation 7 level 7 wares that more closely relate to Nehuange ceramics described by Langebaek (2005) and Bischof (1969a), they rare and only appeared on relatively deep deposits dated shortly after ca. 500 AD. They are not the oldest forms or decorations. CUB1 (Buritaca Bowl) shard has red paint on a white background. The paste is fine-red-orange and is located in the exterior alone. The CUB5 shard is fine-sand with no discernible surface treatment other than burnishing.

Finally, it may be useful for archaeologists working in the region to note that there are similarities of the Buritaca and Tairona ceramics with the Loma and Portacelli ceramics from the eastern slope of the Sierra Nevada de Santa Marta, the Guajira peninsula and even Venezuela. Some of the elements found in the N1 and B1 groups are similar to Portacelli wares such as "corrugation" along the rim and a few decorations of Tairona artifacts such as faces and handles (Figure 3.28), which are classified as early Portacelli or Bonda ceramics by most archaeologists (Ardila 1996:106-107; Langebaek, Cuellar and Dever 1998:74); both are found in Chengue but none were found in stratigraphic excavations so they are difficult to date precisely (see Figure 2.7). However, the paste, color and other aspects of the ceramics are not too similar to what is usually called Portacelli and there are many decorations and forms from this group not present in Chengue (such as fine painted wares). All these issues may give some indication of exchange or of some degree of communication between populations to the east of Chengue during the N1 through T1 phases, which is not unlikely because of their proximity. Chronologically, it is very likely that Portacelli styles coincide with B1, T1 and T2 phases according to the excavation from Ardila (1996) and Langebaek, Cuellar and Dever (1998) that would place the beginning of this period between 750 AD and 950 AD. It may be useful to have these relationships in mind for future research but the limitations of what can be said only with a few similarities in ceramic style should also be of concern. A great deal of regional and household archaeology is necessary for the time between the N1 through T1 phases in the region of northern Colombia and Venezuela to determine the differences and commonalities of the people who inhabited this vast area.

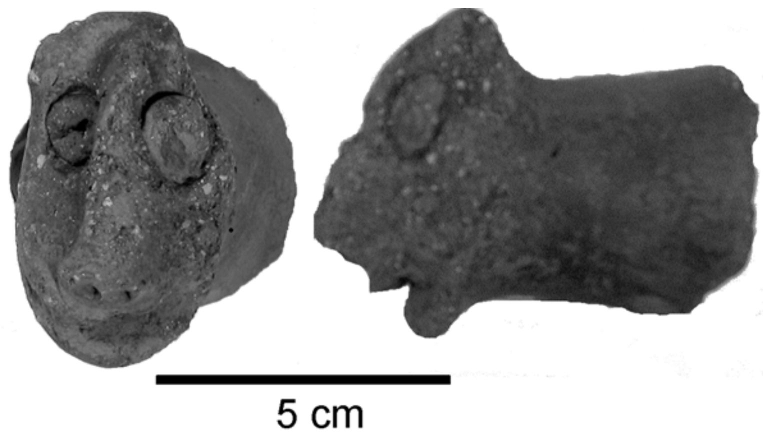


Figure 3.28 Bonda Style Ceramic Handle.
Lot 179, Red Slip (very eroded).

CHAPTER 4: TERRACES, HOUSEHOLDS AND DEMOGRAPHY

INTRODUCTION

In the following chapter the problem of estimating population size and density based on archaeological, ethnographic and ethnohistoric data will be addressed. The intention is to reconstruct demographic trends throughout Chengue's entire archaeological sequence. The project's methodology was designed to obtain data at a resolution that would allow the identification of aggregates of domestic units, and in some instances very compact clusters of small terraces that would appear to be individual household clusters. The following chapter will explore some aspects of the distribution, size and economy of these households at a village scale. The basis for population distribution and size will be the relationship between terrace size and floor space as defined in Naroll (1962), Kolb (1985) and Cook and Heizer (1968:85). The demographic estimates shown in this chapter suggest that there is a considerable degree of consistency with well founded Mesoamerican population estimates, making demographic comparative analyses based on archaeological features feasible (Santley et al 1979, Kolb 1985, Flannery 2002:423). The terrace data from Chengue, mostly from Sector 1, is a good indicator of the distribution of structures for most of the Tairona phases. In many instances, the preservation of the terraces on very steep slopes is good enough to be able to measure their contours without excavation. In other cases the dense vegetation and very large terraces make their identification harder and less precise, yet most measurements are sufficiently detailed to allow for demographic estimation.

TERRACES AND HOUSE RINGS OF B200 AND PUEBLITO

Data from 2 Tairona villages, Pueblito and Buritaca 200 (B200) will be used to explore the relationship between roofed area and terrace area in an attempt to derive demographic figures from archaeological features. Both villages are located on the northern slope of the Sierra Nevada de Santa Marta; Pueblito is 17 km east of Chengue and Buritaca 200 (B200) 25 km south east, in the valley of the Buritaca river (see Figure 4.1).

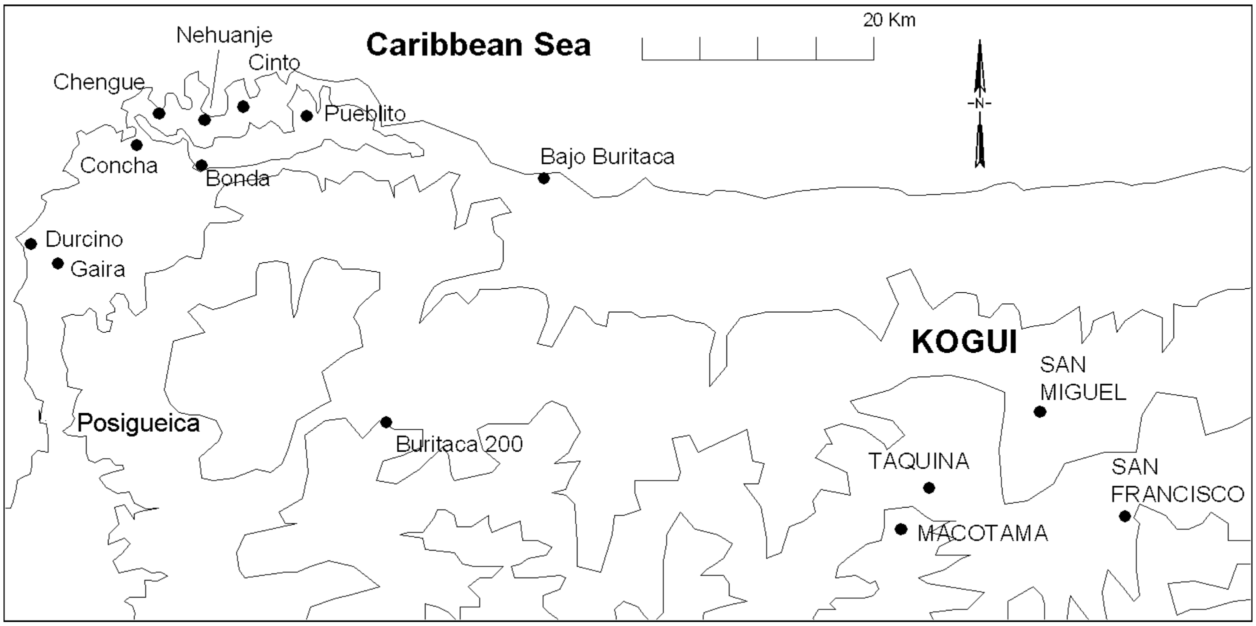
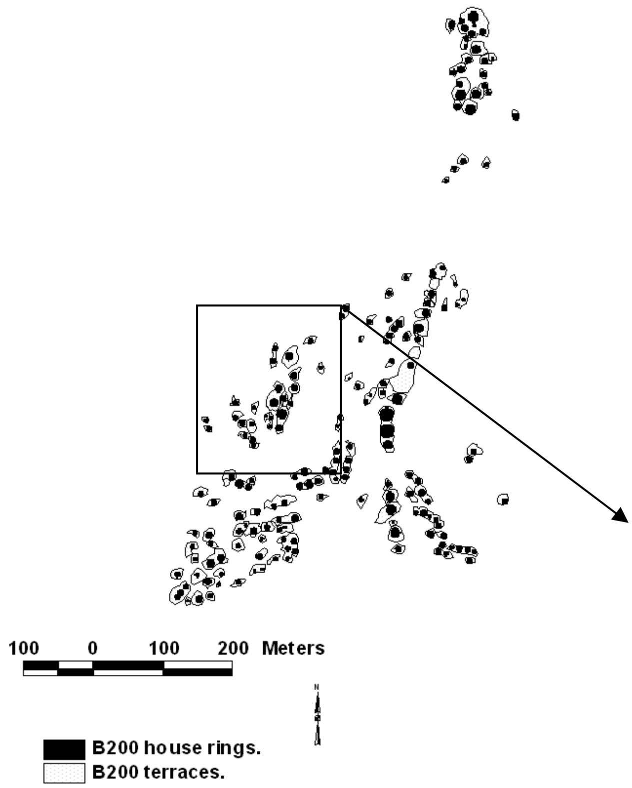


Figure 4.1 Location of Places Mentioned in the Text.
Lower case names are archeological villages, upper case names are modern Kogui villages.

Roofed area and terrace area relationship in Buritaca 200.

The B200 data set published by Cadavid and Herrera (1985) and Groot (1985) contains information on the size and distribution of 184 house rings spread out in two clusters measuring a total of 13 ha (See Figure 4.2) although Groot (1985) estimates that there are areas of B200 that were not mapped that add up to approximately twice the size of the sectors shown below. Groot’s data suggests that at least 26 ha were inhabited during the 16th and early 17th centuries. The most salient characteristic of the map is that the vast majorities of the terraces contain at least one stone house ring or house foundation. The terrace and house sizes vary considerably; many terraces have more than one house ring and appear to form clusters, yet the most important feature is that the terraces are paved and would appear to be the most elaborate example of clearly delimited domestic space (see Figure 4.3). Outside the ring a paved area may have served as a stable mud-free surface over which domestic activities were performed; for this reason it is assumed that if multiple houses were found in a single terrace they would have been sharing primarily the same domestic space and were probably part of the same household. However, regardless of whether all or some of the houses in a terrace were the same household, the sum of the house ring area would be the sum of the roofed space on a terrace. In all recorded cases, ethnographic and archaeological, the interior of the house ring is never paved. There appear to be two groups of terraces and house rings, one composed of large structures that may have not been "normal" family units, but rather larger perhaps "public" houses with a religious function or elite houses, and another that are likely to have been less notorious residences but still quite elaborate and probably from families who where "well-off" judging by the higher labor investment on constructing detailed architectural features. The two peaked distribution of B200 is a fairly strong indicator of two broad classes of structures, possibly the result of the existence of some form of social differentiation and public space (See Figure 4.4). It should be noted that there is a third group of terraces that was not mapped because they had simpler architecture and hence less interesting to the archaeologist of the time. Some of the structures appear to be extremely large residences or communal houses; two are classified by most as open public spaces or small "plazas". The group with exceptionally large houses has only 6 structures that have areas of or above 150 m^2; the average of this group is 135 m^2 with a maximum area of 311 m^2, which strongly suggests it is not the usual Tairona residence. (see Figure 4.2). In the case of the smaller houses it is likely that they were structures used for storage or other specialized functions like temporary housing, cooking, weaving or other crafts; however, they would have provided some kind of service that may be related to the number of people in a household, and thus will be part of the data set used to estimate population size (Naroll 1962, Kolb 1985,Cook and Heizer 1968). The largest house rings are believed to be ceremonial structures or some sort of public place; this belief is reinforced by the unusual ovoid shape of the platforms which is a highly unusual shape for a house in the region. This suggests that most of the structures are residences of considerable size that range between 15 m^2 and 76 m^2, which is roughly similar to Reichel-Dolmatoff's (1985) ethnographic observations of Kogui houses (28 to 78 m^2). The variation of house size and distribution of structures suggests that there may have been fairly large domestic units, composed of many structures, many of which could have been used for multiple functions other than sleeping areas (i.e. storage, weaving, male or female gathering place).



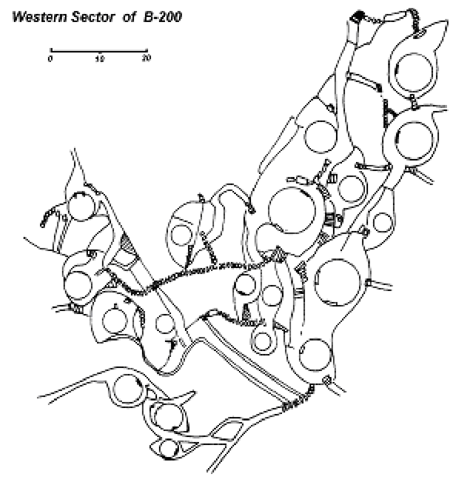


Figure 4.3 B200 Detail.
Redrawn from Cadavid 1993.

Figure 4.2 B200 Map.
Redrawn from Herrera 1985. House ring area 9,559, terraced area 0,824 m^2.

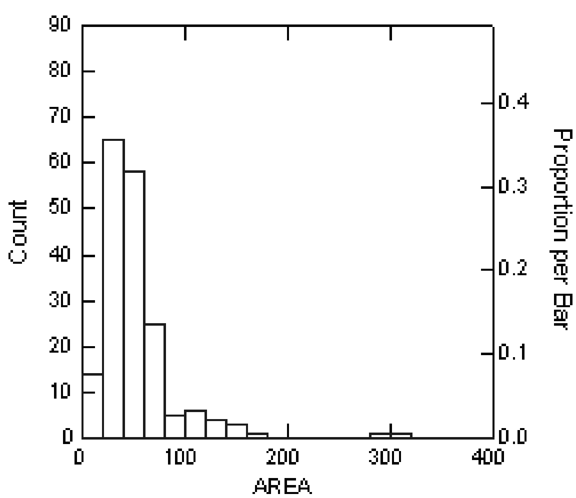


Figure 4.4 Buritaca 200 (B-200) Roofed Area Distribution.
Area in m^2.

At a first glance the observation of the B200 house and terraces map show what appears to be a constant relationship between roofed area and terrace area. This seemingly disproportionate cost in the construction of a terrace meant to hold very simple and perishable wooden structures. This suggest that it is the terrace, and not the house that sat on it and that was probably rebuilt every 15 years or so, the most valuable form of domestic space (see Figure 4.3). Furthermore, many terraces show considerable investment in their construction; the foundations in some instances have each individual stone cut to fit snuggly in a ring, in other cases one or two concentric stone rings were built as foundations forming a small circular elevated terrace or foundation around the house. The estimated population for B200 is 956 people if we consider the 183 house ring's 9559 m^2 as reasonable proxy for roofed area and in turn estimate that there is 1 person per every 10 m^2 of roofed area.

The relationship between the terrace and the house ring, which is equated to floor area, was found to be strongly correlated (r= .876, P <.0005). A regression analysis of all the 126 terraces and 184 house rings showed that a linear relationship explained 76.2 % of the cases on a line described by Y = .36X – 6.14 (see Figure 4.5). However, if the 2 larger terraces towards the center of the village are omitted the results are Y = .28X ± 7.9, (r2.638, P<.0005, see Figure 4.6). One large case was not eliminated from the regression analysis because it is a terrace that contains 5 structures of normal size. This case is likely to be a terrace with multiple residences, possibly a large complex household. The other examples of very large terraces with areas in excess of 1000 m^2 also contain extremely large houses that would have been extremely unusual residences, or public places.

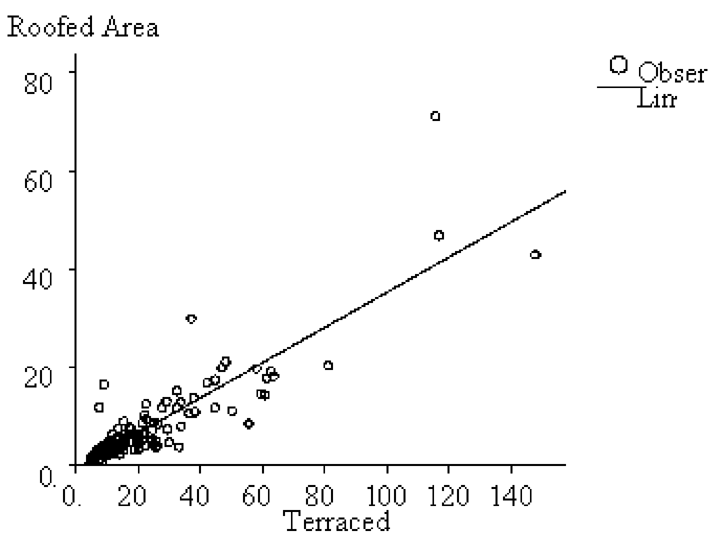


Figure 4.5 B200 Terrace Area and Roofed Area Correlation.
Y= .359X – 6.14. (r2.762, r =.873, P<.0005).

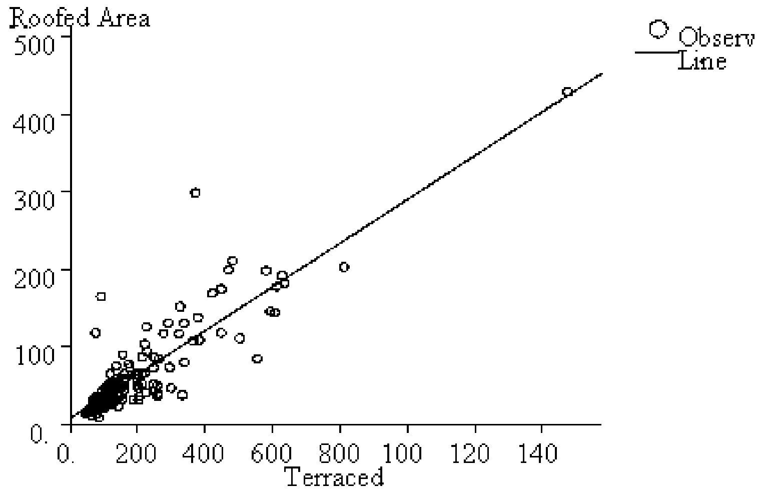


Figure 4.6 B200 Terrace Area and Roofed Area Correlation (Trimmed).
B200 Scatterplot and best fit line excluding 2 cases in the center of the village that are suspected to have been public places, Y = .28X $\pm$ 8.3, (r2.638, r=.798, P<.0005,n =125). The graph shows a case of an unusually large terrace, upon which 5 structures were built, all which are residence size.

Floor Area-Terrace relationship in Pueblito

According to the drawing in Reichel-Dolmatoff's 1954 article Pueblito has at least 264 house platforms, although only 260 were clear enough in the drawing to be digitized and measured in a GIS. The measurements from the core area drawings from Reichel-Dolmatoff (1954a), Mason (1931) and Cadavid (1993) were about 5164 m^2 of roofed space in an area of about 7 ha. This suggests a population of 516 people and density of 73.5 people/ha. The total area of Pueblito has an area of approximately 33 ha, although the drawing shows something closer to 61 ha if a single perimeter is drawn around the mayor house clusters and the paved paths. (See figure 4.7). More recent data, still being processed by Santiago Giraldo (personal communication 2006), suggests an area of 90 ha, but with decreasing density of structures measured from the "core". The resolution of the data from the 1954 map is barely enough to derive a tentative estimate on the size distribution of the houses, public architecture and the size and distribution of the village. The measurement suggests a fairly large and dense population, in a pattern slightly unusual for many chiefdoms of Northern South America. However, taking into consideration the 264 house ring mapped by Reichel-Dolmatoff and using an estimated 5.5 people per house the population density of Pueblito is 1452 people with a population density of 32 people/ha, well within the ranges found for other complex chiefdoms of the intermediate area (Drennan and Boada 2006).

More detailed and reliable data from a small section of Pueblito, published by Gregory Mason (1931) and Cardoso (1993) shows the village's "central" area, which contains the largest and most conspicuous constructions and public architecture. Estimating population density with this data alone is somewhat problematic because many of the structures that may not be residences are closely associated to fairly large courtyards, land fills, channeled brooks and streets. These very large houses may have not been normal residences and probably had unusual population densities when compared to the rest of the village.

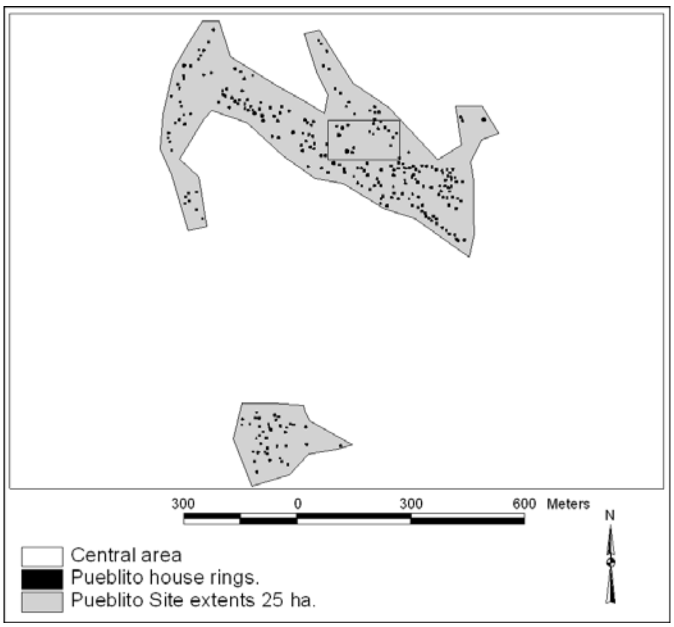


Figure 4.7 General Simplified Map of Pueblito.
Showing the distribution of houses, redrawn according to Reichel-Dolmatoff (1954a).

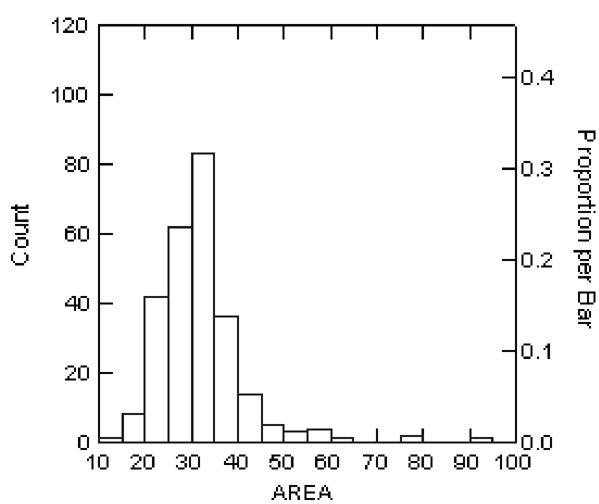


Figure 4.8 Pueblito House Area Distribution.
According to Reichel-Dolmatoff's map, most houses of Pueblito are between 25 and 45 m^2 Not shown: Reichel-Dolmatoff's cases that were in excess of 300 m^2

In the case of Pueblito, there are terraces that are built over rivulets and include extensive modifications of the natural topography, landfills, contention walls, channeling of streams, aqueduct and sewage channels and a considerable expense in building stone foundations, but not all appear to have a purely domestic purpose judging by the considerable labor investment which would appear to be excessive for a single household. There is also an association of the larger structure's to rivulets that were channeled and suggests both a mechanism for water supply and sewage, consistent with the needs of a fairly dense population. Historic and ethnographic sources suggest that some of these large houses could have been communal or public residences for men (Reichel-Dolmatoff 1985, De la Rosa 1830). However, Castellanos (1944:322) describes that these large houses, often associated with very large plazas, were the residences of the village's chiefs, who had many wives, concubines and children and thus large houses would be consistent with very large polygynous households. Castellano's account specifies that these houses were well constructed, robust and would have been capable of housing 300 Spanish soldiers. These large houses are said to have surrounded large plazas. These patterns of extreme differences in family size are not evident in ethnographies of modern Kogui villages, but are a fairly common occurrence in the archaeological record of the region.

The relationship between floor area and terraced area for Pueblito follows a similar trend to that of B200. As in the case of B200 the correlation was strong and significant ($r = .982$, $P < .0005$, $n = 20$), the linear regression results show that the function $Y = .246X \pm 46$ ($r2 = .96$). This relationship has a similar slope to that of B200, although it is only considering 20 terraces that were well described in published drawing of Pueblito, the following drawing shows the area that was used for this regression analysis (see figure 4.9). It should be noted that the quality of the data is not robust; there are cases in which the house ring is described but not the terrace it is in, which makes it useless for this analysis. However the sample is sufficiently large to produce a picture of the pattern, although ongoing research will probably expand the data set. It also suggests that the common Tairona houses were large enough to house a family and have individual storage, characteristics though to be associated with more complex social structures regardless of the shape of the house (Flannery 2002).

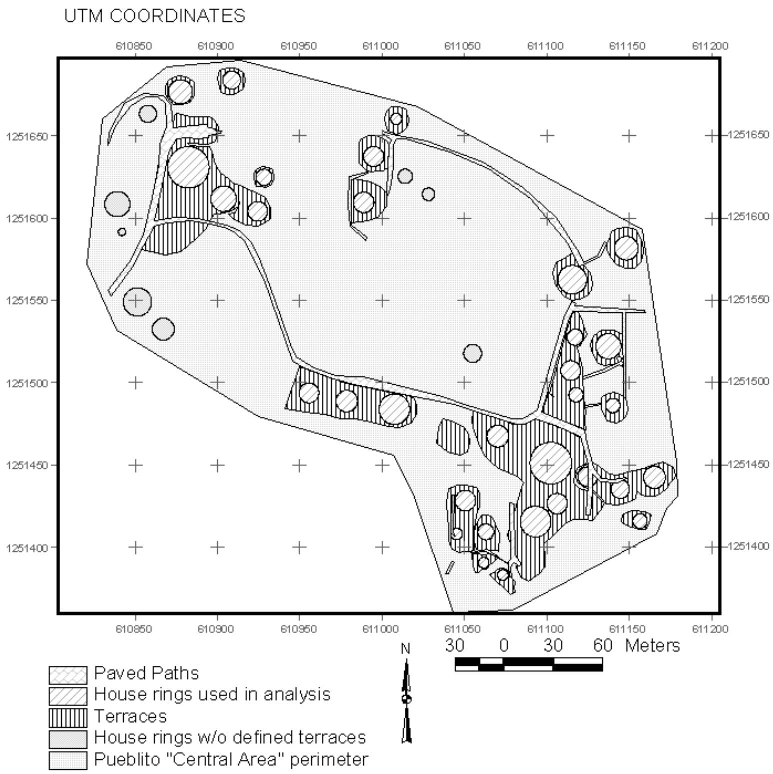


Figure 4.9 Pueblito, Central Area, (redrawn from Mason 1931 and Cardoso 1993).

The drawing shows exclusively architectural features; rivers and topography have been left out. The area within marked perimeter is 7.1 ha. Only the house rings that have terrace size outlined were used in the Pueblito regression (20 terraces).

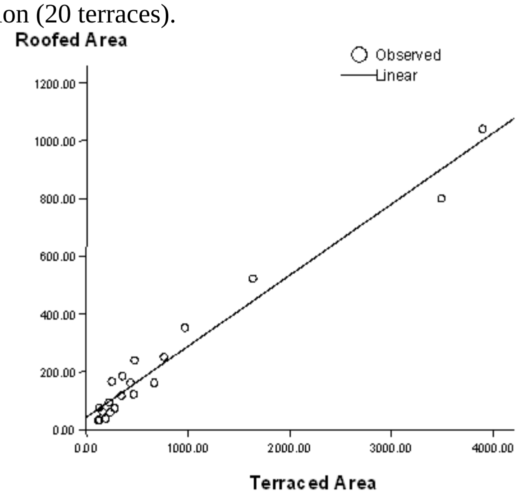


Figure 4.10 B200 Terrace Area and Roofed Area Correlation.

(r= .982, P<.0005, n= 20), The linear regression results show that the function Y=.246X $\pm$ 46 (r2 = .96, F= 476.2, P<.0005).

In conclusion, it appears that in the cases where the quality of the data is the best, the relationship between house size and terraced size is consistent. The slopes for both datasets are between .28 and .24 with very strong and significant relationships that explain most cases. If all cases are pooled into a single dataset for 145 terraces with roofed area the linear relationship represented by the equation is Y= .259 X$\underline{+}$15 (see Figure 4.11) is sufficiently strong and significant to justify its use as a method of estimating the total size of roofed space in them and subsequently their population.

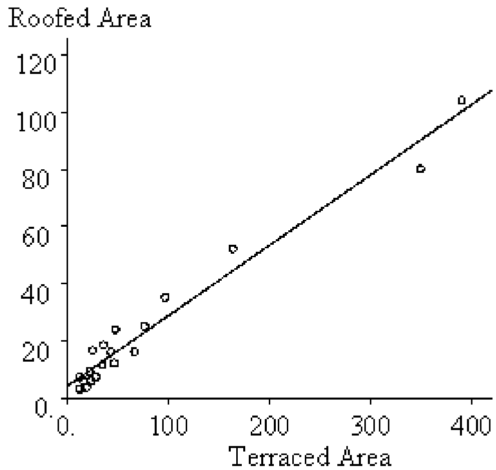


Figure 4.11 Pueblito and B200200 Terrace Area and Roofed Area Correlation.
(r = .958, P<0005, n = 145), the linear regression results show that the function Y=.259X $\underline{+}$ 15 (r2 = .918, F = 1598, P<.0005).

CHENGUE'S TERRACE CLUSTERS

Unlike B200 and Pueblito, there are no excavated house platforms in Chengue which would presumably make the use of the roofed floor estimations useless; yet, terracing of the slopes, paved paths between terraces and large platforms are evident without excavation throughout large sections of the sites. Although the data is not sufficiently complete to produce fully detailed maps like the ones available for B200 or the central area of Pueblito, there is a record of the entire site's ceramic and topographic variations and a few particularly conspicuous features such as some contention walls, stone fences, paved paths, water wells and cisterns. The aggregate of these features provides a fairly robust body of data on the spatial characteristics of the village and the identification of terrace and house clusters. It is very likely that all terraces served as platforms for houses, in some occasion's fragments of the stone rings were unearthed by looters and are visible on the surface as were many stone slates from small paved surfaces that protrude occasionally or were detected in shovel probes. Terraced space and the dispersion of ceramics provide the most robust evidence for the distribution of house clusters. On occasion, relatively large sections of the center of a terrace would contain no ceramics. In these cases, excavations showed that the area had been flattened and the soil hardened; post molds are occasionally found in shovel probes and test pits. In other cases these central areas would be associated to very large carved boulders, boulders with petroglyphs or massive grinding stones. Additionally landfills and paths connecting or evading clearly modified topography strongly suggest that fairly large perishable structures were erected in these sites, of which the largest are thought to be the remains of relatively large public structures. For this reason the population estimation based on platform size and not in house size is extremely useful for Chengue current dataset.

Unlike house rings, terracing is very evident and can be easily measured without extensive excavation, although it also means that in the very large terraces, areas that were paths will be included in the measurement and possibly produce distortion of the final estimates. In many cases, it seems, terracing required a considerable investment of labor when compared to building a house alone because they require fairly large contention walls and excavation. Evidently, terracing is a more permanent construction than houses because it can be reutilized for many generations, and it is reasonable to assume that the most valuable domestic space was not the actual house but the terrace. The larger terraces, which are often defined by stone contention walls, appear to be the end product of a fairly large amount of labor and are probably not the result of a single building process but of a slower process that would be consistent with multiple household’s life cycles. It appears that many of the flat areas around and inside a terrace are a land fill that would have been stabilized with stone walls as greater space or new spaces were needed. It is likely that this process was an integral part of the expansion of households and would explain why the terraces are occasionally so disproportionately elaborate when compared to the size and quality of the structure erected upon them. A few of these landfills were excavated such as: excavation 12, 14 and 15 in Sector 1; 7 and 2 in sector 2; show that several meters of fill are added to large areas in occasion in less than a century. Yet there is stratification, and older materials remain in the deeper levels, which suggest that it was a series of building events that produced the current ground level and not a single large construction effort. This reinforced by very deep deposits of unstratifed soil surrounding the salt lagoon, apparently some of the terracing in Sector 1 was intended to expand the inhabitable areas by filling sections of the lagoons floodplain. An analysis of these trends associate to ceramic use patterns will be discussed in chapter 5.

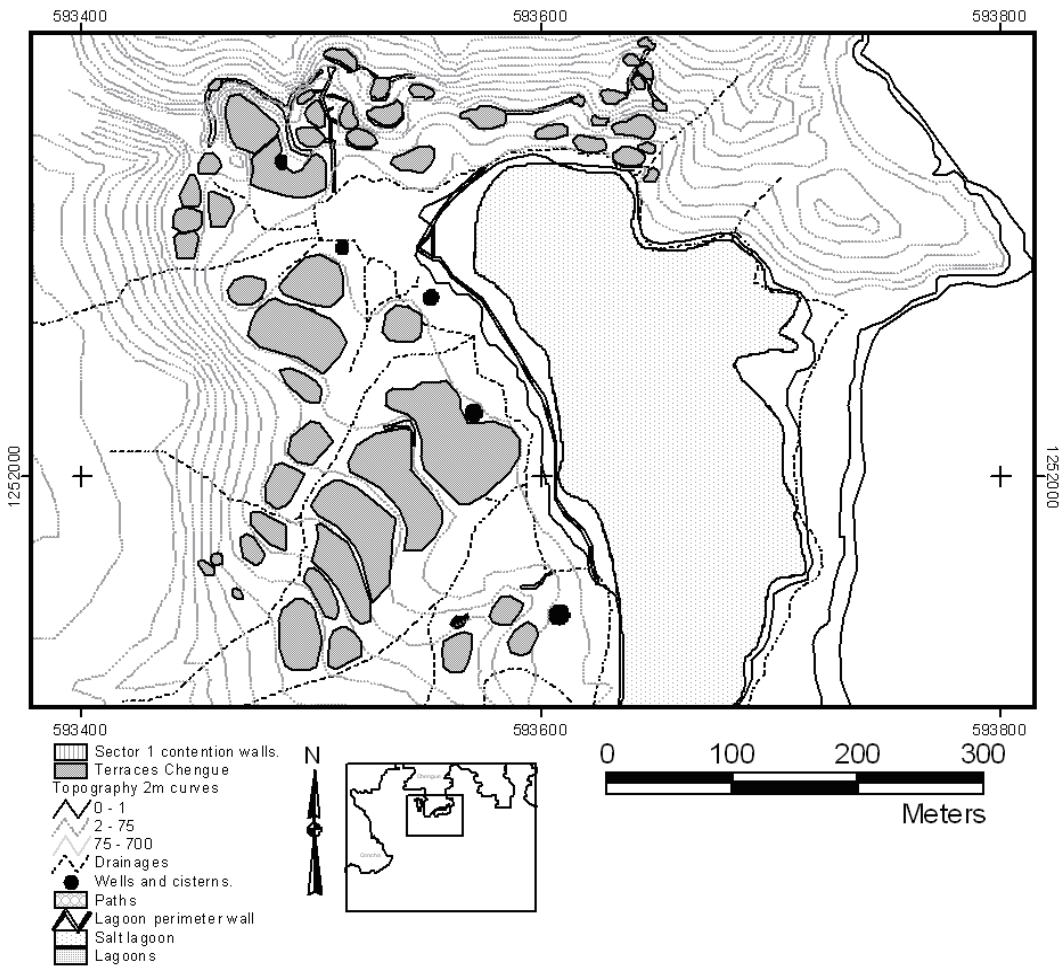


Figure 4.12 Terraces of Chengue, Sector 1.

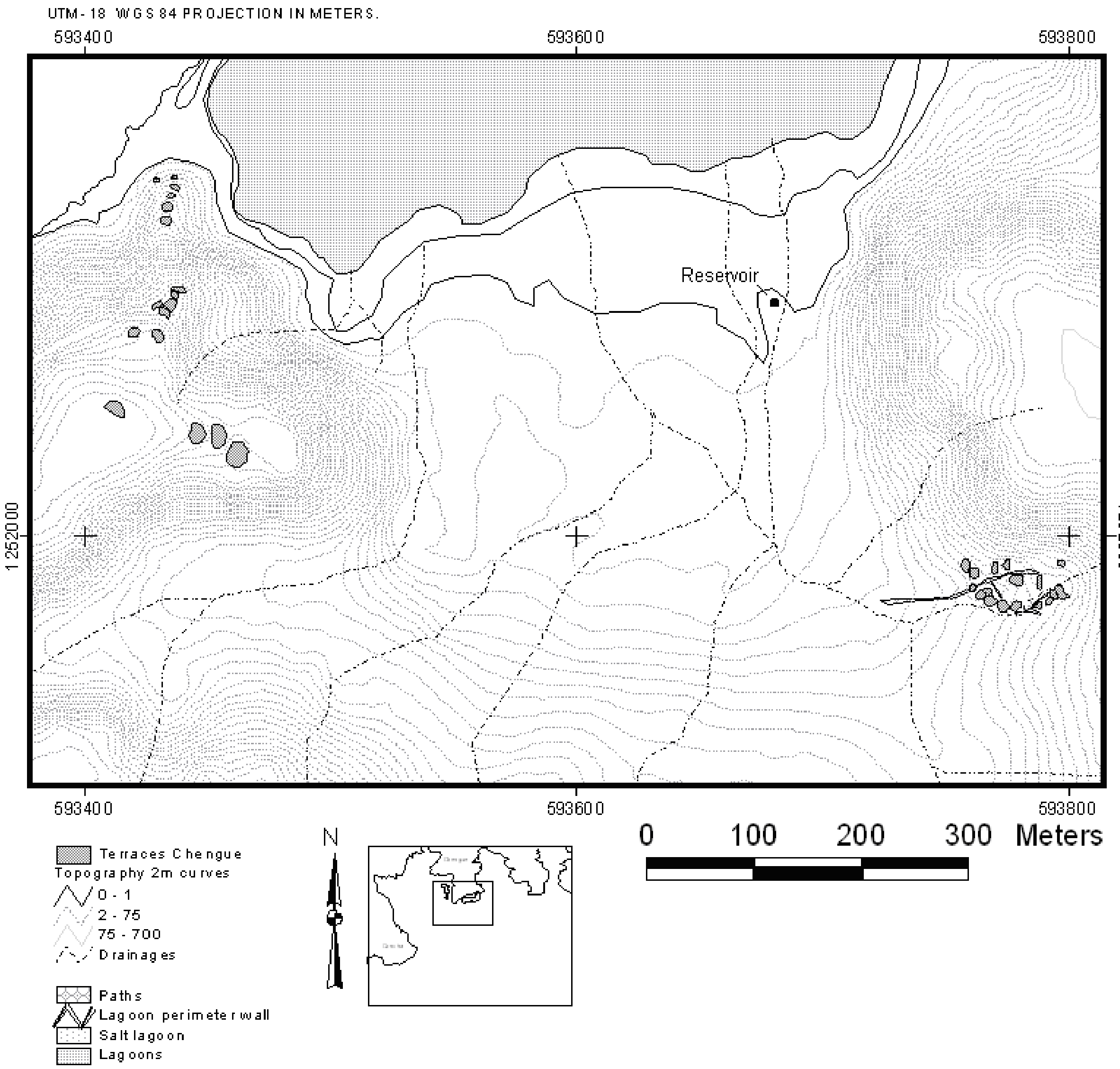


Figure 4.13 Terraces of Chengue, Sector 2.

This accretional transformation of the landscape suggests that much of Chengue's valley floors have artificial topography and it follows a pattern directed towards optimizing the construction resources within the cultural ideas of house and space. This pattern creates flat domestic, public and private areas as part of the immediate domestic and communal needs. Among these needs is the construction of space into settlement patterns akin to the ideas of community, household and apparently other, more complex, forms of social organization. Therefore the terraced areas of Chengue are more the result of a domestic process than a centralized urban planning scheme, as it has been suggested by Castaño (1987) among others. This allows for an analysis and interpretation of this type of evidence through a series of steps that include the evaluation of the relationship between terraced area and activity areas based on refuse density and architectural features. It also strengthens the analytic relationship between settlement pattern, house cluster patterns and social organization. Assuming that the accretional pattern of growth of house clusters or house compounds are closely related to household structure, and perhaps to another structure that would group multiple households into an intermediate social structure such as a barrio, lineage or “house” (Gillespie 2000). The first step will be to estimate the population size of Chengue based on terrace size. For this purpose the use of the regression formula derived from the B200 and Pueblito data was used, which gave an estimated roofed area in Chengue of 11,709 m^2 or about 1.17 ha. A remaining aspect of the population estimation is to establish a relationship between the roofed area and a number of inhabitants.

ETHNOGRAPHIC BASIS FOR A TAIRONA DEMOGRAPHY FROM ON RESIDENTIAL REMAINS

To many archaeologists it has become evident that the modern Kogui and Ijka communities maintain house architecture and settlement patterns that are similar to those found archaeologically in the region (Uribe 1993, Reichel-Domatoff 1991). Ethnographic data has been a common and useful dataset for many projects but it should not stop us from understanding that the modern inhabitants of the Sierra Nevada de Santa Marta have different economies, goals, social organizations and the obvious temporal distance with the Tairona or the XVI or XV centuries (Oyuela-Caycedo 1998). However, the data on the population density and size of the settlements may be useful because it can be contrasted with the most clear-cut methods for estimating population density based on house size. For this reason data from the classic 1950 ethnography by Reichel-Dolmatoff and more systematically obtained data from Arango and Sanchez (1989) and Uribe (1993) will be used. The Arango and Sanchez data (from Uribe 1993:80) show that the average family size of the native groups of the Sierra Nevada was 5.6 people/family with a standard deviation of 0.8 people/family. This statistic is a robust average from 47 communities and 2404 families from two ethnic groups Arhuaco (Ijka or Wiwa) and Kogui (Kagabba) and will be used as a reasonable estimate for a Tairona family size.

In the 1946 ethnography Reichel-Dolmatoff describes the construction of Kogui houses in fairly good detail. He mentions that houses are between 3 and 5 m in diameter, this implies a range between 79 and 28 m^2 with an average of 53 m^2 Other ethnographies of the Ijka suggest a typical house size to have 3.75 m in diameter for round houses and 4x4 or 4x5 m for rectangular houses, more common at lower elevations (Chaves and De Francisco 1977:99-139). It should be noted that a family often has more than one house, which suggests that larger houses are not necessarily indicative of larger families. Unfortunately the details about the sample are not available which makes the use of an average size based on Reichel-Dolmatoff's house range data somewhat imprecise. The ethnography mentions that larger houses were somewhat scarcer because they are not meant for family use but rather public use such as communal cooking, a government house and a Christian Chapel. All these houses are rectangular and none of them are residences. Aerial photography of San Miguel shows the existence of these houses; all were for public use and were constructed under the influence of Christian missionaries. The large round houses, of which there are two in the village of San Miguel and one in Takina, are used regularly for religious meeting, primarily of men. They are about two and a half times the size of a normal residence. These observations allow the contrast between statistics from the late 1940´s and 1980´s which gives an idea of the population densities likely to occur in the modern Kogui populations (see Tables 4.1 and 4.2).

Village	Houses	Families	House/Family	Inhabitants	Inhabitants/ House	Inhabitants/10 m^2	Persons per family
San Miguel	74	50	1.48	275	3.72	0.7	5.5
San Francisco	88	70	1.26	385	4.38	0.88	5.5
Maruamake	43	29	1.48	na	na	na	na
San Andres	30	20	1.50	na	na	na	na
Mamarongo	8	6	1.33	na	na	na	na

Figure 4.14 Kogui Demographic Data Derived From Reichel-Dolmatoff's 1946 Observations.
(Reichel-Dolmatoff 1985). The data refers only to the core of the settlement. Average house/family is 1.41 with a standard deviation of .11. The relationship between roofed area and population is .76 in average (.76 people/10 m^2 of roofed space).

Village	Houses	Families	House/Family	Inhabitants	Inhabitants per House	Inhabitants/10 m^2	Persons per family
San Miguel	109	109	1.00	658	5.50	1.04	6
Takina	20	20	1.00	80	5.50	1.04	4

Figure 4.15 Kogui Demographic Data From 1989.
Compiled by Arango and Sanchez, data from Uribe (1993:80). The number of houses was taken from aerial photographs of core areas of Takina and San Miguel in 1982 (Mayr 1998). The average density of inhabitants per house is 1 person per every 10 m^2 is similar to Naroll's (1961) observation. San Miguel measures approximately 3 ha.

The data available suggests that the estimates based on the data compiled during the 1940's shows different population densities because the Kogui were under increasing levels of stress as a result of loss of territory and forced migration. The data suggest that the lower population densities observed in 1946 (.74 and .88 persons per 10 sq. m of roofed space) may have been the result of a population in poor health, high child mortality rates, and female infanticide, which may have resulted in a negligible population growth or even a slight population decrease. It is believed that the ultimate cause for this situation was pressure from colonizing peasants with the resulting displacement of the Kogui to less productive lands. This trend was becoming more intense at the time as observed by Reichel-Dolmatoff in the late 1940's (1985) although it was an influential factor long before, during the XIX century. It can also be inferred that hamlets such as Takina or villages like Mamarongo had slightly lower population densities because most of the families are not permanent residents of the village but are moving around to seasonal housing, although the data in this aspect is not very reliable. Another clue of a Kogui population crisis during the early 20th are indicators of the poor health and economic problems; among these is the unbalanced male to female ratio, there were 15% more males than females and several cases of polygamy which made the ratio of married women to men worse. A low ratio of men to women is unusual and may have been the effect of mechanisms for population control stimulated by the dire economic conditions at the time. Recent data from a 1993 census shows that the relationship between males and females is in a near perfect balance which suggests that more current conditions were slightly better than in the previous century (Arango and Sanchez 1998). According to Reichel-Dolmatoff (1985) the XVIII, XIX and early XX centuries were traumatic for the populations of the Sierra Nevada de Santa Marta. The period was marked by a continuation of land conflict, loss of land and in the early late XIX and XX century with the abandonment of settlements or relocation at more remote and higher elevations which may have had severe impacts on population growth. Reichel-Dolmatoff estimated the population of the Kogui in 1807 from a tributary census to be around 674, in two villages that are now outside the tribe's territory, and whose population was forced to migrate in the late XIX century when the villages now mentioned where founded. His estimate for the 1940's population was of 5,000 people. The current estimate for 1988 is around 6,500, from Uribe (1993) and 9,765 according to Arango and Sanchez (1998), which shows a growth of 30% in 40 years and close to 100% in 50 years, which is in turn consistent with San Miguel's increase in population size and density. It would appear that villages like San Miguel approached more stable conditions and higher densities towards the end of the XX century than anytime after the XVI and XVII centuries. This increase in the apparent health of the populations may actually resemble the robust increases that were seen during the T1 and T2 phases in Chengue, which make the comparison between modern populations and ancient ones less problematic. The variation in population density and per capita roofed area (from .76 to 1 per 10 m^2) shows a variation that seems to be related to the degree to which the villages were under political and economic pressure which in turn translates into a population density index for a population that had no real growth and a population in a growing pattern respectively.

The more recent data shows that the estimate of 1 person per 10 m^2 on average is consistent with a relatively healthy population that can be assumed was the case of the XV Tairona and the Kogui during the early 1990's. The observed house size/population relationship of modern Kogui is about 1/10 m^2 although the older data shows a relationship of .76 per 10 m^2 It also shows that there has been a considerable increase in the Kogui population size and density. The San Miguel village shows a 100% population growth with only a 30% growth in the number of houses with the resulting decrease in the number of houses per family, which drops from 1.41 to 1. This increase in density may be caused by a growth of the family unit, probably caused by lower infant mortality rates and vaccination programs.

This review of the data suggests that the population of Chengue, assuming that all terraced space was occupied at one point, probably at the beginning of the T3 phase (ca.1500), was between 889 and 1170 people if we consider that there were between .76 and 1 persons respectively, per every 10 m^2 of roofed space. It also suggests that pressure on the population and population decrease may have reduced the density of the settlement first and then its size.

DEMOGRAPHIC ESTIMATION BASED ON CERAMIC DENSITY AND SETTLEMENT AREA.

The population size for the T3 phase based on terrace seems to be a very accurate way to measure the population size of Chengue close to the final stage of development, before it was completely abandoned in the 1600s, because most of the area containing T3 ceramics was terraced. Based on this it can be reasonably assumed that the relationship between area and shard density could be used to estimate the population size of areas that were inhabited during the whole extents of the archeological sequence (Sanders, Parsons and Santley 1979).

The ceramic samples obtained in shovel probes provide an excellent corpus for the measurement of ceramic density for all sectors of Chengue. An approach to the relationship between ceramic density and inhabited area is to use polygons of varying size that approximate the extents of the dispersal of artifacts. This method of calculating approximate areas for the dispersal treats the site as discrete areas that can be included or excluded depending on the presence of ceramic types or artifact styles. The size of the areas is sufficiently large to allow for the inclusion of a few houses within its perimeter, yet sufficiently small to provide a level of detail that may include the broad activity area of a household, and as it has been shown in numerous opportunities the dispersal of domestic refuse closely resembles the distribution of domestic units (Hayden and Cannon 1983, Schiffer 1985, Drennan and Boada 2006). This method is advantageous because it produces a discrete distribution of the totality of Sector 1 and most of Sector 2 where the distribution of shovel probes was practically identical to a random distribution (Nearest neighbor analysis results: z=.968, R=1.5), and it yielded the equivalent of a proxy for the size of the occupation for all identified periods. This in turn allows for an estimation of the intensity of the occupation for each ceramic phase and a proxy for population size based the area ceramic dispersals and shard density (in shards per m^3). These estimates can not only answer the question of how big was the village of Chengue, but they can also tell where and when it was smaller or larger in area and population density.

An increasingly popular way of addressing a population estimate based on shard density and area measurements is what can be called the Density-Area Index (DAI) as described by Haller (2004) and that is based on Drennan's approach to relative population measurements in the Alto Magdalena and China (Drennan 1984, 1987, 2000, 2006; Drennan and Peterson 2005). An analogous index based on surface collections and shovel probes obtained every ha, but with a much higher sample resolution, were used for Chengue and its surrounding area with results that are comparable to the mentioned works by Drennan. It should be noted that current DAI for Chengue only uses shovel probes because the shard density estimates are more reliable and easier to calculate than in surface collections of forested areas like Chengue.

The problem of calculating population size for the 5 phases based on the DAI assumes that the production of ceramic shards was constant, and that higher population densities can be expected for high shard densities. This leaves the issue of the variation in lengths of the ceramic phases and its effect on the population estimates that would be inflated or depressed if they were not calibrated to accommodate the additional accumulation of ceramics produced by similar population sized during longer periods of time. A rough and extreme example of this is the comparison between the Tairona 3 phase and the N1 phase: one spans for 700 years, the other is roughly 200 years long. If both phases, or any other phase, was compared without compensating for the difference in duration, the area inhabited during the N1 phase would be severely inflated producing a distortion in the size of the occupation, which in turn can be translated into distortions in the demographic estimations and analyses derived from these statistics. This is a common problem that can be addressed with what has become a common solution, and that is compensating the DAI for the duration of the phases (Drennan 2000, Drennan 1985). In the chronology proposed for Chengue the phases range from 700 years to 100 years, but there are enough indicators to identify the T3 phase as the shortest phase for which ceramics were produced, used and disposed of locally, creating a proxy for a local pattern of population density. The shortest phase is the Colonial phase, but this is entirely composed of exotic ceramics, for this reason it is not used as a baseline measurement. The index used in this case is composed of area in ha multiplied by shard/m3 and finally divided by the relative duration in units of the shortest phase. In this case the 200 year long T3 phase, would be equal to 1, so the DAI would be divided by 1, and in the N1 phase the DAI would be divided by 3.5, that is 3.5 times the T3 phase. In turn this procedure produces a calibrated relative population index that accounts for the differences in phase duration. This procedure is analogous to the corrections used by Drennan (2000:53-58) in the Alto Magdalena. For the case of Chengue, the population for the last occupation was estimated by Langebaek (2005) by assuming a population density between 5 to 10 people per ha; these estimations are however too low for the observed population size based on terrace size. The absolute population size of the T3 phase can be used as a way to estimate the absolute population size for the whole sequence by assuming that a calibrated DAI of 132 for the T3 phase represents a population between 889 and 1170 during the T3 phase. The T2 DAI is 3.54% larger than the T3, which is the baseline population and thus it would be interpreted as a population 3.4% larger than the one that inhabited Chengue between the 150 years of the T3 phase and so on. The same calculations are made for all phases until the N1 phase (see Tables 4.3 and Figure 4.14).

Phase	DAI	Duration	Time Unit	DAI / 200 yrs.	Proportio n 0f T3.	Min. Pop.	Max. Pop.
T3	132	200	1.00	132	100.00%	889	1170
T2	170	250	1.25	136	103.54%	920	1211
T1	4	400	2.00	2	1.67%	15	20
B1	68	300	1.50	45	34.33%	305	402
N1	23	700	3.50	7	5.06%	45	59

Table 4.1 Population Estimation for Chengue.

Population size in the T3 phase is derived from terrace clusters. The estimates on all earlier phases are based on the DAI (Density/ Area Index) variations from the latest phases. Pop = (T3 Population) x (Proportion of T3's DAI).

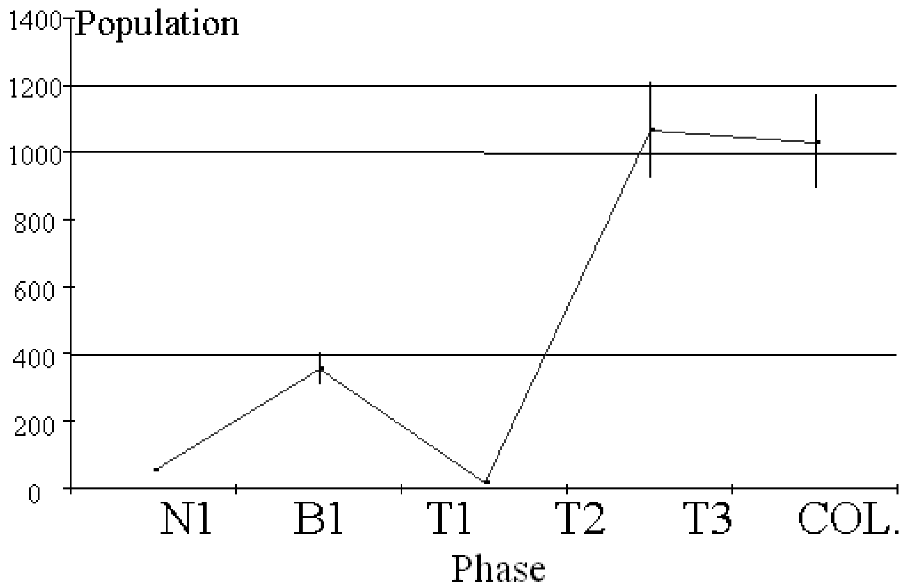


Figure 4.16 Estimated Population Size of Chengue Over 1800 Years.

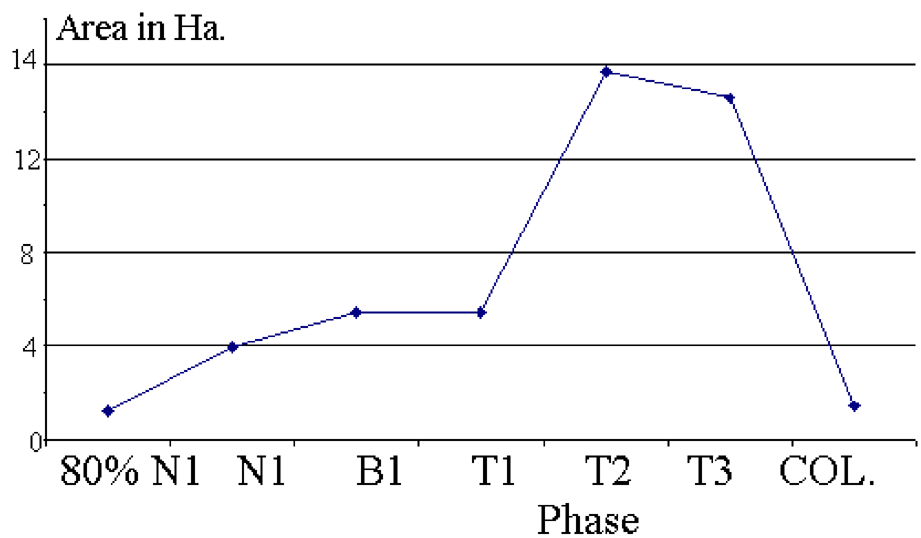


Figure 4.17 Settlement Area as a Population Index.

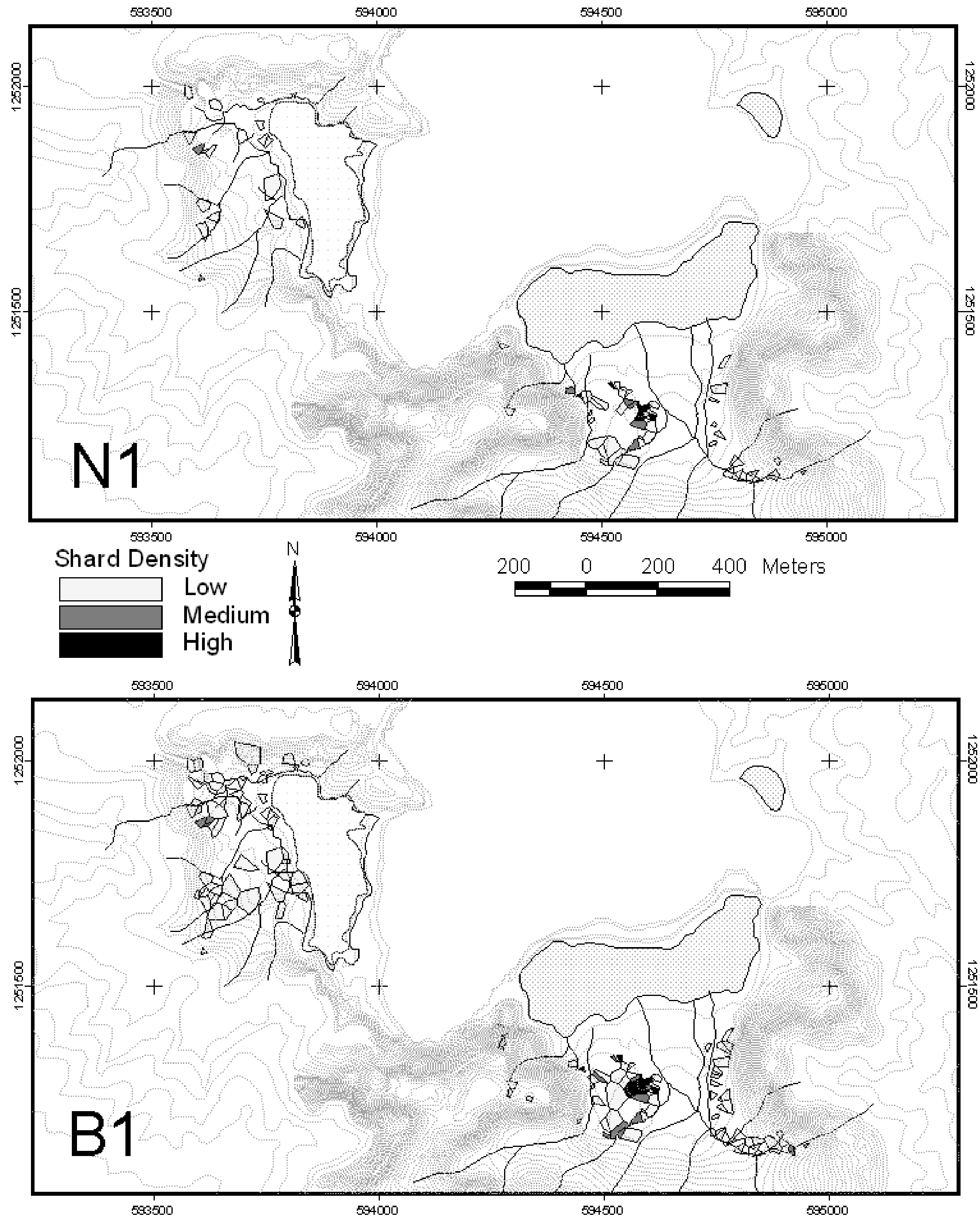


Figure 4.18 N1 and B1 Lots.

N1 Phase and B1 Phase Settlement

The index shows that there was a consistent yet modest population increase between N1 and B1 phases; in the T1 phase the population seems to decline but very high population growth is seen for T2 and T3. As it was mentioned in chapter 3, there are two ways of interpreting the data from the N1 phase. The first one takes into account the lots where the N1 phase shards are dominant; curiously this is only possible with N1 shards because B1 lots are never without N1 shards, although there is a cluster of exclusively N1 ceramics. This produces a very disperse distribution clustering in three small assemblages and one slightly larger area (see figure 4.16). The second approach is the Dull Brown indicator that will portray the maximum extents of the N1 occupation robust distribution patterns for a smaller scale of analysis, the terrace clusters. While the 80%N1 distribution represents the more persistent and possibly older occupation settlement the distribution of Dull Brown ceramics is considered the safest indicator of the earliest occupation of Chengue, and will be used henceforth.

Tairona Period Settlement

In the Tairona period phase, the indexes that compensate for the period's duration show that there is really no population change between the T2 and T3 phases (Figure 4.17). There appears to be a relative decrease in the population size during the T1 phase, in all stratified contexts with a clear T1 component, the frequency of all ceramics was particularly low, yet T1 contexts always contain T2 and T3 shards. The drop in ceramic density for this phase is a trend that is similar to the one found by Wynn (1976) between the Buritaca and Tairona periods and that has been interpreted as an abandonment by Wynn or population drop caused by environmental factors by Langebaek (2005); although in the case of Chengue it could be explained by a strong change in the settlement pattern caused by a shift in the subsistence economy from non-specialized fishing and farming village to one specialized in salt production, which in turn may be caused by environmental changes. On the other hand, N1 and B1 phases show a very slow population increase that is completely shadowed by the sheer volume of Tairona (T2, T3) period ceramics and settlement size. By the T1 phase the area used by the settlement would have been relatively constant between the B1 and T1 phases. Another factor that may distort the DAI is that the growth pattern may have been somewhat distorted by an increase in the per capita production and consumption of ceramics and other consumption patterns of households.

The T3 phase provides three independent methods for population estimations, historic data, terrace size and DAI that produce a complete picture of the demographic situation of Chengue at the end of the sequence. A final statistic that can be useful in comparing the relationship between population size and shard density in greater detail is the overall population density based on terrace estimations. Table 4.3 suggested a population size based on T3 terraces; based on this data a plausible population density for the village was estimated (Tables 4.4 and 4.5). At a more regional scale the population density for the whole valley of Chengue was about 135 people/sq. km., assuming a population of 1000, a likely estimate for phases T2 and T3. However, most of these 740 ha are practically uninhabitable and agriculturally useless due to the extreme slopes, cliffs and semi-arid conditions through most of the year. From this perspective nearly 100% of Chengue's inhabitable and productive land is used intensively or as intensively as the conditions and political-economy of each phase allows.

Phase	Area in ha.	Min. Pop.	Max. Pop.	Min. Density People/ha	Max. Density People/ha
T3	14.6	889	1170	60	80
T2	15.7	920	1211	58	77
T1	5.38	15	20	2.78	3.71
B1	5.39	305	402	56	74
N1	3.3	45	59	14	18

Table 4.2 Population Density for the Settlements of Chengue.

Phase	Area	Min. Density pop/K m^2	Max. Density pop/K m^2
Colonial	1.4	na	na
T3	14.6	120.1	158.1
T2	15.7	124.3	163.6
T1	5.38	2.0	2.7
B1	5.39	41.2	54.3
N1	3.3	6.1	8.0

Table 4.3 Population Density of the Valleys of Chengue.
The valleys measure 7.4 square kilometers. Population size is based in figure 4.4.

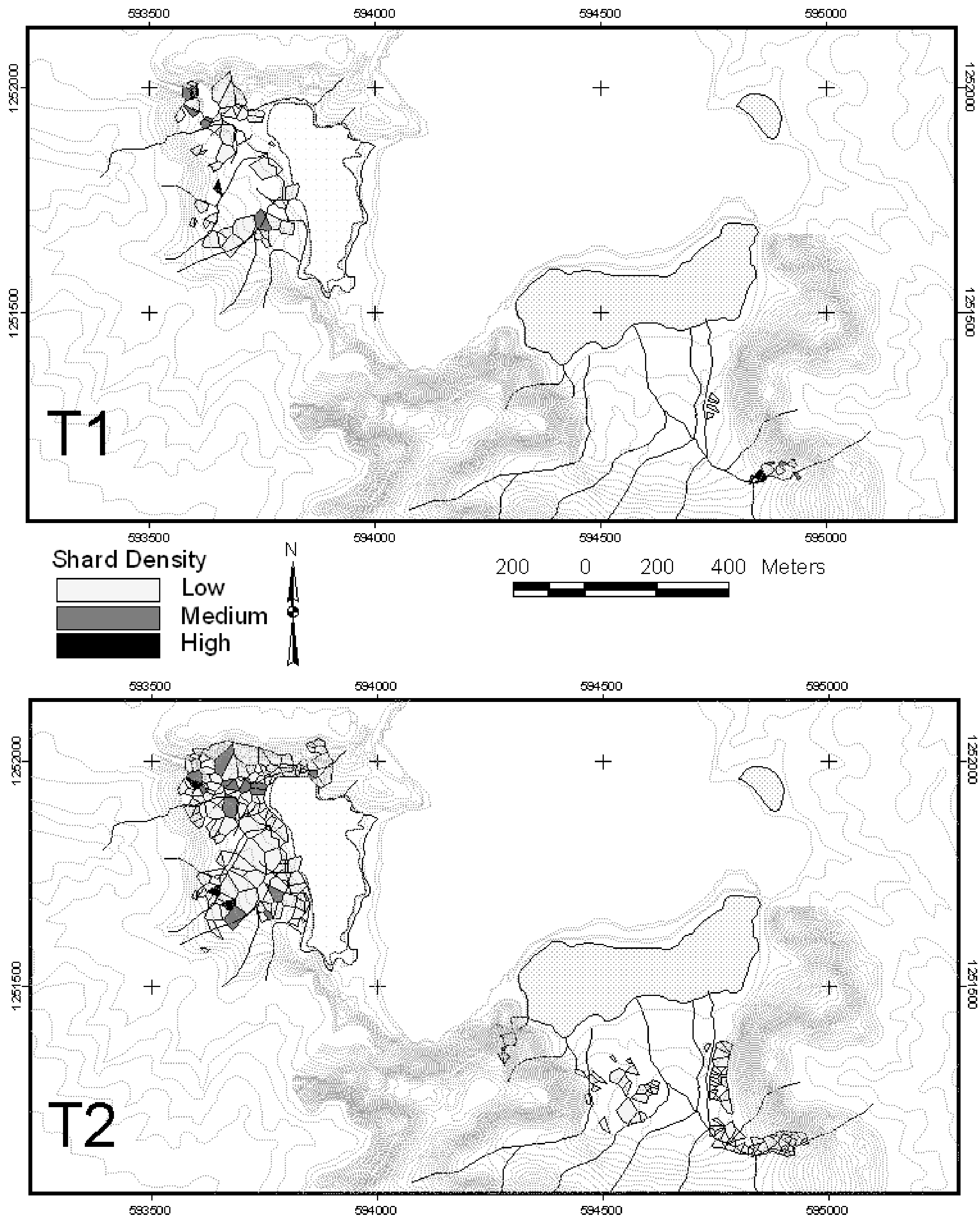


Figure 4.19 T1 and T2 Occupations.

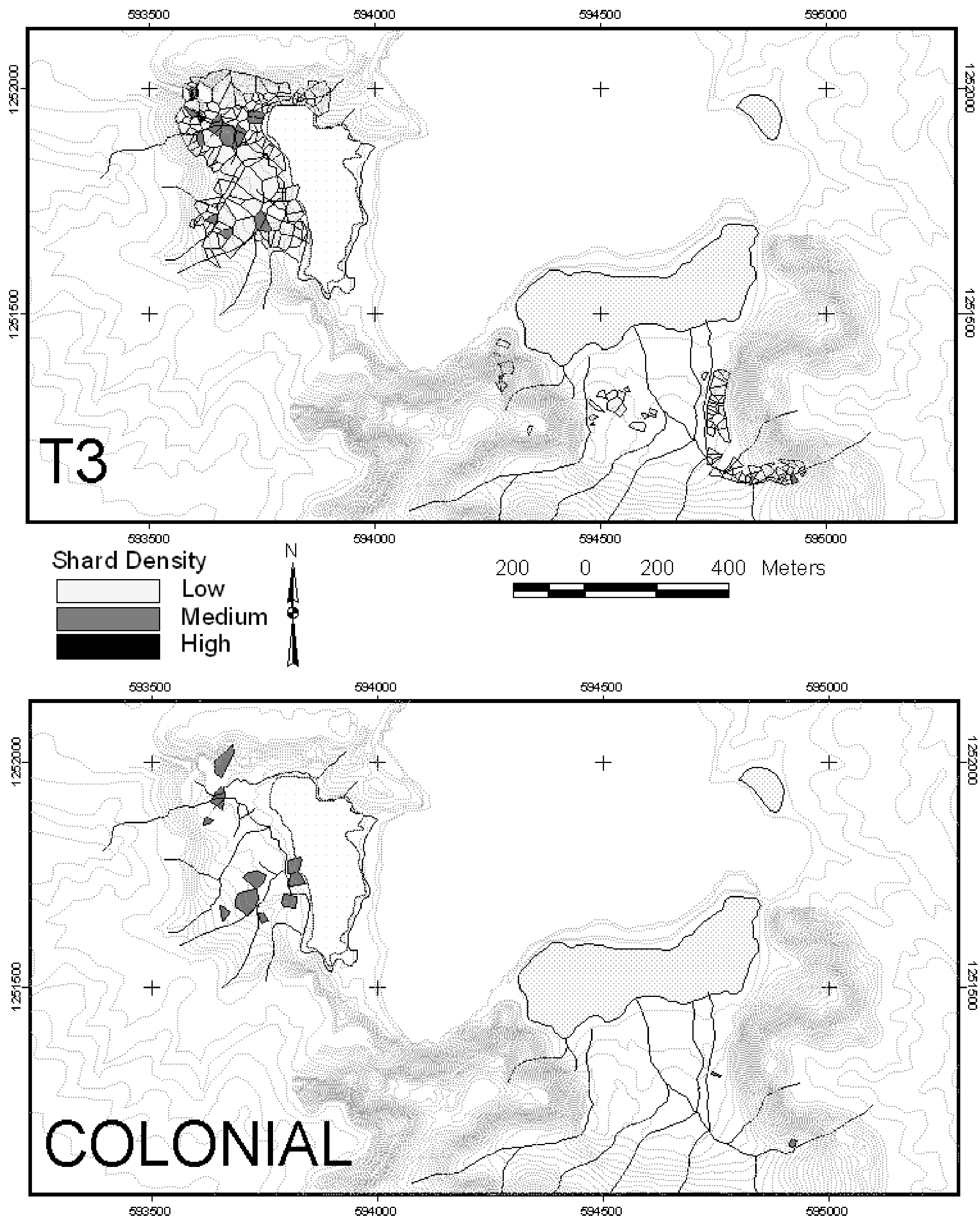


Figure 4.20 T3 and Colonial Occupations.

Colonial Occupation

Part of the Tairona 3 ceramic phase includes the Colonial phase where the declining trends in the demography of the region become evident. There are multiple references to Chengue from the XVI century but it is only until the early XVII century that actual census data can be obtained for Chengue and its regional context. Although there was an indigenous population that was under Spanish encomienda in the XVI, they were restricted to the city of Santa Marta and pearl exploitation to the northeast of Santa Marta in the Guajira coast. However, it should be noted that the data available corresponds to the period after the military defeat of the Tairona chiefs. A document resulting form the trial against the Tairona chiefs after their last uprising of 1599 (AGI 1603) registers the number of tributary Indians for each town and to whom they are assigned for their encomienda. This is valuable in demographic terms but it should be treated with caution because the Tairona population at the time was under severe stress and their numbers were probably much lower than at prehispanic times. Tables derived from the original document suggest that Chengue was a fairly common village, with a population of about 60 “Indios” (each “Indio” is a married male more than 14 years old). Assuming that the families were composed of about 5 members, as it appears to be a typical family size, Chengue would have had a population close to 300 people in 1603. It should be noted that the same document describes the execution of Chengue’s head chief and three of his “captains” who in turn where under the leadership of the paramount Chief of Bonda, these are the only casualties registered for the village, which does not mean there were not many others as a result of the plunder the followed the defeats of 1574 and 1599. Presumably, the population of Chengue must have been under military, economic and environmental pressure during the confrontations with the Spanish between 1572 and 1601with the resulting population decrease.

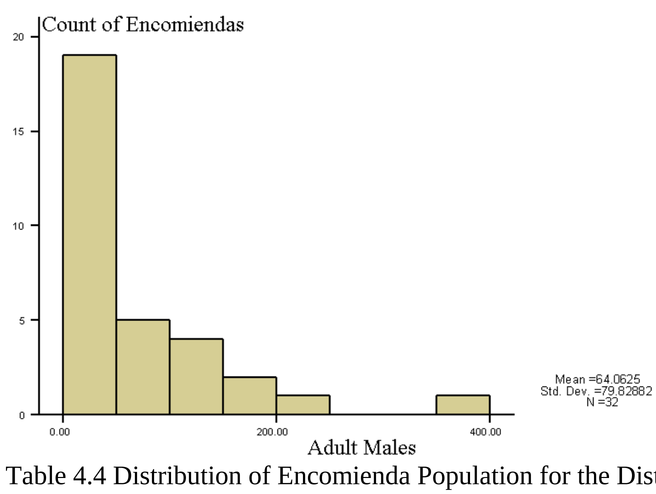


Table 4.4 Distribution of Encomienda Population for the District of Santa Marta in 1603.

	Village	Encomendero	Taxed Indians	Pop. Estimate	Maravedies	Marv/Indio
1	Yerimaca	Don Alvaro Ballesteros	8	40	2800	350
2	Unjaca	Juan de Rios	14	70	4928	352
3	Jucuenca	Sebrían Vasquez	14	70	4908	351
4	Diroquenca	Cacique de Durama	14	70	4928	352
5	Gairaca	Juan de Rio y Diego Nuñez	14	70	1008	72
6	Taganga	Doña Francisca de Angulo	15	75	4294	286
7	Macazaca	Sibrian Vasquez	15	75	4850	323
8	Caraca	Alonzo de Monroy	15	75	4850	323
9	Cinto	Diego de Perade	15	75	4852	323
10	Durcino	Don Antonio Majarez	20	100		0
11	Dibocaca	Dona. Francisca de Angulo	20	100	5766	288
12	Haumaca	Don Luis Manjarez	20	100		0
13	Garagoa	Raul Corona	22	110	7040	320
14	Durama	Diego de Peralta	24	120	4722	197
15	Macinguilla	Diego de Mendoza	24	120	6412	267
16	Mamatoco	Julio de Rios	30	150	6648	222
17	Duica	Juan Dias de Ayala	30	150	10560	352
18	Daunama	Duitama Aunarinabora	36	180	13227	367
19	Bodaca	Diego de mendoza	40	200	12900	323
20	Cocoencaira	Juan Dias de Ayala	50	250	6412	128
21	Cienaga	Don Antonio Majarrez	50	250	7600	152
22	Concha	Don Alvaro Ballesteros	50	250	14317	286
23	Chengue	Don Alvaro Ballesteros	60	300	17180	286
24	Diero Cuenca	Diego Nuñes	80	400	17730	222
25	Sinmendora	Don Alvaro a Ballesteros	100	500	22160	222
26	Dibunguey Cancuey	Don Antonio Martin	100	500		0
27	Mocuenca	Juan de la Rua	120	600	11583	97
28	Geriboca	Francisco de Torquemada	140	700	25862	185
29	Origua	Doña Francisca de Angulo	150	750	14316	95
30	Bonda	Baltazar Rivadeneira	160	800	29556	185
31	Macinga	Martin de Adaro	`	1000	4722	24
32	Geriboca y Macinga	Pedro de Carcamo	400	2000	38604	97
		Total	2050	10250	314735	

Table 4.5 Encomienda Census of the Santa Marta District and Population Estimation.

The population estimate assumes that a normal family would have had 5 members, below the ethnographic average. It should be noted that the population of Bonda was displaced from its original location on the slopes to the bottom of the valley.

Just 5 years after the 1603 encomienda of Chengue another document written by the Bishop of Santa Marta (AGI 1607) makes a detailed and exhaustive description of the excessive work to which the entire families are subjected and it becomes quite clear that the Tayrona did not have healthy population dynamics was in the early XVII century. Mortality rates of children must have been very high, war, malnutrition, decease, depression leading to suicide and infanticide could have played a role in the population decline. An excerpt from a letter written by the bishop of Santa Marta illustrates the situation:

> These Indians have been taken from them the most and the best of their lands in which they planted and what they planted on them it has(sic) been left (sic.) They work them but they don't enjoy them because they (the Spanish) have placed cattle on them and it eats and tramples what they plant, even the hay from their huts or houses in which they live, and so they perish, even famine they work without rest or food. And in that way some of them leave to the forests to die, others hang themselves and there are women who kill their babies when they are born. It would be very convenient if your majesty would have all the livestock banished from these lands where the Indians live and farm. I have asked you many times and nothing has been done, and if this is not remedied there are few left, and it is impossible to work without food. (Sancta Marta may thirty of 1607). Fray Sebastian Bishop of Santa Marta. (My translation,).

In another section he specifically mentions the case of Chengue and describes in detail how there are only 30 able people who extract salt and sell cured fish. He expands his complaint to the high levels of taxation, overseers and abuse and accurately predicts that there will be no one left if this is not corrected. If we assume that the 30 able Indians of Chengue are adult males and head of families it is likely that the population, including elderly, women and small children, was within a range of 90 to 150 people or roughly half of what was only 5 years before. The situation seems to have stabilized for a few decades, by 1627 there are 35 "Indios tributarios" in what is called Conchaitacama and Chanque, which may be Concha and Chengue, which appears to be less than what was estimated for 1607 (Miranda 1976:163). Part of the problem may have been related to the over-taxation that appears to have affected the smaller communities, as the per capita figures show that the smaller encomiendas had higher taxes. In 1625 another list of encomiendas mentions 24 "indios" in Chengue and Duira. By 1651 there is a document that regulated the Encomienda of Chengue but by 1660´s it appears that Chengue is still used to extract salt but it is not clear if it has a resident population. In 1664 a neighbor of Santa Marta called Salvador Barranco is denied permission to exploit Chengue's salt because it is still the livelihood of the Indians there but it doesn't say how many live there or in the vicinity (Miranda 1976, Luna 1993).

The population of Chengue apparently halved every 5 to 20 years in Colonial times and a population of about 1200 during the 1400's becomes a fairly realistic situation. If we consider that only a tenth would be expected to have survived the first 100 years of the colonial period there would be about 120 people by 1608, a figure similar to what is observed is shown in the colonial documents. Using the same logic large encomiendas like Geriboca, “Geriboca y Macinga” and Bonda (see Table 4.6), which apparently were part of what was called the Chiefdom of Bonda, had a population of 760 taxable men, or possibly 3800 people. A rank size graph based on the census data suggests that the populations involved in the 1599 uprising were in fact part of well integrated regional economy (See Figure 4.21). If we assume a population decrease of 90% (see Denevan 1992), which is very likely judging by the degree of violence, indigenous enslavement and trade with the Antilles during the previous century, a population of 38,000 for a very discrete section of the district of Santa Marta of about 200 km2 is quite likely. Similarly a linear extrapolation would suggest a population of between 200,000 to 300,000 people for the entire northwestern section of the Sierra Nevada de Santa Marta. The archaeology and ethnohistoric accounts for the Tairona have been notorious in that they emphasize the existence of fairly large towns. A rank-size distribution of the archaeological data for the Late Tairona period for the villages immediately surrounding Chengue shows a convex pattern that suggests there is no hierarchy between the small villages of Concha, Chengue, Nehuange, Cinto and Gairaca (Langebaek 2005:88).

CHAPTER 5: RESIDENTIAL ZONING

INTRODUCTION

The life cycle of a community can produce very particular dispersions of artifacts and architectural remains that reflect the collective patterned behaviors of multiple households over a very long time. This chapter will take a closer look at the distribution of ceramic forms at a community level that is intended to view the distribution in a synchronic way, losing much of the detail and variability present in a household scale, but conserving the overall pattern (White 1985). This chapter offers the most detailed perspective possible for the resolution of the data; it maintains the focus on the community scale by subdividing the entire inhabitable area of the bay in small sections called residential areas. The residential area is similar to residential wards in many cases, in others the vegetation and the fact that most structures are buried produce a more diffuse data set that conserves only the most outstanding aspects of the artificial topography so these areas may contain more than one residential ward (Kolb and Snead 1997). The ultimate intention is to analyze the spatial distribution of artifacts, detect robust patterns in artifact consumption within the community and identify changes in demography and economy both spatially and temporally. The data and analyses shown in this chapter will complement the artifact and structure distributions described in chapter 4, consider some environmental aspects, evaluate population density using average ceramic densities as an index, evaluate evidence of trade, and monitor the distribution of ceramic styles. All this will serve as evidence for the identification of differential status and will help analyze the distribution of the households in relation to resources. All of the mentioned factors contribute to the characterization of aspects of social organization including social stratification and specialization through the sequence (Hayden and Cannon 1982:152, Hirth 1993, Costin 1991).

Several of the terrace clusters mentioned in chapter 4 can be classified as discrete residential areas that share some kind of trait that suggests they were part of complex households, house compounds or groups of households that have been interpreted by some as residential wards or barrios (Boada 1996 and 1998, Langebaek 1996, Flannery 1976:73, Flannery 1972, Wills 1991, Santley 1993). The 9 residential areas used in Chengue are in part arbitrary segmentations of the village, but are also the result of architectural and topographical patterns. As it turned out there are patterns in the data from the systematic collections that suggest that these analytical divisions are partially correlated to some form of social organization. In some instances the residential areas are clearly defined by architectural features connected by paths in such a way that they suggest they were inhabited simultaneously and that there was sufficient traffic between them to require the construction of stone paved paths, or hardened earth embankments and ramps. Several other terraces show a significant investment in contention walls, trails and terrain modification including areas that resemble courtyards but may have had a different function through the sequence. As it was shown in chapter 4 some segments of Chengue have evidence of intense occupation but are located on a topography that appears to have been intentionally flattened or terraced. These transformations occur at a scale that makes it impossible to determine the specific number of structures that were erected on these surfaces without extensive deforestation and excavation. However, the distribution maps and density analysis shown in the previous chapter are a sound base that show that the occupations of Chengue have very particular patterns and what appear to be distinct residential zones within the community. These trends alone may be very useful markers for wealth identification (Smith 1987). Furthermore, the distribution of middens does not seem to coincide with individual terraces; there are multiple areas of Chengue that have concrete indications of being sites where structures were erected had 0 shards per m^3. The systematic sampling procedures identified areas where the trash was piled up, perhaps even burned in multiple occasions over a period of centuries. Some of these zones are so large that they would appear to be middens used by multiple households. As it was shown in chapter 3 several of these middens were excavated and some had particularly accelerated deposition rates during the T2 and T3 phases. All this evidence suggests that most terraces were occupied at the end of the sequence and that their surface materials and shallow deposits obtained from the house floors tend to date only this last occupation. The middens produced by the behavior of multiple residences living in a fairly compact settlement are more accurate receptacles of artifacts for a collective of residences than for an individual household. Similar observations to these have been made in the Alto Magdalena and Boyacá, Colombia (Drennan and Boada 2006:59) where they have observed refuse dispersal patterns that correlate the greater dispersal of artifacts to longer occupation. In this chapter these trends will be explored in greater detail as well as several indicators for social status, differential access to resources and activity areas. The evidence for these differences in residential areas will include the evaluation of patterns of stone artifacts, ceramic densities, ceramic forms and various types of ecofact distribution. Unlike the analysis from chapter 4, that relied exclusively on shovel probes, there will be evaluation of patterns produced by surface collections and profile collections. However, all density calculations are using only shovel probes while profile and surface collections were used to evaluate the dispersion of ceramic forms and lithic artifacts. The proportions of ceramic forms between residential areas shown in this chapter combine artifacts obtained by means of shovel probes and surface collections indistinctively, unless otherwise noted.

The analyses will use 9 residential groups or areas distributed in the 2 sectors mentioned in chapter 1 (Figure 1.8). Residential areas 1 through 5 are located in Sector 1, and contain fairly robust groups of terraces. Groups 6 through 9 are areas from Sector 2 that were sampled by a continuous set of transects but were found to be separated by rivulets, topography or extremely deep alluvial deposits which resulted in clearly clustered distributions. The exception to this trend in sector 2 is group 9, which has terraces similar to those from sectors 1 and 2, but somewhat smaller and with less prominent stonework (Figure 5.1).

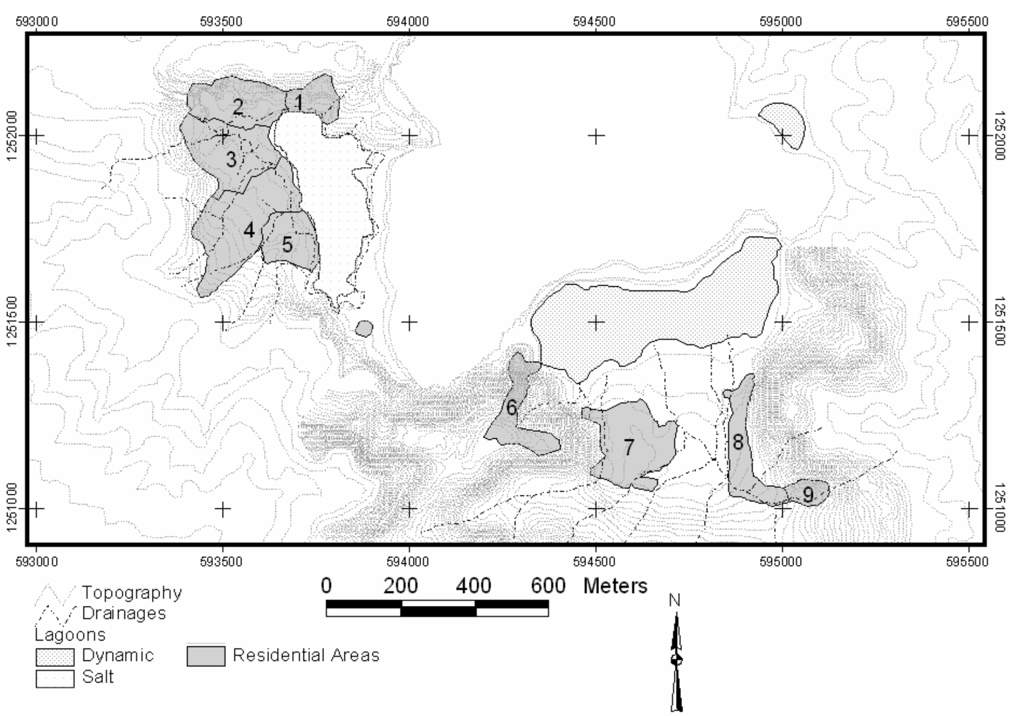


Figure 5.1 Zoning of Residential Areas in Chengue.

RESIDENTIAL AREAS 1 AND 2

The terraces of RA 1 were easily measured because this areas has lighter vegetation; the terraces are even more conspicuous and consequently more damaged by looting, yet still in relatively good shape. Unlike area 1, area 2 has many terraces, very evident contention walls, some several meters tall and paved paths visible on the surface. A larger amount of the construction used coral for pavement and walls. A particular characteristic of this cluster is that it contains a large artificial platform labeled S1-1A, which apparently housed a small plaza or public structure measuring about 1300 m^2. The entire area is completely empty of ceramic shards. Furthermore, excavations showed that the entire surface had been scraped clean of soil. All of the shovel probes from this platform showed that the thin layer of organic topsoil had been removed up to a stratum of hard clay. Around this area paths were constructed and ramps were built out of compacted earth and refuse, providing access to sections of the southern section of the village through routes that avoided drainages or large terraces near area 3. Another possibility is that the ramps and elevated paths served as part of a public area, which allowed easy visibility to the events unfolding on the “plaza” and clearly dividing the space between spectators and performers. The S1-A1 terrace contains a large boulder with a petroglyph and at least three other large boulders that were evidently transported, intensely polished and smoothed. The petroglyph depicts 3 human stick figures and a fuller central figure that appears to wear a headdress. For these reasons this terrace will not be used in the calculations for population size. It is possible that it is the site of a XVI century chapel mentioned in multiple documents of the period and destroyed in the 1599 uprising (Simon 1944, AGI 1602).

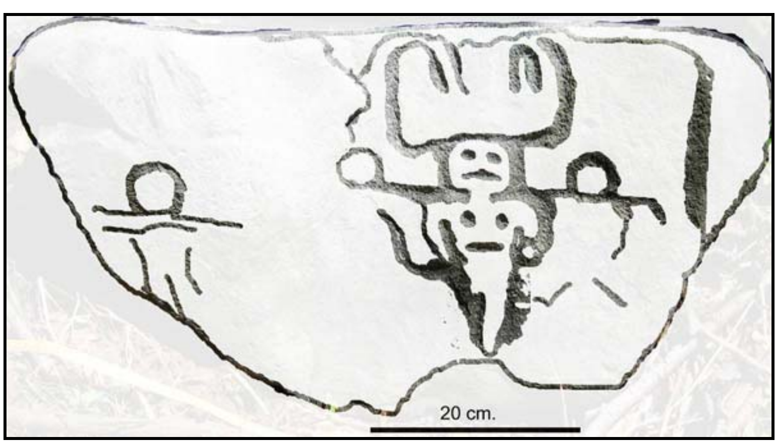


Figure 5.2 RA 2, S1-1A Platform Petroglyph.

The stone’s entire surface was burnished until smooth. Sections of the image appear to have been lost as the stone has lost part of its original surface due to flaking. The negative image (bottom) shows the areas that are indentations on the burnished surface.

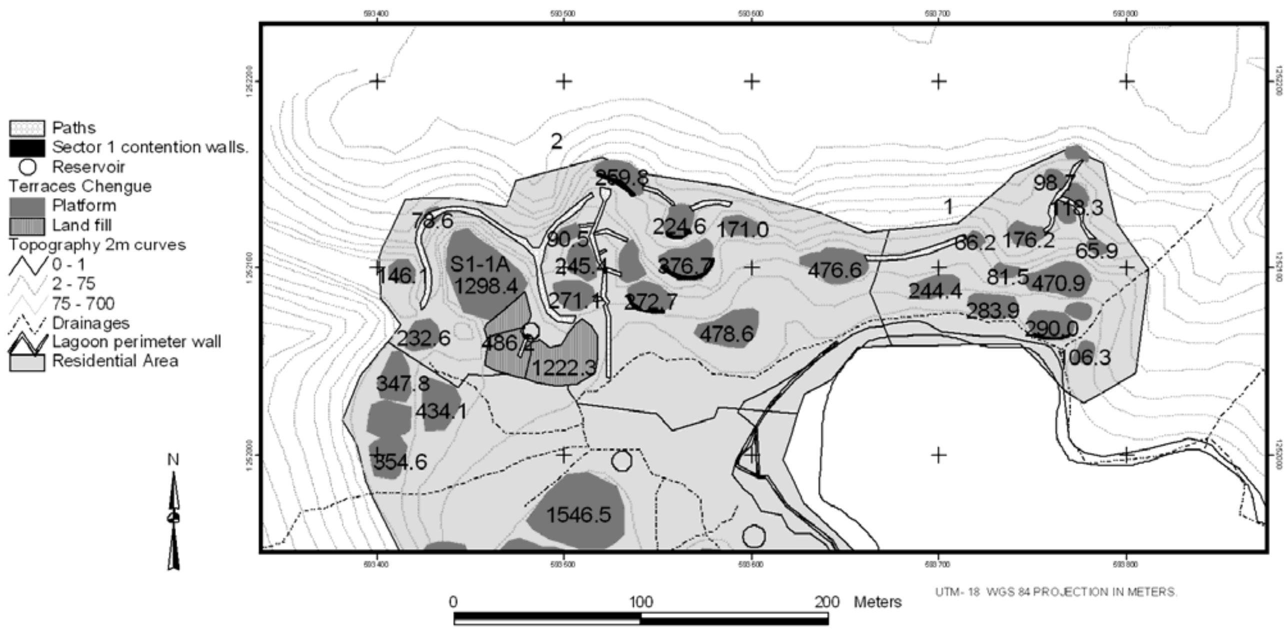


Figure 5.3 Terrace Cluster at Residential Areas 1 and 2.

Residential Area 1 and 2 measures 4.82 ha and contains 105 lots and at least 34 platforms, 1 water reservoir and multiple paved paths and ramps. Terraces shown with area in m^2. Note. Terrace S1-1A is thought to have been a public area and had no ceramics.

As discussed in chapter 4, Sector 1 has considerably different demographic trends, and contains a much larger and more robust cluster of terraces. This coincides with the hi ceramic density (559 shards per m^3 from all phases) as recorded in the 76 shovel probes in RA 2, although all 5 of the stratigraphic excavations made in RA 2 had densities that exceeded those of shovel probes (1475 to 840 shards per m^3) which strongly suggests a very dense and persistent occupation of RA 2. It would appear that areas 1 and 5 were inhabited in higher density during the last phase, and area 2 appears to have been severely modified towards the end of the occupation of Chengue to accommodate a public area and a new residential ward interconnected by a single straight stone path that would have served as an axis for transit between houses. The areas with highest densities, as mentioned in chapters 3 and 4, are located in flatter areas that have some indications of stone foundations and paved paths but are often not evident to a surface inspection. However, it is likely that the size of residences was larger than those observed for areas 1 and 2, which were easily mapped because they were build on slopes where soil formation is somewhat inhibited by the topography.

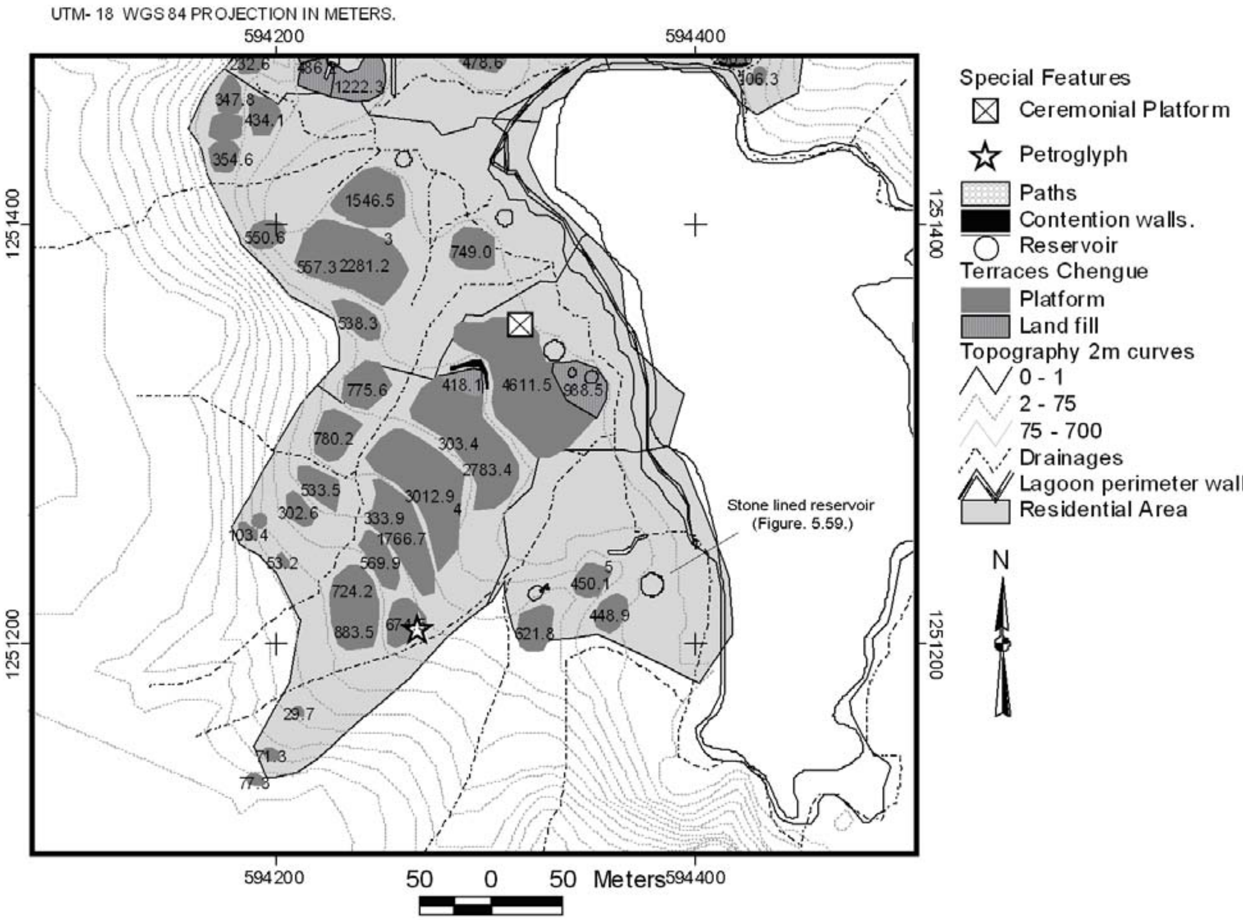


Figure 5.4 Residential Area 3, 4 and 5.

RESIDENTIAL AREA 3, 4 AND 5

This large and dense area of Chengue contains the vast majority of artifacts and features from the Tairona Period that will be described from a chronological point of view in the following sections of this chapter. The most notorious features are landfills and water management structures, which include fairly deep water well and several reservoirs, some of which are lined in stone or have stone fences. This section of Chengue contains extremely high ceramic densities and very discrete platforms with 0 shards per m^2 and unusual soil structure such as terrace S1-1A (see Figure 5.3 and "ceremonial platform" in Figure 5.4). These platforms appear to be similar to those described by Oyuela-Caycedo 1998:47-48) for field temples and divination areas found in the Kogui population of Takina.

Figure 5.5 Petroglyph found in RA 4.
Located near the only stone lined water well of Chengue.

RESIDENTIAL AREA 6

The project located small clusters of terraces along the eastern slope of Sector 2. In this case the terraces are very conspicuous; a few have stone contention walls and have extremely low shard densities. Furthermore, there is no evidence of N1 or T1 occupations. It would appear that these house clusters were not the remains of permanent residences, or of residences that were not occupied for a long time. The ceramic density associated to the structures are extremely low, with shovel probes of only 28 cm deep in average (the density in 50 shovel probes was of 35 shards per m^3). However, there are 16 terraces and other flat areas that could have been used as a surface for construction of large perishable structures. Some large flat areas towards the top of the ridge were not counted as terraces, only the ones that had distinct embankments, ceramic or stone artifacts or stone contention walls.

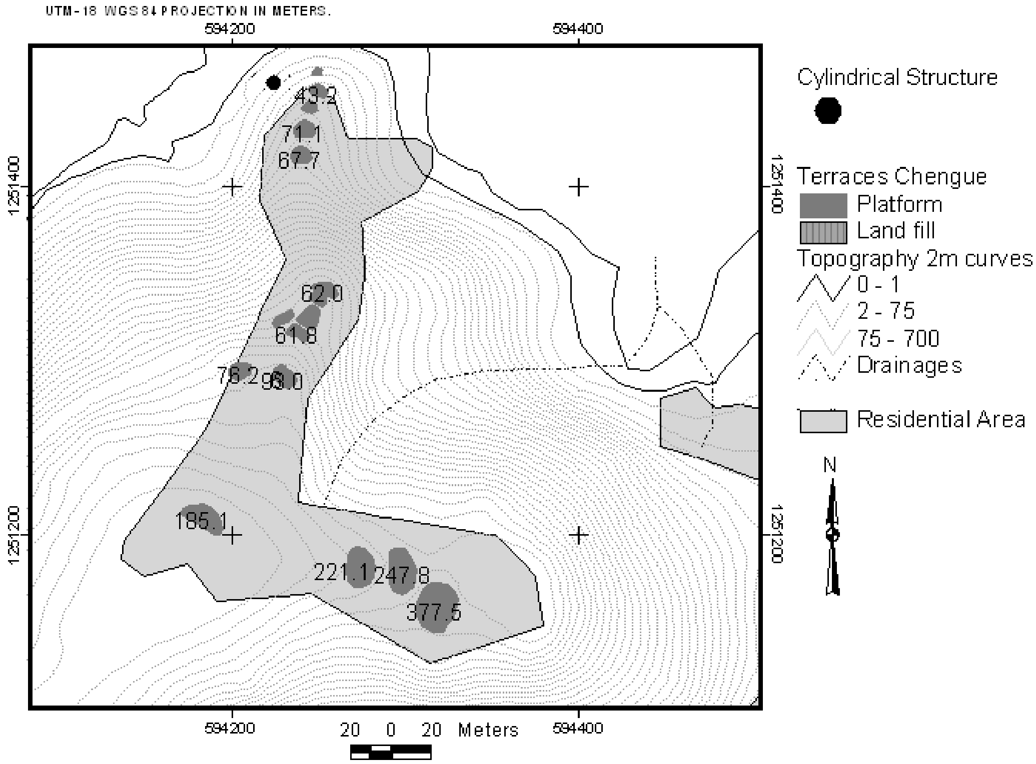


Figure 5.6 Residential Area 6.
Measures 1.73 ha and contains 57 lots and at least 16 platforms, 1 circular stone structure with tall and thick walls, possibly a fortification (upper section of the map, detailed in Figure 5.7).

The function of the terraces along the dry and steep slopes of this section is hard to deduce. It clearly offers few advantages over the neighboring flat areas, other than excellent visibility over most of the bay and maybe the military advantage of a higher ground; yet from a domestic perspective it is hard to imagine the reasons that would lead to the construction and use of a permanent resident on the slopes. The cluster is associated to a very unusual structure that resembles a small fortress made up of a very tall and thick circular stone wall. This structure is located about 2 meters from the beach, it is almost completely covered in rubble, yet the structure still holds most of its 3 meter tall walls. It in unlikely the structure was built by Spanish, the structure contains no brick, mortar, cement or tiles and it is perfectly cylindrical, a shape that is more consistent with Tairona structures than Spanish ones. Additionally, it is located in an odd place for a fortress, it would have been useless in defending the bay from pirates because it is in the innermost part of the bay and does not restrict access to it from the sea. This small fortress may have been used to control the access to Sector 1, as it is located in an area with the lowest population density, and practically on the beach, which is the natural path from Sectors 1 to 2. However, a Spanish colonial defensive function, although unlikely, is hard to dismiss without further excavation.

Figure 5.7 Cylindrical Stone Structure Associated to Residential Area 6.
The location of this structure and its shape suggest it was a community boundary. Diameter about 4.5 meters, walls are in excess of 2 meters tall and about 1 m wide.

The idea of a defensive structure or a structure meant to control the passage from the valley in Sector 2 to the salt lagoon in Sector 1 is reinforced by the difficult access of RA 6 terraces (Figure 5.6). The household clusters were built along a narrow ridge with extremely steep slope, in some parts completely vertical natural stone walls. Additionally, the area immediately contiguous to the cluster have practically no T1, and a very small T2, T3 or Colonial occupation even though it is one of the areas of Chengue with the best access to fresh water and stable natural flat land. For this reason it is hard to explain why anyone would go through the trouble of modifying the terrain to build terraces, the large section of at least 4 ha, of uninhabited land to the east would have made an ideal place for residences and was occupied intensely during the N1 and B1 phases. Alternatively, area 7 could have been intensely used during the T2 though Colonial phases as farm land.

RESIDENTIAL AREA 8 AND 9

The denser parts of the T1, T2 and T3 occupations in Sector 2 are on the opposite side of the bay, along a relatively narrow strip that goes from the edge of the lagoon to the RA 9. Both sectors have independent paved paths out of Chengue, which suggests that RA 6 was the limit of the salt producing community and that another community, perhaps closely associated to Gairaca, inhabited the eastern side of Chengue (RA 7,8 and 9). Most of the shellfish consumed by the village around the salt lagoon were collected from the shallow coastline between Sector 1 and 2, including the southern coastal lagoon. Proof of this is that most of the mollusks found in the domestic contexts of Sector 1 (50%), between ca.1200 AD, and 1550 AD contain *Anomalocardia Brasiliana* shells, which core samples showed flourish in very high numbers in the muddy bottom of the coastal lagoon of Sector 2; at the time the saturated salinity of the lagoon in Sector 1 would have been incapable of sustaining any form of mollusk. This strongly suggests that the lagoon in Sector 2 was part of the territory of the village around the salt lagoon. These and other aspect of the subsistence economy of the Tairona period will be expanded in chapter 6.

Residential area 8 is a basically a flat alluvial terrace that runs parallel to Chengue's main drainage. There are few conspicuous indications of an occupation in this area, except the remains of a reservoir near the edge of the lagoon. Although this particular section of RA 8 is heavily looted, the contours of the reservoir are still visible including large spherical stones that in RA 2 were used to mark the entrance to the reservoir. In RA 9 the sum of all the terraces measured 966 m^2 and may have housed 33 people in 17 small terraces, assuming that the trend observed for Pueblito and B200 in chapter 4 remains constant. The cluster spans over .43 ha which means that the population density for this patch of a village is roughly 77 people/ha at its peak. The terraces are likely to be a low estimate of areas used for construction because the terracing occurs only when the slope increases substantially. This does not mean that there are no residences in the lower parts of the valley in RA 8, on the contrary, there is plenty of evidence that the bottom of the valley was occupied first in the N1 phase, although, agricultural intensification, environmental factors (such as changing sea level) and possibly war would have been strong factors in the way the settlement changed over time. Therefore, the most likely pattern of construction for this area, and extendable to most of Chengue, is an accretional pattern of growth centered on a founding population with daughter households that slowly aggregate around it.

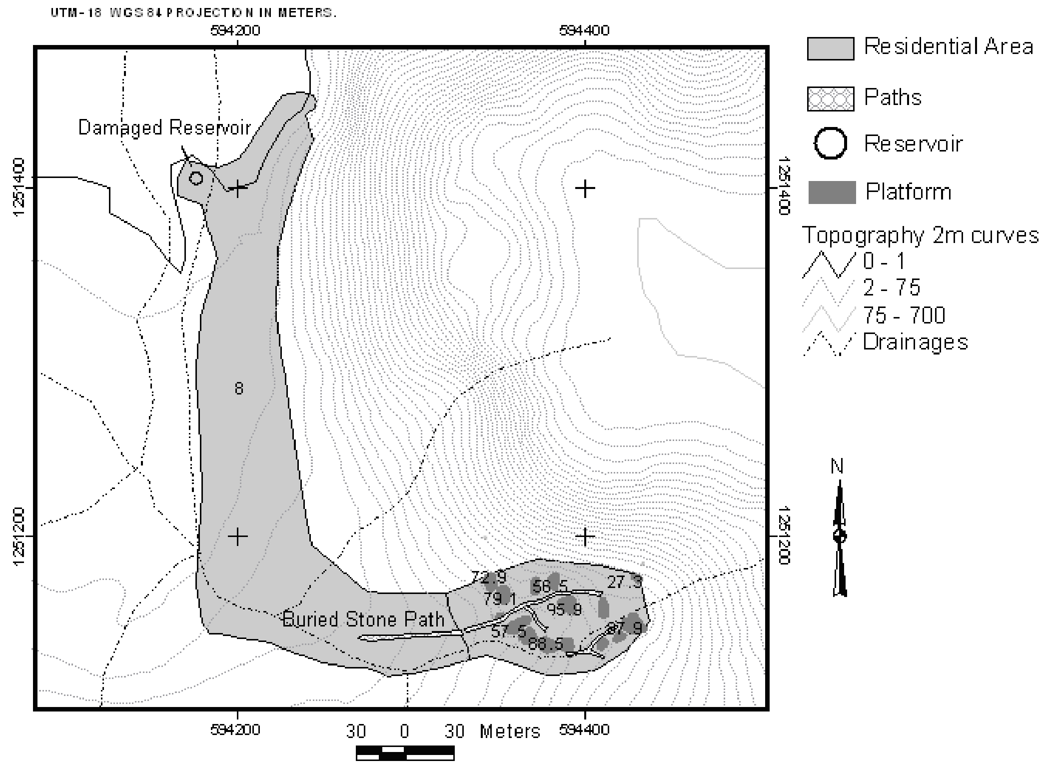


Figure 5.8 Residential Area 8 and 9.

THE N1 VILLAGE

Ceramic density and distribution of the N1 village is extremely low in 8 of the 9 areas which suggest that all except for RA 7 were not inhabited. The extremely low shard count registered in Figure 5.9 and 4.18 is probably the result of “noise” in the data set, ceramic transported in the clayey soil used to build houses during other phases and fortuitous events or short lived camp sites. The distribution of ceramic forms also shows a weak pattern dominated by cooking pots and a few bowls with little decoration (Figures 5.9, 5.11, 5.12, 5.13, 5.14). Decorations for ceramics from this phase are usually a pattern of coarse broad incisions in the case of cooking pots (OB1) and some incisions along the rim, all appears to be concentrated in the residential area (RA) 7 and to a lesser degree residential area 8. This trend is weak and it can hardly be considered as evidence for social stratification or the presence of a political elite. The forms in all cases are small and simple culinary forms that are likely to have been produced domestically and were probably not restricted goods. Furthermore, these forms seem to have been produced with very little effort; it is common to find “corrugation” or incomplete smoothing and very evident defects on the surface and rims. The cooking pots appear to be smaller than the Tairona forms, they average 21 cm while the Buritaca average Tairona 23 cm (see Figure 5.10). The differences are small, yet significant and suggest that N1 Ollas may have been used and produced in a different way. At this stage it is hard to establish but it seems that Tairona pots are also much deeper than N1 pots because the rims and walls are thicker, thus small changes in diameter may not accurately represent the large differences in volume. Nonetheless, it is reasonable to interpret this evidence as an indicator that the N1 storage capacity and food processing capacity was less than for the Tairona period. The N1 ceramics are restricted to a few bowls and cooking pots with very little decoration. Another characteristic of N1 ceramics from Chengue is the lack of bases of any kind. There is only one example in the whole collection of this kind of form, and it comes from a collection that contains a large proportion of B1, T2 and T3 ceramics.

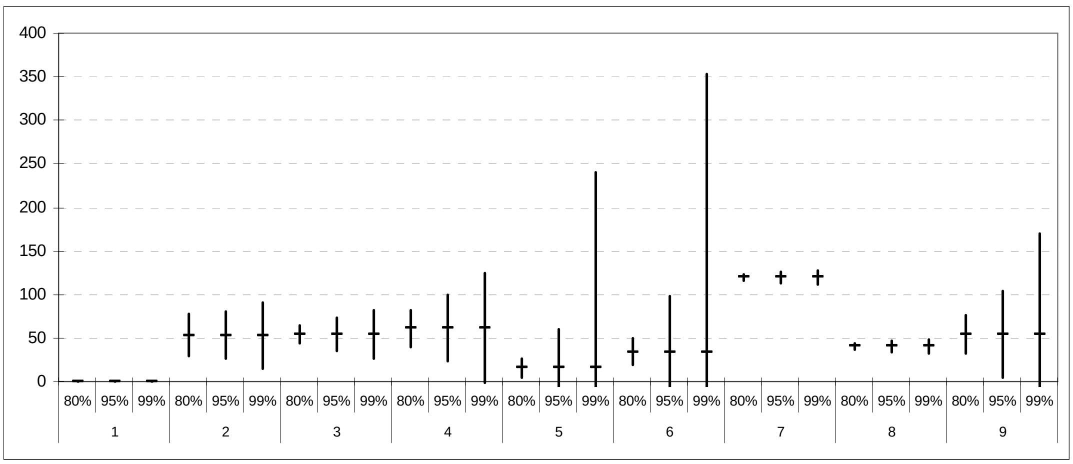


Figure 5.9 N1 Mean Ceramic Shard Density per Residential Area.

RA 7 is significantly denser than all the other areas at the 95% confidence level which suggests it had a larger population. There was no N1 ceramics in area 1. Densities in shards per m^3.

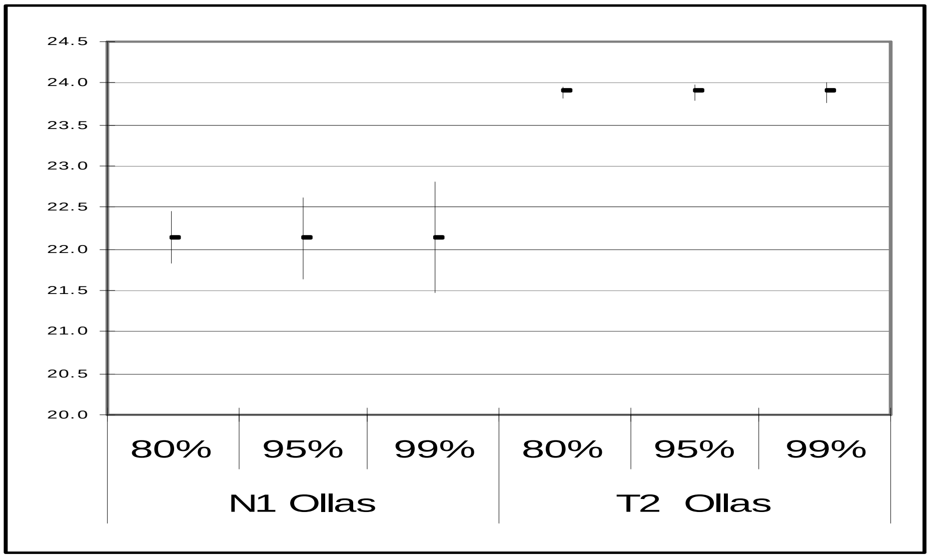


Figure 5.10 N1 and T3 Cooking Pots Diameter Measurements.
N1 cooking pots, or “ollas” have smaller diameter mouths at the 99% confidence level.

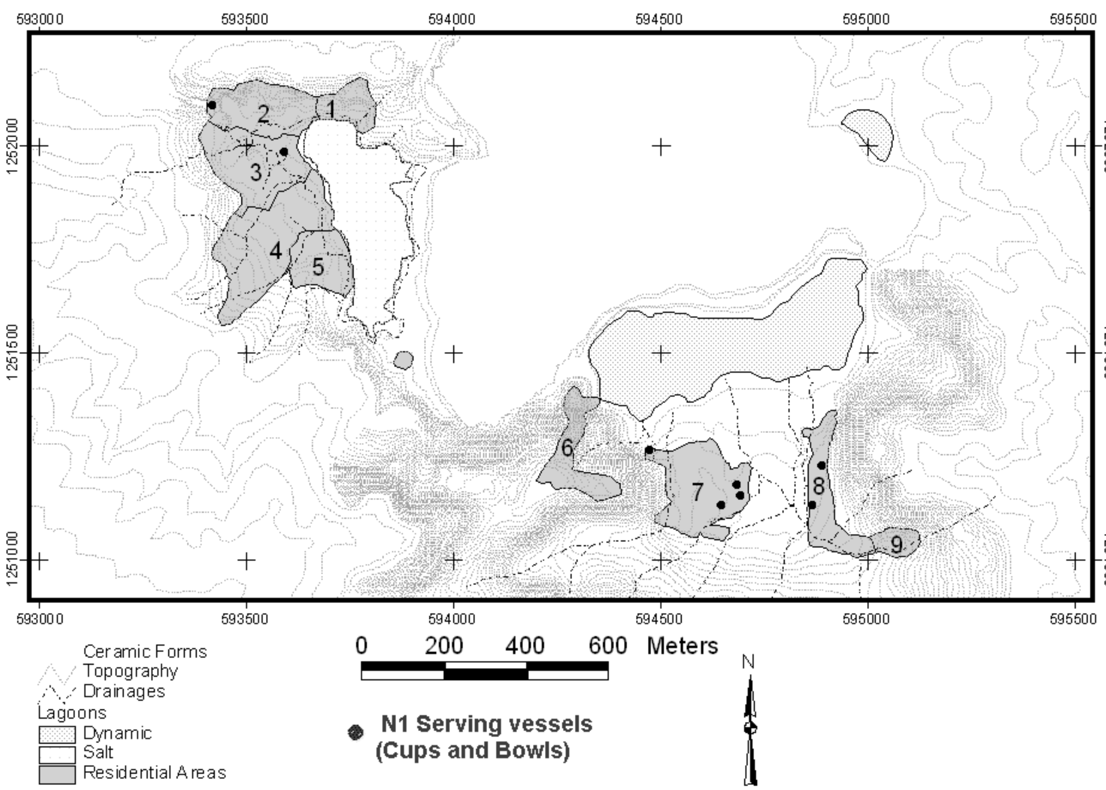


Figure 5.11 N1 Service Vessels Map.

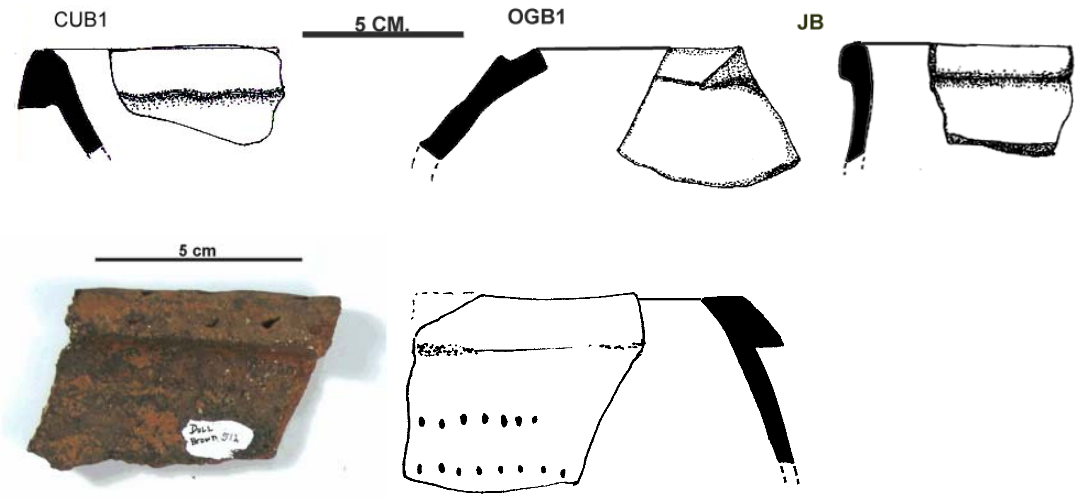


Figure 5.12 N1, Dull Brown and Dull Tan Ceramic Ollas and Jars.
Cups or bowls (CUB1), globular pots (OGB1) and jars (JB). Some CUB1 rims have irregular incised decoration and tend to have sharp edges. Both CUB 1 rims shown above are dull brown type, mostly associated to Residential Area (RA) 2 and 7.

One of the most famous Nehuange decorations, the *Red on Red* and *Red on White* pattern of lines commonly thought to be associated with large mound burials is practically not present in Chengue. The only clear example of this type of ceramics was found in excavation 7, located in RA 8. Although the dates associated to these particularly elaborate Nehuange forms are not completely clear, it is possible that the absence of these decorations in Chengue is due to a population that was not a permanent resident of the bay during this phase or that was not particularly interested in these ceramic forms. With or without painted wares the lack of evidence for a stratified society in the N1 phase in Chengue is prevalent. Furthermore, there were no architectural features detected for the N1 phase, this may be caused in part by the deposition of gravel and alluvial sediment that seems to have covered the N1 remains in most of Area 7 and 8 to depths exceeding 35 cm in most cases. However, it is likely that most of the population at that time was settled in Area 7 that is the flattest and therefore no terracing was necessary. This area is also the most humid and in combination with Areas 7, 8 and 9 collectively constitute the most productive land in Chengue. This suggests that a small self sufficient, egalitarian population lived in Area 7 during the N1 phase.

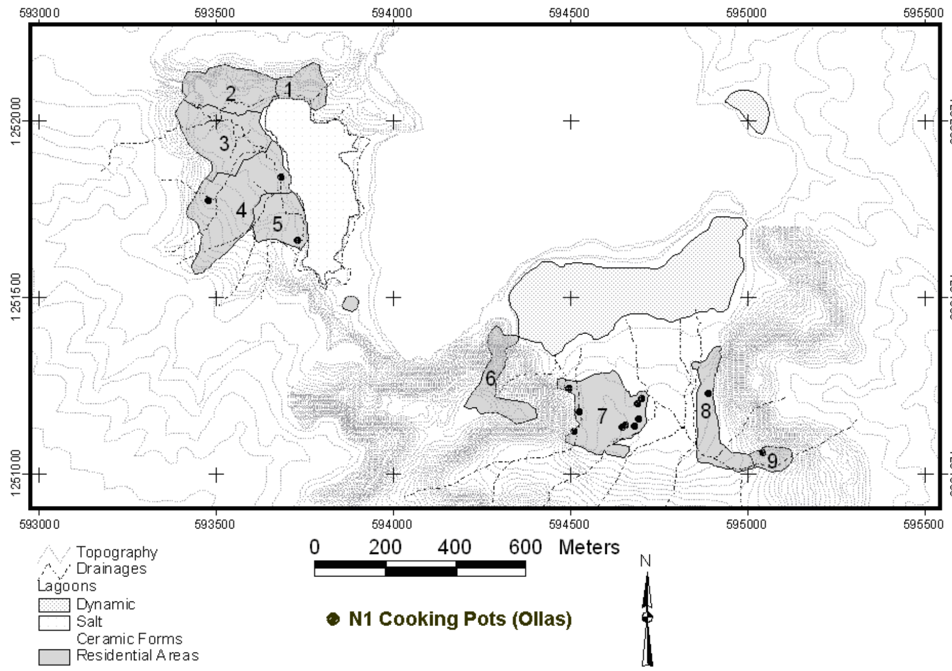


Figure 5.13 N1, Dull Brown and Dull Tan Ceramic Ollas and Jars Distribution Map.

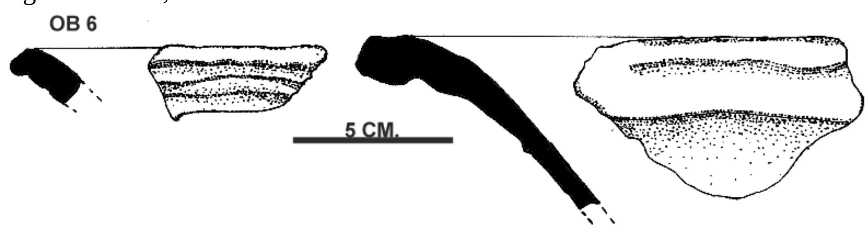


Figure 5.14 N1, Dull Brown and Dull Tan Ceramic Ollas and Jars.

THE B1 VILLAGE

The B1 distribution has similarities to the N1 distribution although there are higher ceramic densities and fairly clear ceramic concentrations in RA 7. In Sector 1 there is a significant increase in ceramic density, particularly in a section between areas 2 and 3, which suggests that there was a fairly persistent settlement, probably a small group of households in this area. In Sector 2, RA 6, 8 and 9 appear to be inhabited in very low density as well (Figure 5.15). This pattern appears to be indicative of a relatively disperse settlement pattern, a scatter of independent households over most of Chengue with a small nucleation in RA 7. The very low densities in areas 1,5,6 and 9 are unreliable and could be the result of "noise" in the sample. Eliminating these very small subsets from the interpretation leaves a clear pattern of two small occupations in areas 3 and 7 (see Figures 4.18 and 5.16). During this phase, RA7 is a village occupying an area of up to 3.9 ha at a fairly high shard and population density (300 shard/m3). Judging by the dramatic difference in ceramic density compared with all sectors, similar densities have been observed for the T3 village in areas 2 and 4, who had populations estimated on terrace size of 70 people/ha and 109 people/ha respectively. Based on this it would be reasonable to assume that residential area 7 had up to 300 to 400 people during the B1 phase or an approximate density of between 76 and 100 people/ha. The other fairly populated areas 2, 3 and 9 may have had population densities of around 20 to 30 people per ha or less. In any case, it is plausible that there was a fairly compact and persistent settlement in RA 7 during the B1 phase, which tends to coincide with a smaller settlement from the N1 phase. However, the differences in ceramic density suggest that the N1 settlement pattern was truly disperse because although there appears to be a slight indication of a persistent occupation in RA7 it is not nearly as strong as the one observed for the B1 phase. Furthermore, most of the 100% N1 phase lots are buried under thick deposits of gravel or further away from the coast, which suggests some change in the settlement pattern during the B1 phase.

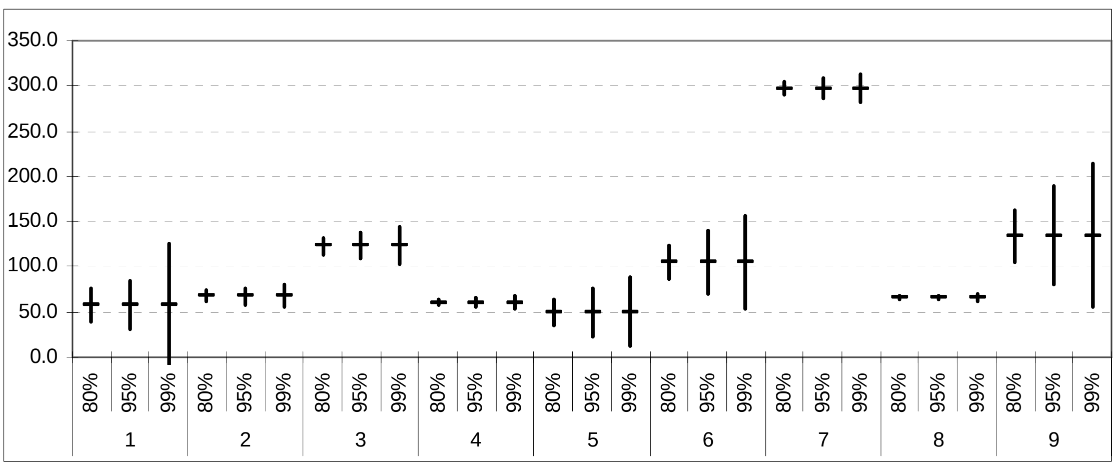


Figure 5.15 B1 Mean Ceramic Shard Density per Residential Area.
Density is measured in shards per m^3.

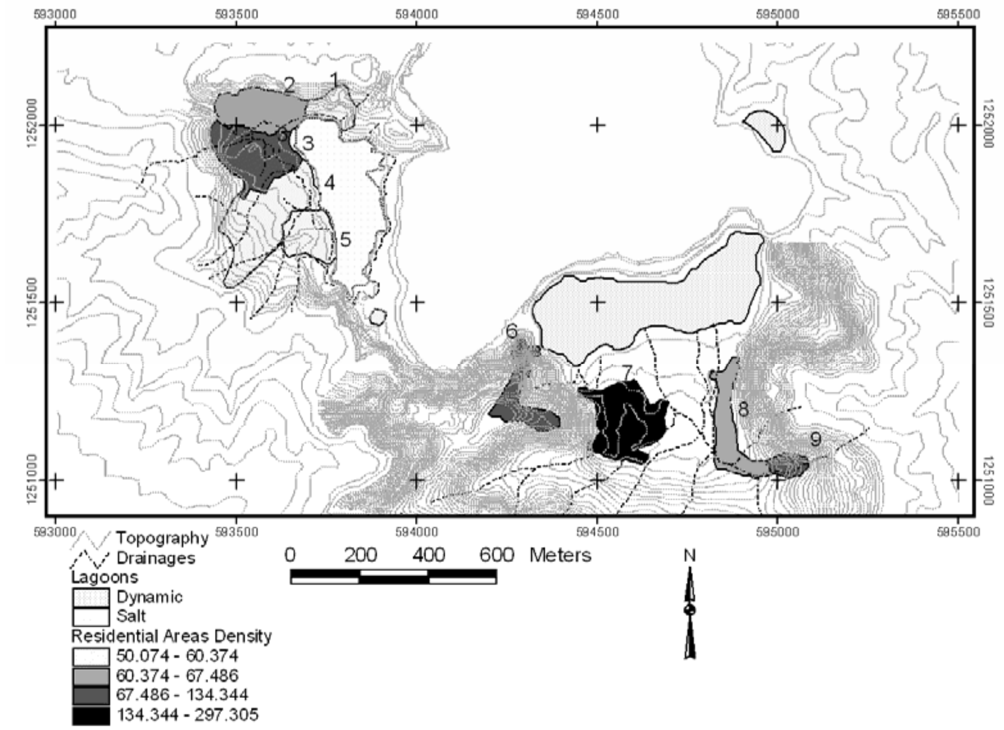


Figure 5.16 Density of Residential Areas.

The transition between N1 and B1phases is characterized by the appearance of very small proportions of painted wares early in the B1 phase. However, the most prevalent decorations and styles don't really match all of the range Nehuange ceramics from funerary contexts as described by Mason (1939) and Bischof (1969a), which suggests that there may have been local elites or social differentiation during this phase in other villages and that these elites had very small spheres of influence yet there are really no data sets that can be reliably compared at this point.

Buritaca Culinary Forms

In the process of searching for indicators of recurrent feasting or particularly sophisticated ceramics that may have been used in public activities, the distribution of CUB rims was analyzed (Figures 5.17 and 5.18). These bowls are clearly made in all cases of B1 pastes and are frequently decorated along the rim with parallel incisions. Their distribution tends to coincide directly with the distribution of B1 ceramics with a weak pattern that suggests some concentration in RA 7. This distribution is not a very good indication of a recurrent and a strong pattern of feasting by a single group of households because it appears to be a constant proportion of B1 ceramics in all contexts for this phase. Area 7 has the largest amount of CUB rims because it has the largest amount of B1 ceramics. However, RA 2 and 5 have fairly high proportions of these vessels compared to all areas. Areas 1, 4, 6, and 9 have no bowls, although they do have B1 ceramics. These proportions produce a pattern unusual enough to generate a significant, but very weak, Chi-Square statistic ($X2 = 15.634$, $.1>p>.05$, $V= .073$). However, this distribution combined with the ceramic density patterns (See Figure 5.18, 5.23) identifies two small clusters of terraces that can be interpreted as the remains of two households from the B1 phase. Finally, although the evidence is not strong or significant enough to suggest that these households were of a higher status it does suggest that they may have been a small but fairly stable occupation of the sector. Residential Area 3 seems to have housed fairly large households during the T1 and T2 phases. If the CUB 2, 3 and 4 bowls are accepted as markers for feasting, it could be argued that there were persistent feasting patterns in RA7 and in a small cluster between RA 2 and 3. Excluding the single specimen areas, it appears that RA 7 has a slightly higher proportion of CUB vessels (see Figures 5.17 and 5.19).

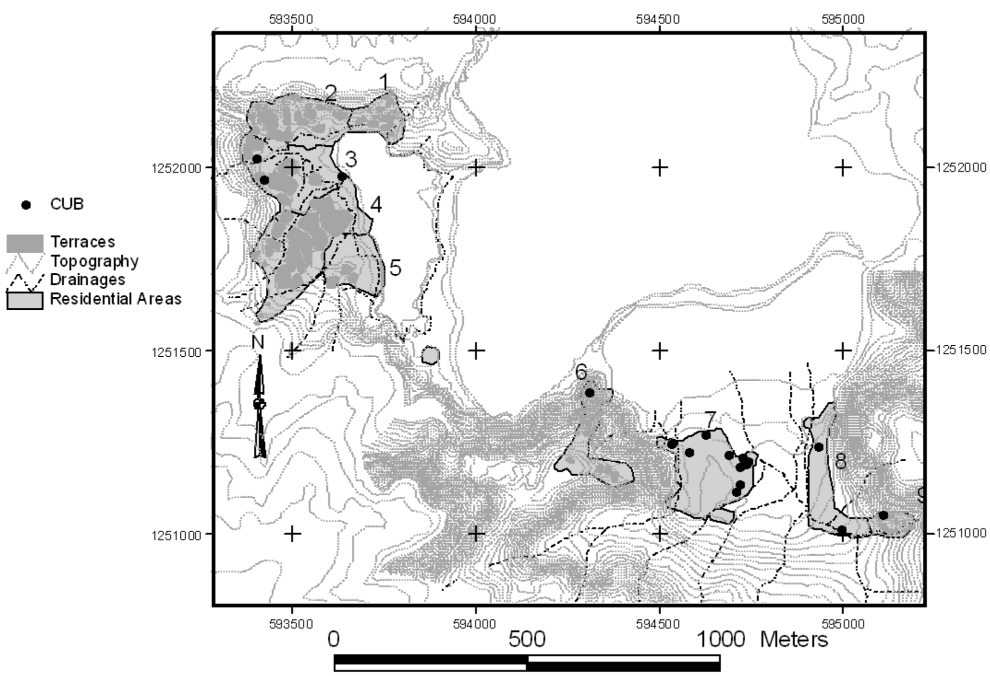


Figure 5.17 Distribution of B1 Bowls (CUB 2, 3 and 4).

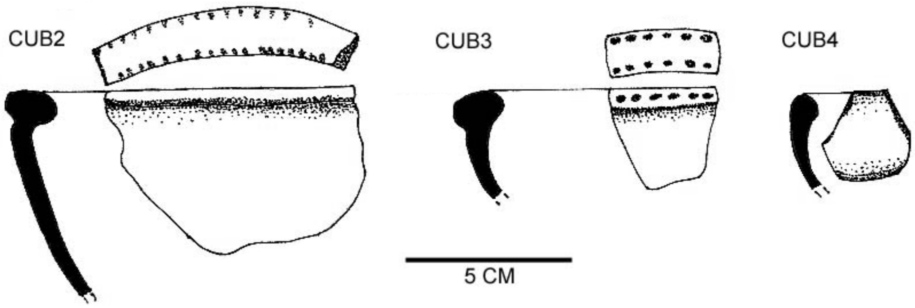


Figure 5.18 B1 Bowls. Characteristic forms for the B1 phase (CUB 2, 3 and 4).

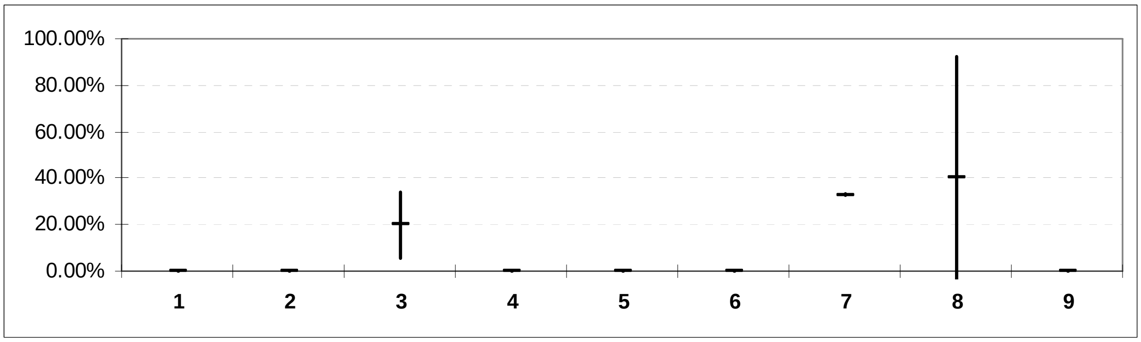


Figure 5.19 CUB Bowls. Proportions per Residential Area with 80% Confidence Intervals.
Areas 6 and 9 have one bowl, area 8 has 2 bowls.

The distribution of B1 culinary forms suggests that there were no concentrations of B1 (Ollas) that can't be explained by the fact that there is simply more B1 ceramics in a particular place. In other words there is no indication that any of the residential areas had a significantly high proportion of cooking or storage vessels. In a Chi Square analysis the results show a less significant and even weaker pattern than the CUB vessels ($X2= 7.975$, $p < .5$, $V= .052$). Another form that could be associated to feasting or storage and fermentation of maize are the jars or JB form group (Figure 5.20). However, the distribution of these forms in the B1 assemblages for each residential area shows that there are no unusual concentrations ($X2= 4.6$, $p < .5$).

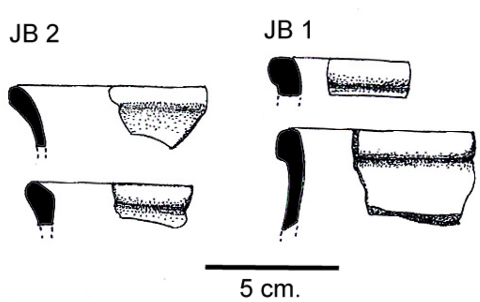


Figure 5.20 Buritaca Jars Form Illustrations.

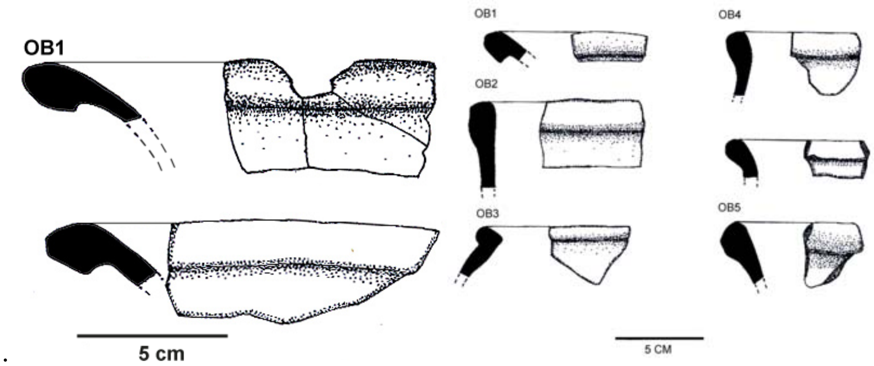


Figure 5.21 Buritaca Ollas (OB) Form Illustration.

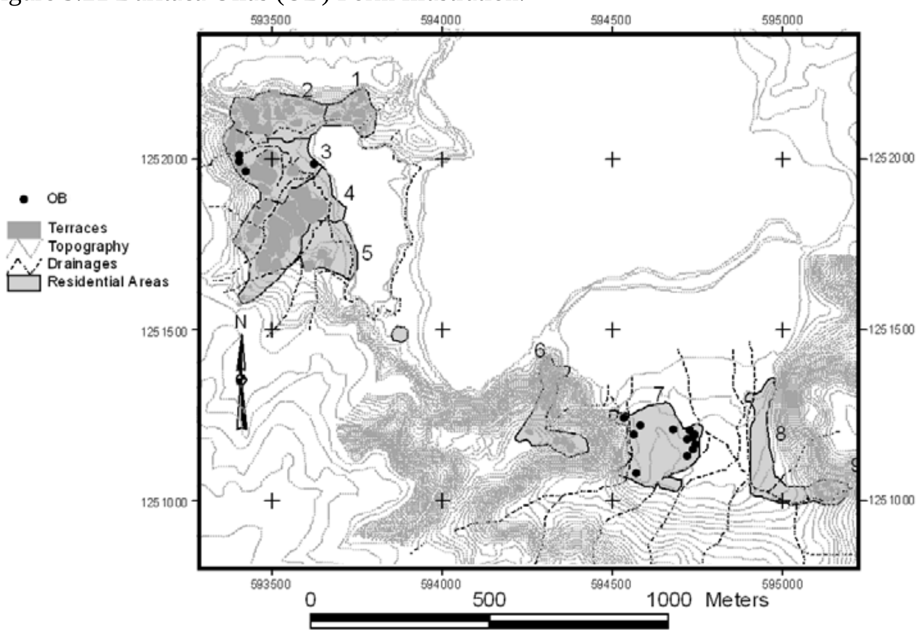


Figure 5.22 Buritaca Ollas (OB) Distribution Map.

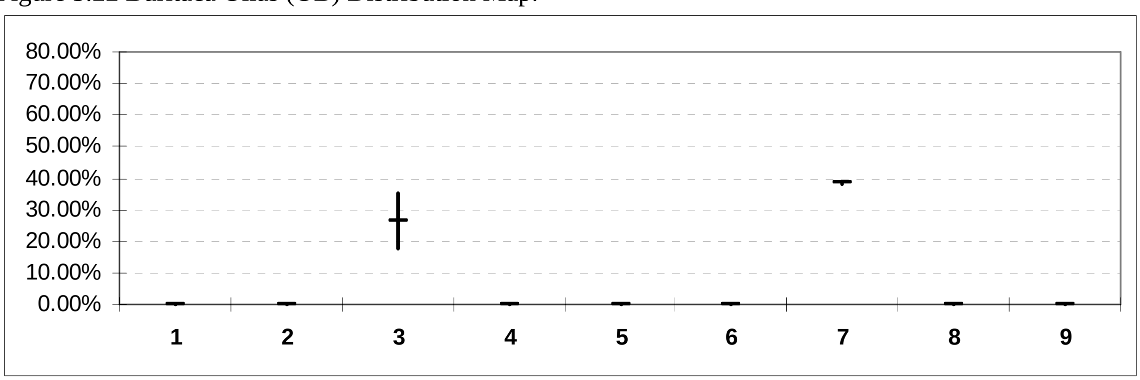


Figure 5.23 Proportion of Buritaca Ollas (OB). 80% confidence intervals.

The width of the confidence interval is a direct result of the sample size. Only areas 3 and 7 had Buritaca OB vessels. The difference between 3 and 7 is significant at the 80% confidence level.

Another group of ceramic forms that does not have a clear purpose yet does show a clear pattern are the globular bowls (CUGB) that vaguely resemble the “treasure jar” form, as described by Mason (1939:357-359) but are not all made of the same *Red* ceramics he describes, but appear to vaguely similar to the Black ceramic forms. Furthermore, these vessels are typically medium sized, about 14 to 18 cm in diameter and with fairly thin walls. Assuming a conservative minimum number of specimens per lot it was found that 66% of the time they were found in contexts containing high proportions of B1 ceramics (35% to 95%, in excavations 3,4 and 5). Its spatial distribution shows a very clear clustering of these forms in two groups in small sections of RA 3 and 7 (See Figure 5.24). This is similar to the distribution of cups or CB forms which appear in two styles (CB1 and CB3) found in the same contexts as CUGB. These forms tend to be relatively small, thin walled and with slipped or burnished surfaces, including faint incised line decorations and about half of them are made of “fine” pastes. The regularity of these traits and its fairly strong clustering suggest that there may have been a household in RA 7 that had somewhat better ceramics than the rest of the B1 households in Chengue. A Chi Square test suggests that RA 7 has a significantly higher proportion of globular bowls and bowls with base, Figure 5.28 ($X2= 15.6$, $p >.05<.02$, $V= .052$). The fact that these remains are found in the most humid location, with the best conditions for permanent residence will be assumed as evidence for very weak social differences between some of the households in RA 7, 3, 4 and 9 probably associated to feasting. However, an analysis shows that although areas 3 and 7 have higher proportions of these ceramics, the difference is not very significant yet it remains particularly strong in area 7.

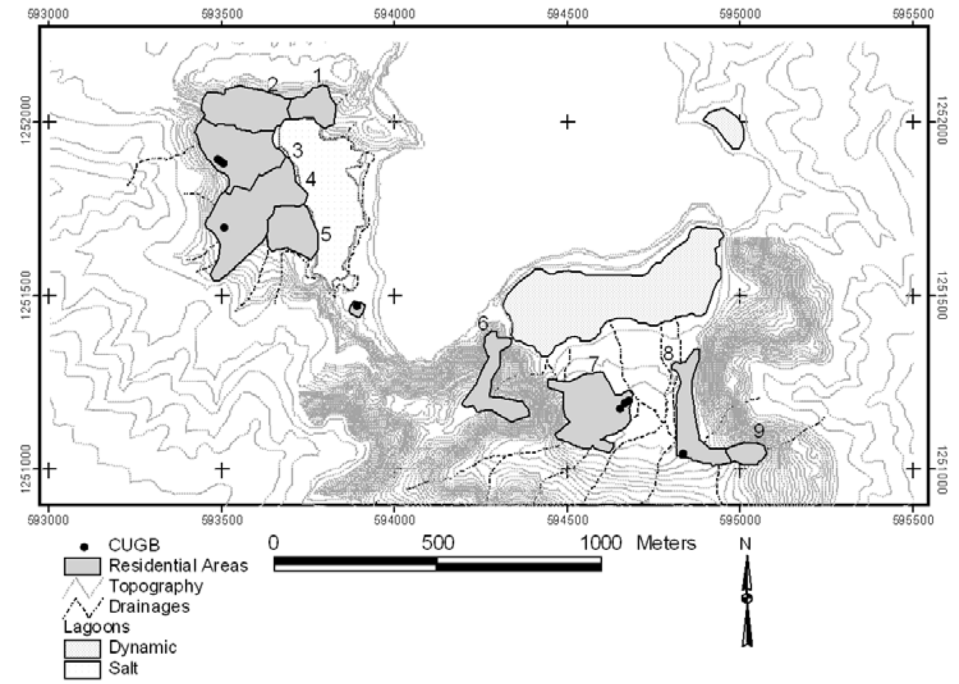


Figure 5.24 Distribution of CUGB (Globular Cups).

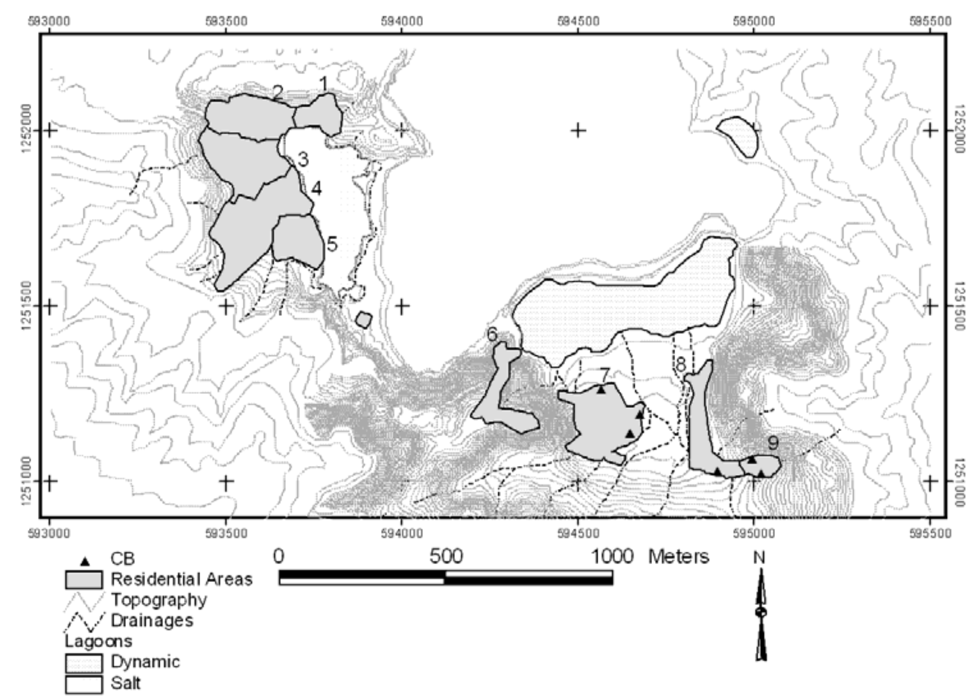


Figure 5.25 Distribution of CB (Bowls with base).

Figure 5.26 Form CUGB (Buritaca Globular Bow) and Lid Fragment with CI10 Decoration.

This specimen is Fine Black (B1) from shovel probe 358 in RA 7. The bowl shows a CI 6 incised pattern on its base and a dark gray slip that resembles lead. It should not be confused with the *Black Slipped* matte finish common in the T2 phase. It is not clear if this form used a special matching lid, none were found in association to this form.

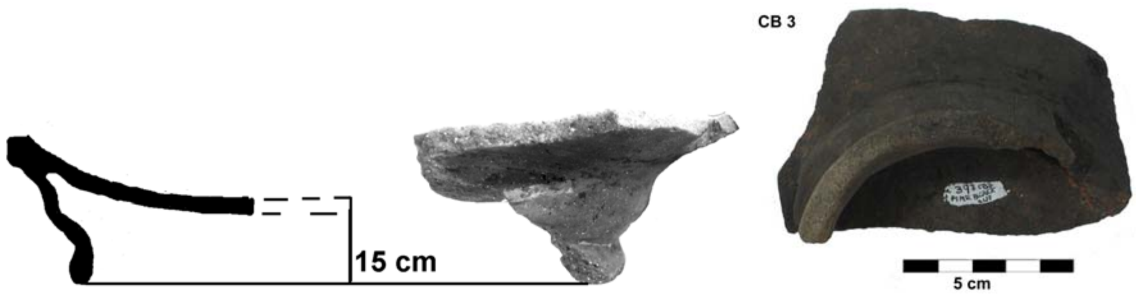


Figure 5.27 CB3 (Cups with Ring Base). Fine Black (B1) ring base from shovel probe 397 in RA 7.

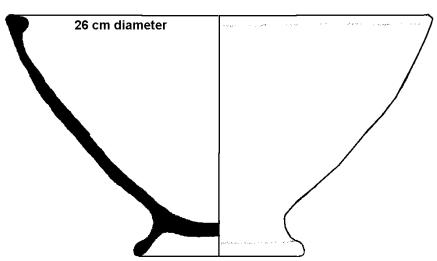


Figure 5.28 CB1 (Cups or Bowls with Base).

Excavation 3, Level 3. Near probe 397 in RA 7. Coarse Sand, but surface color varies from brown to reddish orange in the same vessel.

Figure 5.29 Bird Head Appliqué.

Excavation 5, Level 1, Lot 358. Fine Brown, with fine incised decoration.

Buritaca Non Culinary Forms

The only indication of potential “elite” households is at this time, and that does not appear in any of the other areas with B1 deposits, is associated to CUGB1 and CB vessels. The age of the remains containing these unusual ceramics is though to be closer to the T1 phase because of the presence of a very small proportion of Tairona 2 (T2) culinary forms and the absence of red paint in the decorations. It has been suggested that CUGB offering urns that are made of particularly fine ceramics in the B1 phase could work as potential indicators for emerging elite households because they were found in wealthy burials in the bay of Nehuange. Vessels vaguely similar to these were used to store funerary goods and were called “treasure jars” by Mason (1931:36, 1939). Perhaps the most elaborate ceramics for the B1 types is *Fine Black* ceramics (see Figure 5.30). However, this dark slipped or self-slipped ceramics are not rare items in the B1 assemblage and its presence or absence does not seem to be a good indicator of household status. Fine surface treatments are found wherever B1 ceramics are found, and although some types of serving vessels seem to cluster in a small section of RA7, they are not very significant and may only show that there was a higher concentration of residences. On the other, hand it is possible that the households located in the more favorable environment of sector 2 (RA 7 and 8) may have been slightly better-off than the ones living in Sector 1 (RA 2 and 3). This does not mean that RA 7 residences were elite residences or that there were institutionalized social differences or a political economy.

The notorious Tairona bird themes are almost entirely absent from the B1 assemblages. The exception is a single modeled bird head outlined with small linear incisions that follow a pattern reminiscent of feathers. This specimen was found associated to the CUGB cluster in RA 7 shown in figure 5.29. The style is vaguely similar to the more elaborate incised decorations found in the T2 phase but it is not of the exact same style. The area surrounding excavation 5 appears to have slightly more elaborate ceramics, but it is the only case and if this pattern is the result of incipient social differences it remains a very weak pattern. This area is an ideal candidate for further research and household scale excavations of the N1 and B1 phases.

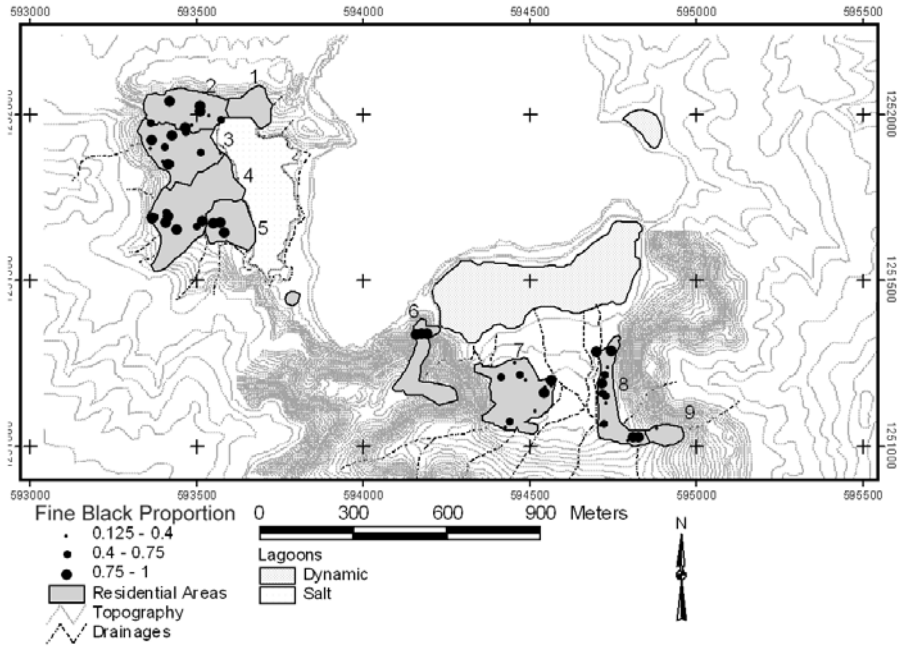


Figure 5.30 Distribution of Fine Black Ceramics.
The size of the dot shows the proportion of Fine Black ceramics in relation to the rest of the B1 ceramics per lot.

In conclusion, there are very weak indications of social differences for the B1 phase associated to 3 household or household clusters in a very disperse pattern that spreads over 3 residential areas 1 km apart. The comparison between residential areas or household clusters of this phase may provide more specific data on the social organization of communities.

THE T1 VILLAGE

During T1 phase the transition between a small autonomous B1 village and the large Tairona complex chiefdom occurred. The T1 ceramic group is composed of fairly unusual ceramics that tend to be found in multiple excavations between the B1 and T2 peaks. Stylistically the T1 ceramic group shares some traits with both phases, however its horizontal distribution is strongly in accordance with the T2 distribution and suggests a very well defined and fairly dense occupation of RA 2, 8 and 9, and a complete abandonment of RA 6 and 7 that used to be the most densely populated during the B1 phase (Figure 5.31, 5.32 and 4.20). This shift in the distribution can be interpreted as a step towards specialization in salt production and less dependence on agricultural resources produced within the confines of Chengue. This shift suggests that the transformation of the community's economy was accompanied by change in its social organization and presumably the rules that would allow cooperation between communities.

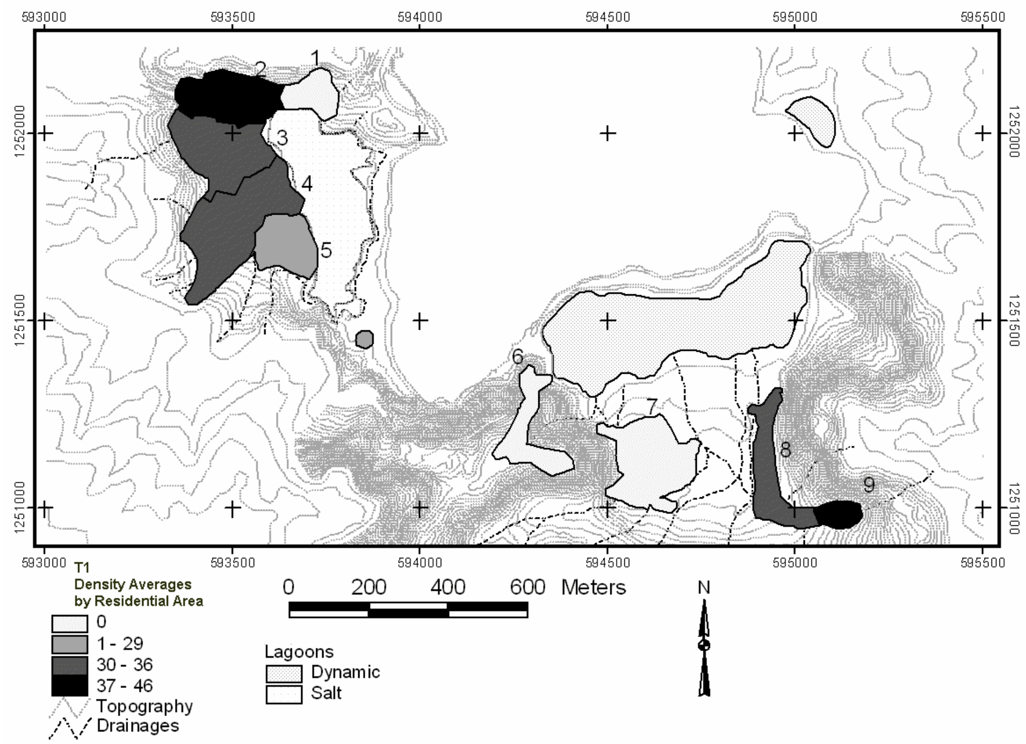


Figure 5.31 T1 Residential Areas.

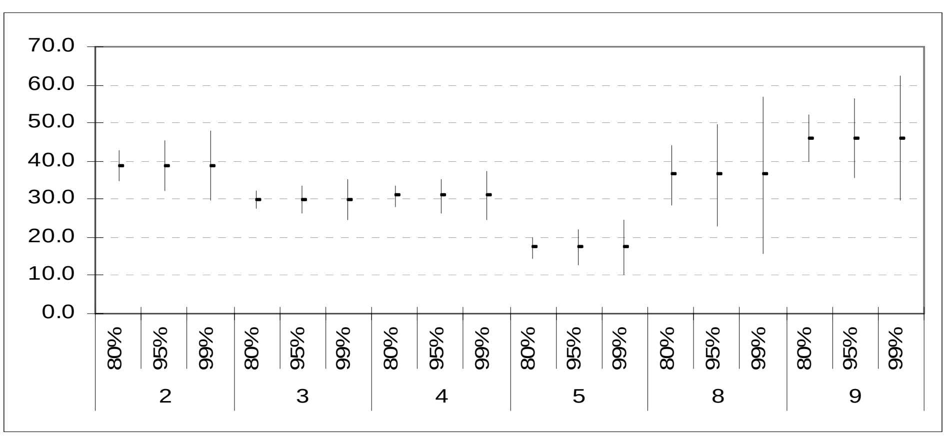
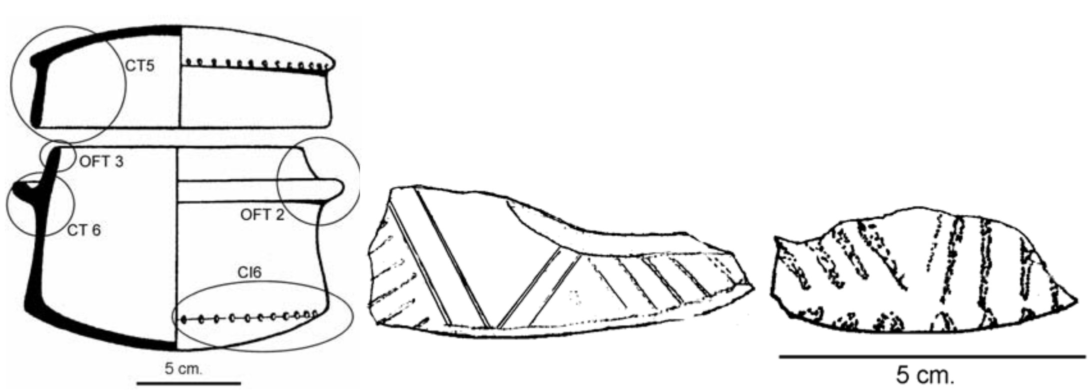


Figure 5.32 T1 Mean Ceramic Shard Density per Residential Areas.
Areas 1,6 and 7 had no T1 ceramics at all. Density is measured in shards per m^3.

T1 Ceremonial Vessels

There are few utilitarian or culinary forms that can be associated exclusively to the T1 phase, however the most notorious form found in this phase and not present in the B1 phase, in some form, is what was classified as a Tairona tetrapod mamiform vessel (VTMT), which are small, thin walled containers, usually very well burnished and adorned with some kind of modeled animal head, in the T1 cases usually a bat (see Figures 5.32). These forms would appear to have some kind of religious value and are usually small so they could also have been exchange items. Stylistically they are almost always within very recognizable parameters; they are small, portable and appear to require a considerably high level of expertise to produce them. It is conceivable that these forms may have been exotic items, not produced locally but by specialist and acquired through an exchange network that may have had ideologically connotations. In some cases the vessels have handles that cross over diametrically, like a basket handle. Similar vessels and handle fragments were found in the T2 assemblages, but the T1 vessels are different not only in the fabric but in their style. Some of the T1 vessels of this sort appear to be cruder and larger, although at this point the sample is not sufficiently large to ascertain this reliably. Another notorious form that can be sufficiently fine and small to be an exchange item is what has been labeled "treasure jars" by Mason (1939). Although these vessels are similar to the CUGB form discussed above it has surface treatments, rim shape and thickness that are characteristic of Late Tairona types(See Figure 5.31). However the variation found in this form is very considerable, there are very fine specimens and very coarse and large specimens. The ones shown below are of the finer type which is clearly from the T1 phase.



"Treasure Jar" Fragments.

Figure 5.31. As described by Mason (1939). Multiple fragment codes are thought to have been part of a single ceramic form. Fine decorations are though to be associated to T2 forms (Both examples are actually Very Fine Black a predominantly T2 surface treatment).

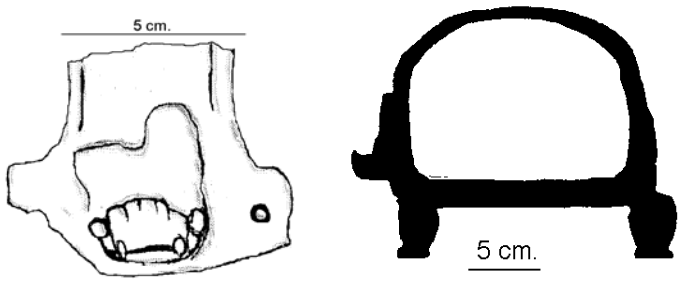


Figure 5.33 Tetrapod Vessels.
The example of a bat figure is from lot 257. in Fine Burnished Gray fabric.

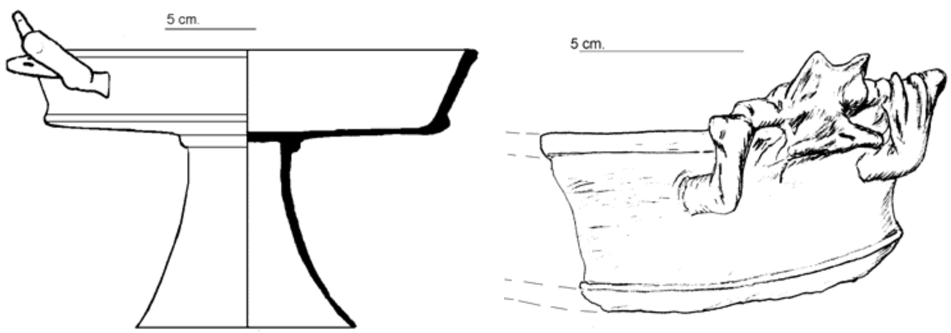


Figure 5.34 CT5 with Anthropomorphic Bat Appliqué and Base.
Fine Burnished Gray. Excavation 9, Level 5. RA 8.

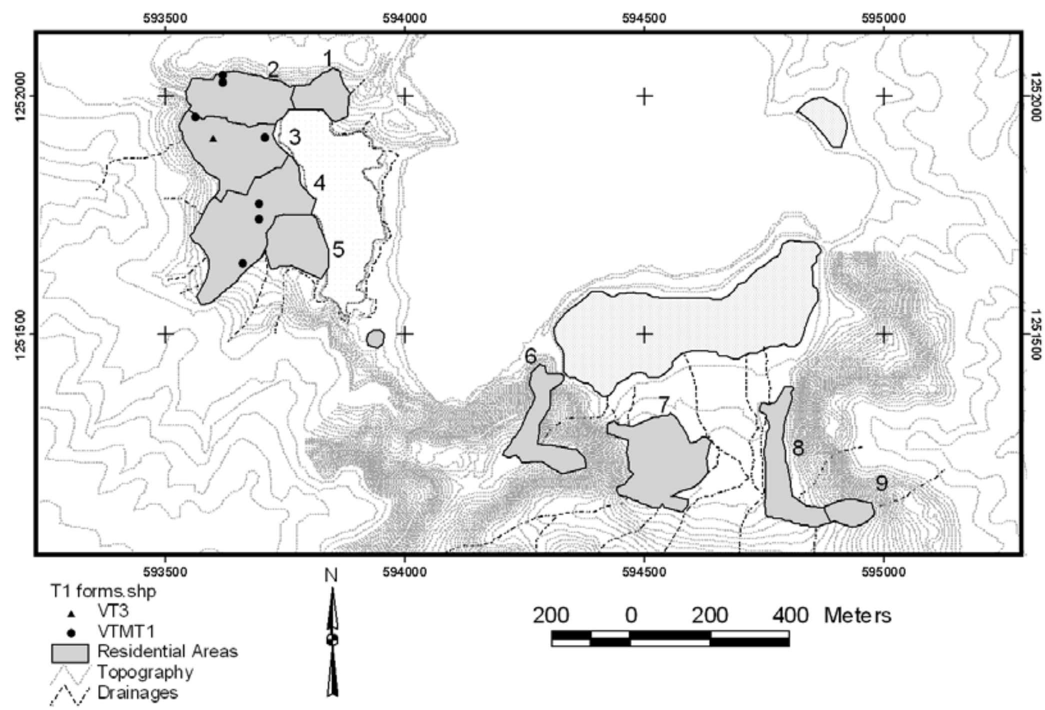


Figure 5.35 Distribution of Mamiform Tetrapod Vessels.

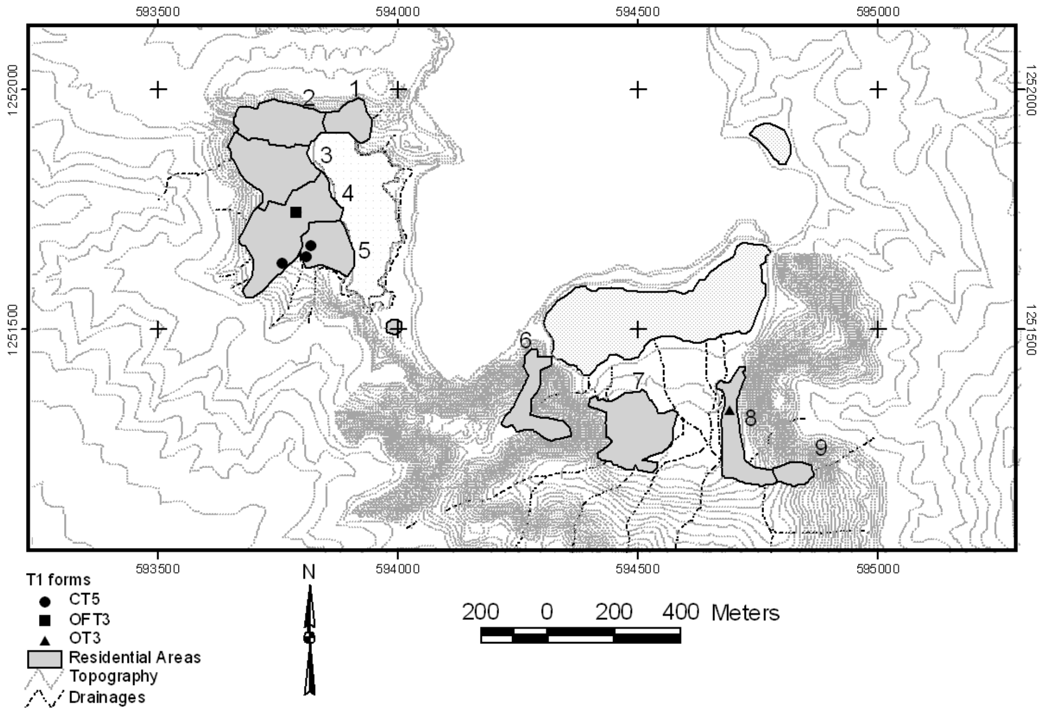


Figure 5.36 Distribution of “Treasure Jars” Made of T1 Types.

The distribution of “treasure jars” and tetrapod vessels is strongly clustered in Sector 1. In the case of the “treasure jars” they tend to be present only in residential areas 2, 3 and 4. In the case of tetrapod vessels there is conspicuous clustering in a small section of RA 4 and 5. This area is where the only deep water well of Chengue is located. The water well is a stone lined structure, with a stone slate fence similar to those found around reservoirs and the salt lagoon and although most of it has been altered by looting and erosion, the staircase that led to the bottom is still visible. At this point it is impossible to date the well, but stratified T1 ceramics found near the rim of the well (see Excavation 17) suggest it may have been build during the T1 phase. The other forms which are composed primarily of bowls, globular bowls, jars and cups are evenly distributed through areas 2,3,4 and 5. As it may have been noted there are no culinary forms in the T1 assemblage. Part of this is due to the fact that most Tairona cooking vessels could only be classified into T2 and T3 phases and based on this, it is likely that much of the T2 assemblage may have been produced in the T1 phase and that some B1 cooking vessels could still have been used during the T1 phase. This leaves the “treasure jars”, *fine burnished gray* wares and the tetrapod vessels as the clearest piece of evidence for a distribution of T1 elite residences. It would appear that these vessels have no “practical” use and that offering urns are not restricted to these specialized forms. As it was seen in excavations 6 and 7, burial and offering urns can be assembled out of common T2 and T3 culinary forms. However, the presence of these forms in a cluster associated to a water well and a slab with petroglyphs and extremely large grinding stones suggests that this small section may have been used by the founding Tairona elite residences.

Although the T1 ceramic group is composed of ceramic types that were identified to be useful as chronological markers, they are not sufficiently varied or abundant to assume that they comprise the totality of forms, fabrics or surface treatments that could be used, produced and discarded during the 400 year lapse between the end of the Buritaca and the start of the Tairona 2 phase. However, there are indications that the population distribution and size was severely altered during this time, which can be interpreted as a combination of population decrease and relocation of the community. There may have been multiple causes for this, including severe environmental and political changes that will be discussed further in chapter 6 and 7. What does become clearer in contrast with the B1 phase is the appearance of an acute difference between residential areas. Area 4 and 5. These appear to house elite residences, while RA 2 and 3 have a dense distribution of service vessels, cups, globular bowls and jars. On the other hand areas 1, 8 and 9 have remains that can be classified as T1 but are composed entirely of culinary forms. At the bottom of the scale are areas 6 and 7 which were practically abandoned during this phase. All this evidence suggests that there was some kind of social differentiation during the T1 phase and that the elite households were located around the Salt Lagoon.

THE T2 VILLAGE

The Tairona 2 (T2) village appears to have had the densest and clearest association to the salt lagoon. Not only in its distribution of artifacts and features but the timing seems to coincide quite well with changes in the salt lagoon's climate and its capacity to produce salt. As mentioned earlier, the size and density of the village also peaks at this phase; areas 2,3 and 4 are clearly the "core" of the village in terms of artifact density, terrace size and consequently population (estimate population density of approximately 120 people per ha, possibly more in RA 4). This is an outstanding difference in relation to the T1 phase where it was hard to identify a "central" area for the village. In the T2 phase the ceramic and terrace distribution of Sector 1 can be best described as a very densely nucleated village with two less populated residential areas. The residential areas of Sector 2 are significantly separated from the residences surrounding the salt lagoon, a pattern first observed in the T1 phase but becomes even more prevalent during the T2 phase.

From this phase on the modifications of the landscape are more pronounced and abundant. There is extensive terracing of the slopes and land fills on the flatter areas near the lagoon suggests that there was construction of mounds or terraces over sections of the lagoon that were previously inundated. It would appear that most of RA 1 and 2 were built out of the slopes during this phase, probably as a result of the demographic expansion of the village. As it became evident with excavations 12, 14 and 15, and very deep shovel probes, landfills of 2 meters in depth from a single phase are not uncommon in areas 2, 3 and 4. Several structures were identified in RA 3 and 4 which appear to be mounds that suggest the possibility of elite burials; unfortunately they were significantly altered by looting probably since colonial times. More detailed mapping and excavation is needed to ascertain the specific function and construction process of these features.

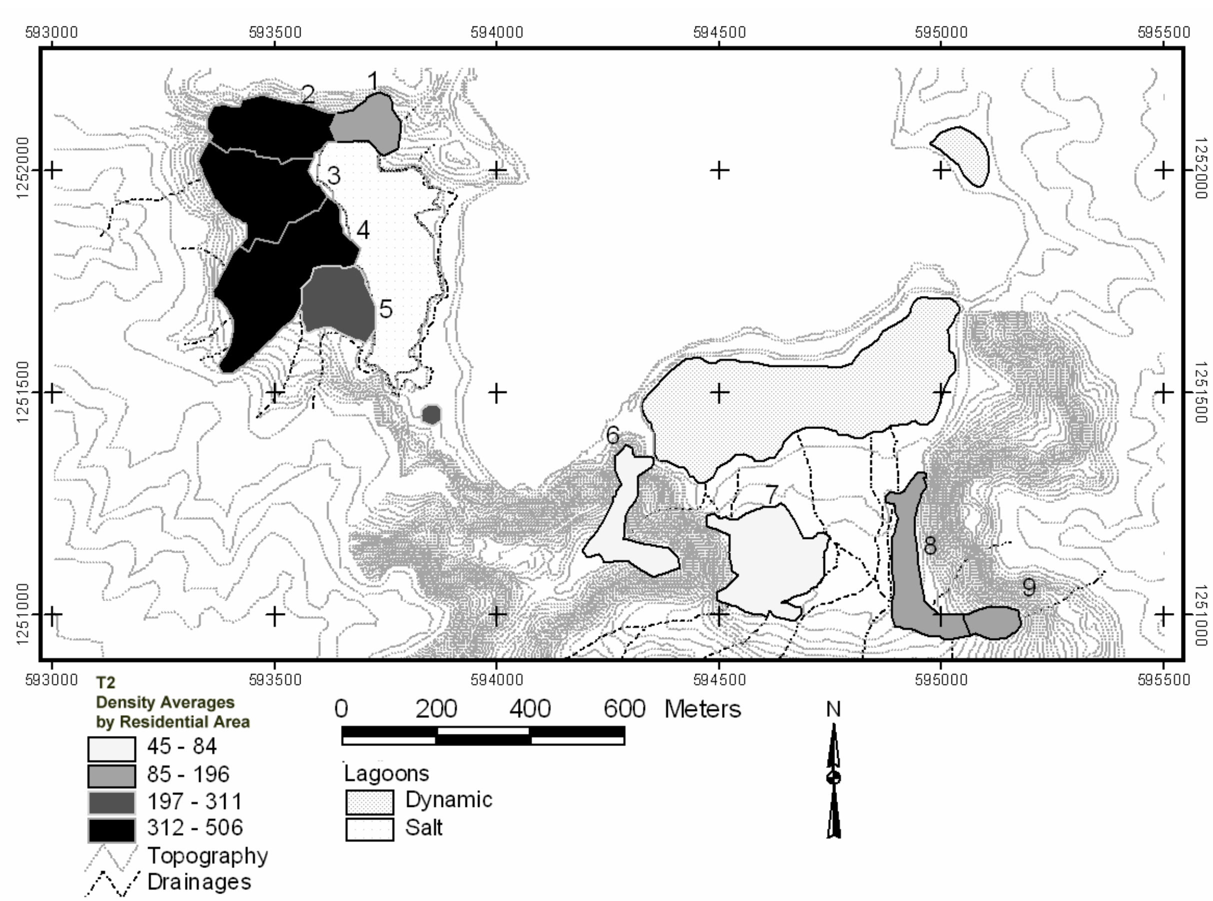


Figure 5.37 T2 Density Averages by Residential Area.

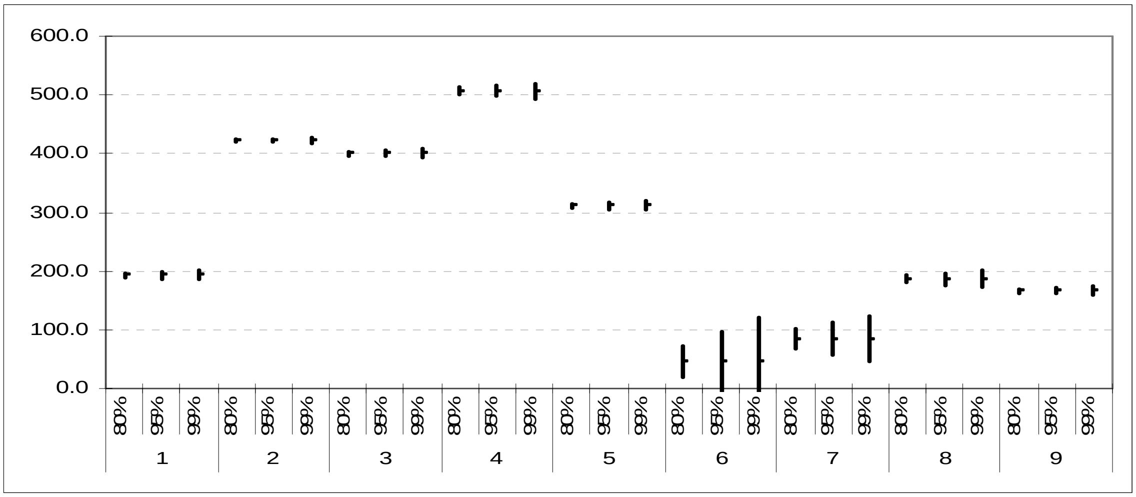


Figure 5.38 T2 Mean Ceramic Shard Density of Residential Areas.
Areas 2,3 and 4 can be classified in a group of very high density zones. Density measured in shards per m^3.

T2 Culinary Forms

As it would be expected after observing the ceramic shard volume and density indicators in Figure 5.38, the most widespread form for this phase are culinary forms, which include cooking pots, storage vessels, jars and bowls. The distribution of these forms tends to be relatively homogenous, and most the residential areas with any amount of T2 ceramics have similar proportions of these forms. There are however a few variations that suggest that RA 4 had a significantly higher proportion of the larger culinary forms and a significantly smaller proportion of the smaller sized jars (Figure 5.39). Additionally, it would appear that RA 1, most of 2 and 5 have almost exclusively culinary forms. This distribution coincides with the more disperse distribution and smaller size of terraces. It would appear that the smaller groups of houses built upon the slope had the least sophisticated ceramics, seem to be in a considerable disadvantage in terms of their access to water resources, and have no evident access to flat living space and arable land for which they had to go into the additional expense of carving platforms out of the slopes and building small contention walls, something that elite households did not need to do.

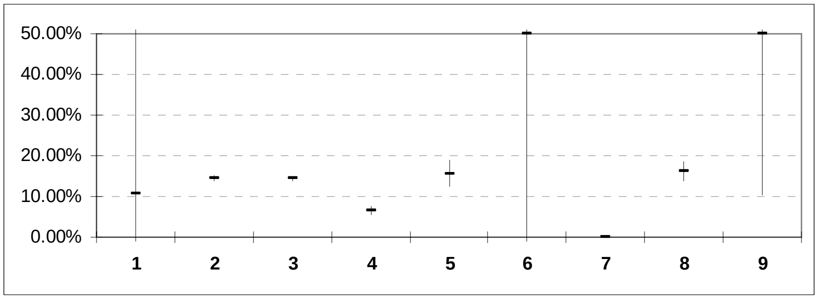


Figure 5.39 T2 Jar Proportions.

JT 1 through 4 with a mean diameter of 12cm and a standard deviation of 5. The distribution of small jars has no real concentration in any of the area at the 95% confidence level. RA 4, which has a high proportion of large storage forms, has a significantly low proportion of smaller containers. Proportion out of the total number of identified T2 phase forms.

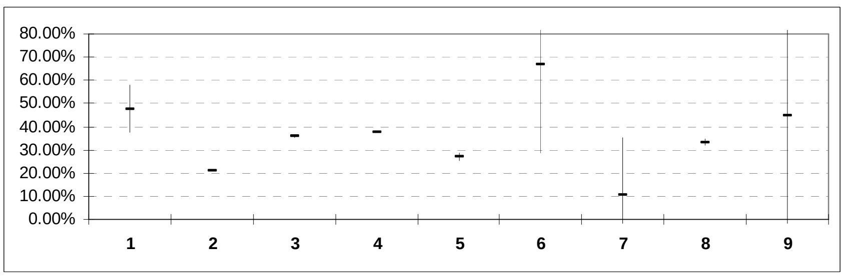


Figure 5.40 T2 Cups and Bowls Proportions.

Cups and bowls with base are ubiquitous multipurpose forms that were apparently used as graters, containers and lids. 95% confidence intervals.

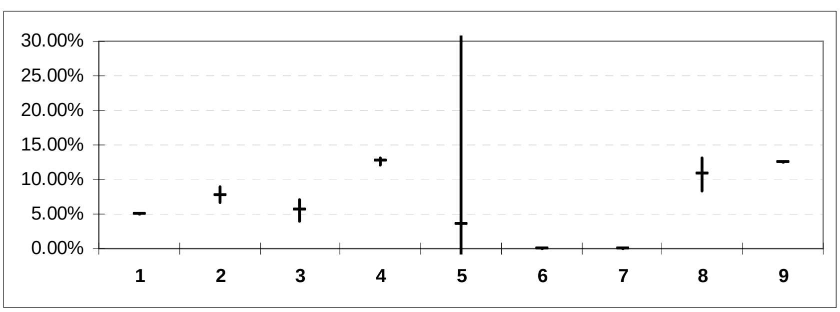


Figure 5.41 OT3 Pots Proportions Bullet Graph.

Although fairly common, OT3 pots tend to be more abundant in RA 4 at the 95% confidence intervals.

T2 Storage, Fermentation and Feasting

Perhaps the most evident ceramic form that had the potential of being used for storage is a very large ceramic vessel resembling a cooking pot but many times larger and that was probably used as a water container (TT form for Tairona Tank). It is often found to have capacities between 40 and 80 and up to 150 gallons, and it can be decorated with faces of people wearing necklaces and somewhat solemn expression or alternatively grotesque expressions. One of these vessels, of which a few photographs still exist, was found by the caretaker of Chengue in RA 4; it contained a large collection of stone axes, batons and bells. Curiously this vessel had a modeled face with a bulged cheek that suggests it was the likeness of a person chewing coca leaf. The combination of the OT3 form (globular pot or jar), the bowls and TT vessels are somewhat common items used as offering urns in burials or tombs (see Excavations 6 and 7). The TT vessel is often referred to as a funerary urn (Mason 1939), but there is no reason to believe that these vessels could not have been used as storage vessels before being reused as funerary urns. The distribution of these forms can be both the result of daily use and breakage, and also the result of reutilization in burials. Several of the specimens found in burials show repairs; all of them have intentional perforations on the bottom or sides that would have made them useless as containers for liquids (Mason 1931). This suggests that the perforated vessel was transformed from a domestic function to a burial urn by rendering it useless for its original purpose. In other cases, like Excavation 15 large fragments of these containers were found in a well stratified context which suggests they were part of daily domestic life. Some of these vessels have been found on single stratum house floors which strongly suggest that these forms are not strictly funerary (Reichel-Dolmatoff 1954).

It would appear that most of the burial sites are associated to residential clusters; nonetheless, there are concentrations of burials that are roughly associated to the periphery of residential areas. The burials found in these areas do not look like those of high status individuals that seem to be buried inside stone lined chambers. An example of this was excavated on a steep slope in RA 2, which contained the remains of a 4 year old child that was found inside a large “treasure jar” (plain tan, OFTT) vessel. The looted remains of the other burials on the same slope appeared to be of similar size and contained none of the TT type vessels. This contrasted with the burials found in RA 3, which do show large vessels and even small stone chambers. It is likely that in a fairly dense village, as it is common for the Tairona, there would be some areas left out to be used as cemeteries that possibly would minimally interfere with the areas commonly used as access, paths and house foundations. These cemeteries seem to coincide with middens like Excavations 7, C1 and C2. However, at the community scale the rough pattern of TT vessels is likely to be preserved, even if these storage vessels have multiple functions. It is likely that the vessels used in the household would have been used to bury members of that household maintaining a correspondence between the distribution of the vessels and the distribution of their former owners. After all, there is not one single cemetery in Chengue, but the burials seem to be everywhere. Some clusters of burials seem to be associated to layers of shells and domestic refuse, which strengthen the assumption that burials were made within the immediate vicinity of residences. It is likely that the TT form can be used as status markers because they are usually massive urns that would require a considerable investment in wood and labor to produce. The type of sampling procedure used and the size of the village do not allow for precise estimations of how many of these vessels were used in a house, but it is possible to identify concentrations of specimens associated to residential areas.

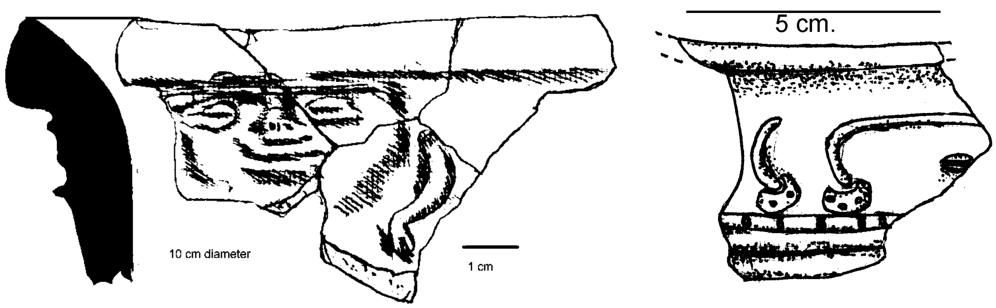


Figure 5.42 OT1 Form and Decoration Illustration (Carinated Jars).
OT1 faces and arm appliqués. The form and decoration suggest it was used to store and serve liquids, possibly partially buried to keep the liquid cool and to “strengthen” fermented maize as observed by Vasco (1987) and to some degree Angheira (1530). Both examples are T3 (Red Slipped) Example from Ex. 2 Level 1 and lot 257.

The distribution of large containers, or TT1 vessels and large OT1 pots is very particular. 100% of the TT1 vessels for this phase are found in a small section of RA 2 and but mostly in RA 3 and 4. The distribution of the OT1 pot, which appears to have been used for fermentation of maize or water storage appear to be almost identical (Figures 5,41, 5,43 and 5.44). The OT1 rims have been found to have a particular set of anthropomorphic decorations which are thought to be related to the idea of maize fermentation (Vasco 1987, Angheira 1986). It is likely that these vessels would have been used in activities directly involved or leading to feasting.

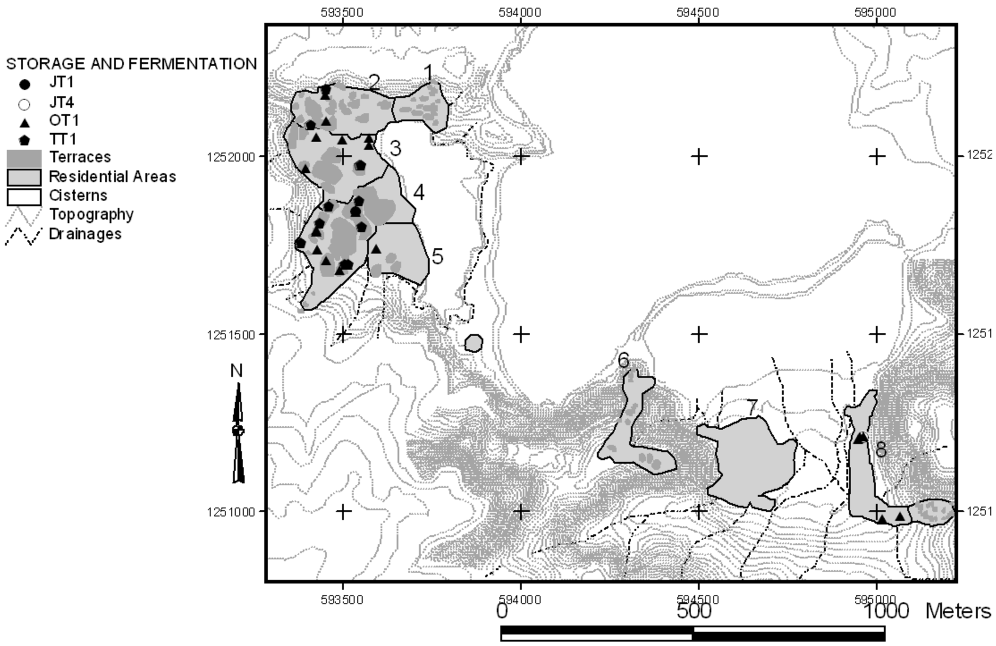


Figure 5.43 Storage and Fermentation Forms.

Jars with carination (JT1 and JT4), Straight rimmed "ollas" and large container vessels, OT1 with or without carination and TT1.

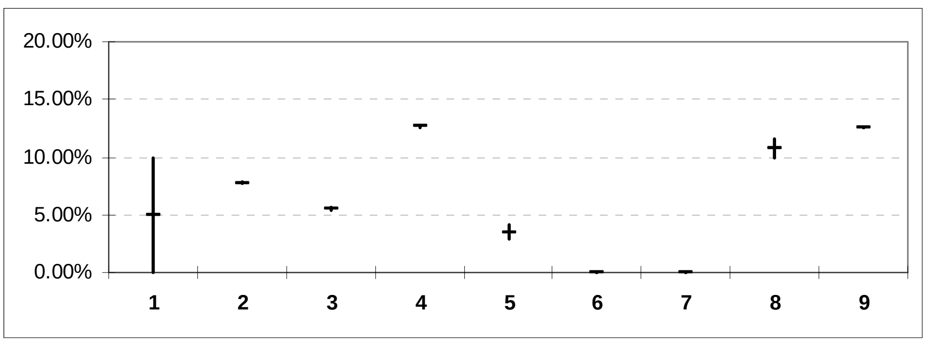


Figure 5.44 Proportions of Storage and Fermentation Forms.

RA 4 and 8 have a significantly higher proportion of these forms than the rest at the 95% confidence level. RA 9 had only one specimen.

Other forms that have been interpreted as service vessels and that may have been related to feasting activities are the BT1 vessels that can be easily describes as a deep service tray (Figure 5.45). The distribution of this form is strongly associated to RA 3 and 4, a pattern that is almost identical to the TT1, OT1 and "carinated" Jar distributions (Figure 5.46). The function of these forms is somewhat unclear. It was almost always found without decoration of any type although a few specimens have been found to contain small modeled figurines arranged in what appear to be rituals involving masked characters often arranged in a circle.

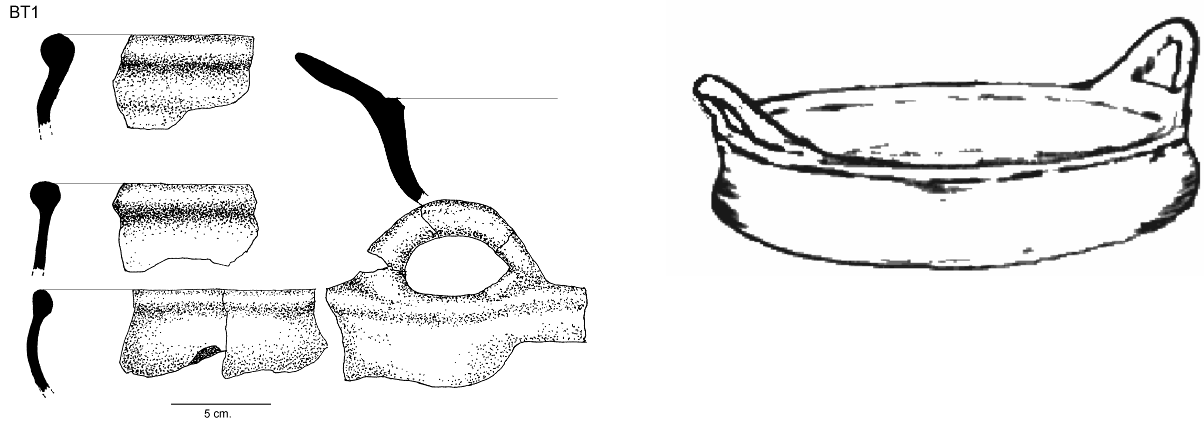


Figure 5.45 BT1 Form.

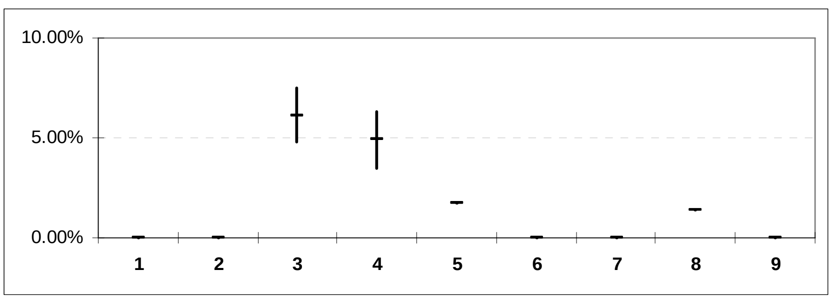


Figure 5.46 Proportion of BT1 Forms.
95% confidence intervals. The sample from RA 5 and 8 contain only 1 specimen each. Proportion out of the total number of identified forms.

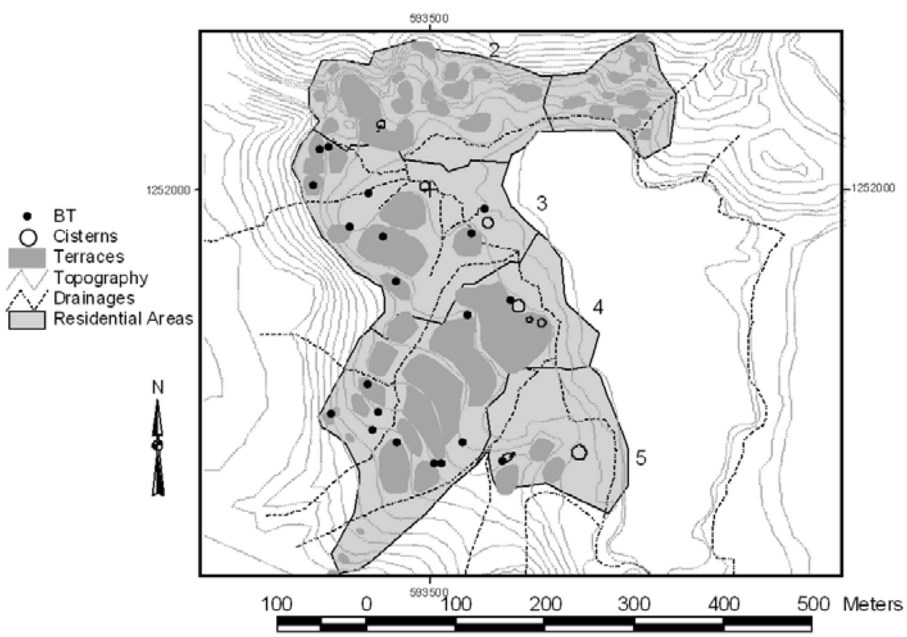


Figure 5.47 Distribution of BT1 Forms.

BT forms are predominantly found associated to the salt lagoon in areas 3 and 4.

Figure 5.48 Examples of Tetrapod Vessels.
Most of the specimens are *Black Slipped*, Fine Burnished Brown and Fine Burnished Tan.

Finally, the last group of vessels for this phase is what has been commonly called mamiform tetrapod vessels and stirrup vessels (Figure 5.48). In many cases the same kind of vessel described for the T1 phase can be found in the T2 phase assemblages, with small differences in surface treatment and style. It is quite possible that many of these vessels were part of family heirlooms and used for many years until finally put out of circulation. The very small size and portability of these vessels would suggest that they could have been easily moved around the village. However, the distribution of artifacts suggest that these were somewhat restricted objects, at least to part of the population living in area 1 and most of 2, 5, 6 and 9 (Figures 5.49 and 5.50). It appears that as in the case of the BT, TT and OT3 vessels residential area 4 has a higher proportion of these forms. In fact residential area 4 not only has more of everything, including living space, water and potentially roofed space. All these patterns can be interpreted as a fairly strong indicator that RA 4 contained elite residences. Furthermore, it strongly suggests that these residences were founded in the T1 phase, before most of area 1, 2, 5 and were occupied. It also appears to coincide roughly with one of the smallest clusters of B1 ceramics of Sector 1.

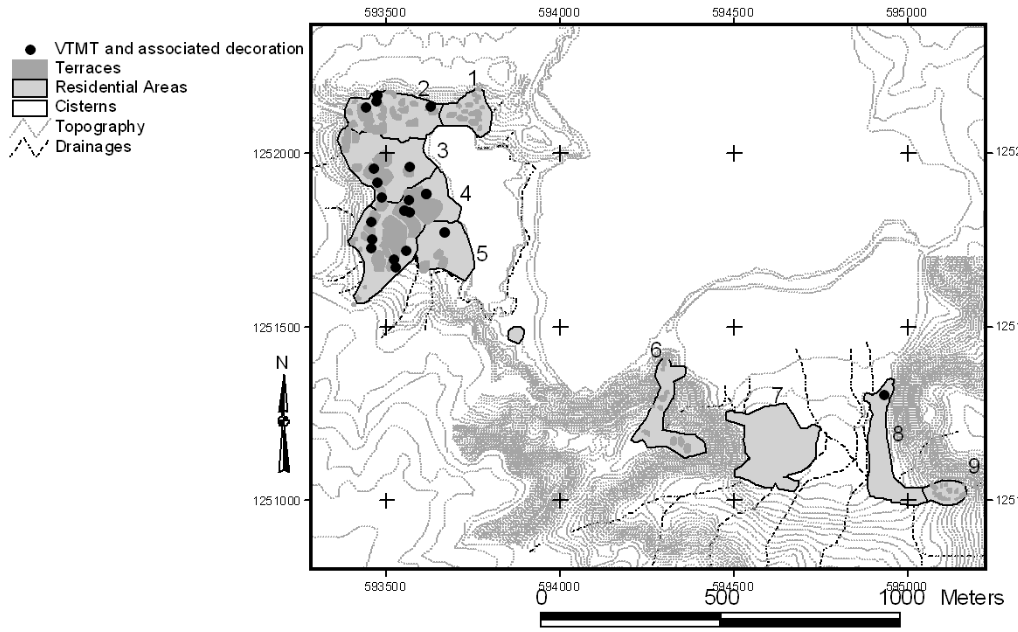


Figure 5.49 Distribution of Tetrapod Mamiform Vessels (VTMT).

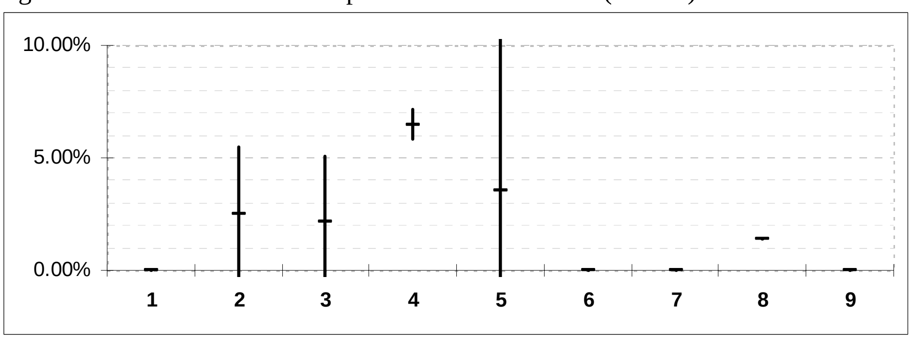


Figure 5.50 T2 Tetrapod Mamiform Vessels,
Intervals at the 80% confidence level.

THE T3 VILLAGE

The T3 phase village is the final village of Chengue. It is thought that the distribution of this phase represents the final extents of the village, but also the time when historical sources show that the Spanish-induced deterioration of the Tairona social organization occurred. It is very likely that all of the Tairona architectural features observed superficially were built and used mainly during this phase. There appears to be a small shift in what would be the most densely populated residential area from area 4 to area 3. Although the number of form variations classified as T3 is substantially less than those for the previous phase (31 for T3 vs. 43 for T2), there seems to be an increase in the amount of exotic ceramics, both of European origin and produced within the region of the Sierra Nevada de Santa Marta.

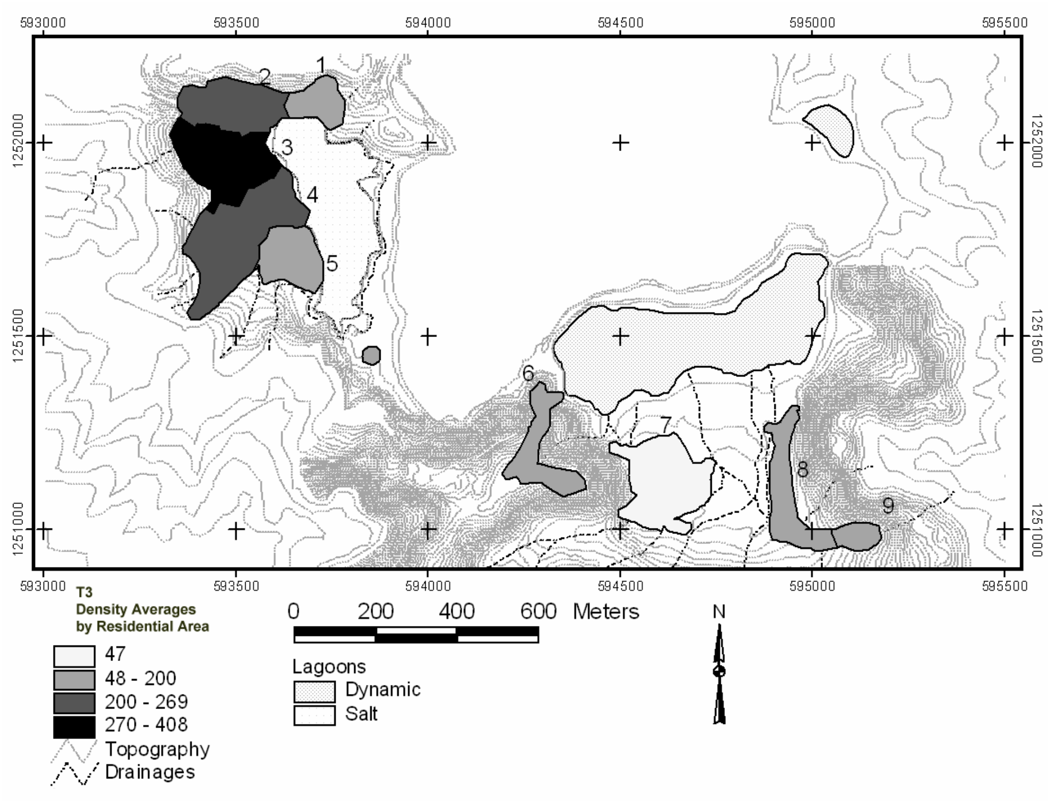


Figure 5.51 T3 Mean Ceramic Shard Density of Residential Areas.

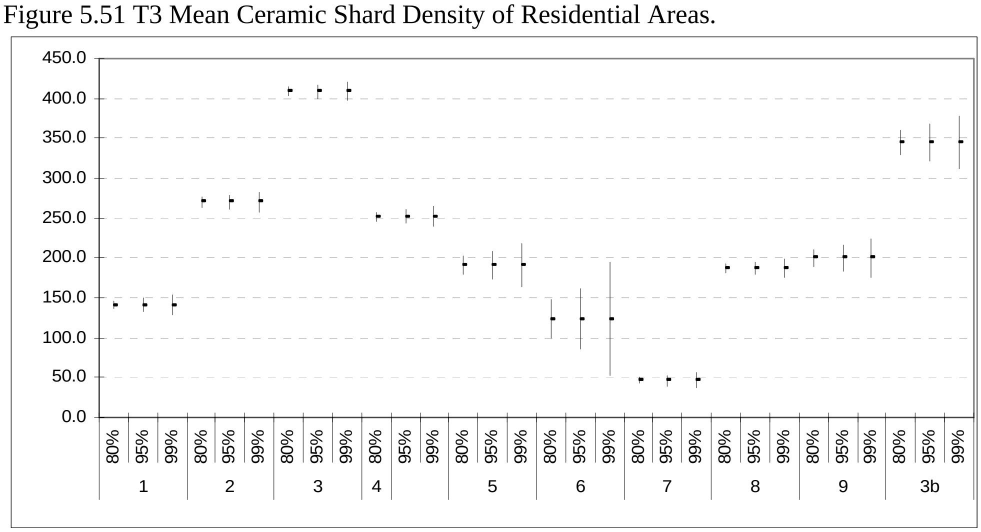


Figure 5.52 T3 Mean Ceramic Shard Density of Residential Areas.
The mean density for area 3 was calculated using all shovel probes and 3b (far right) only those shovel probes that were not on the floodplain of the lagoon. Density measured in shards per m3.

T3 Culinary Forms

Culinary forms, particularly the OT3 pot, are the most widespread forms. Uniform cooking pots found at Chengue in the T3 phase are different from the T2 phase OT3 pots in that they have a slightly different shape and a different surface treatment. The T3 phase cooking pots are almost always of the *Red Slip* type (often more orange than red).The T2 phase OT3 have a harder, more burnished, dark red, shiny surface called *Hard Red Slip*. Initially, this variation in surface treatment and shape was though to be a status marker or perhaps an indication of a different origin, but it would appear that all households had an abundance of these fairly large pots and that the difference is chronological. It would appear that the OT3 pot was the multipurpose vessel that could have been used for most or all domestic needs that required a large container, such as cooking, fermentation, storage or burial urns. Therefore, its presence or absence is not an indicator of status, yet high proportions of these vessels may be the result of more robust domestic economies. Significantly high proportions and frequencies of OT3 vessels are found in RA 4 and 8, which suggest that these two residential areas housed particularly well-off households, a pattern that continues from the T2 phase. Furthermore, a variant of the OT3 vessel, the OT2 vessels that has a rounder shape more commonly seen in the T2 phase, is found solely in areas 2,3 and 4. The higher density of residential area 3 does not seem to have higher proportions of any form in particular, yet it seems to have been a very large and shallow burial site for the T3 phase.

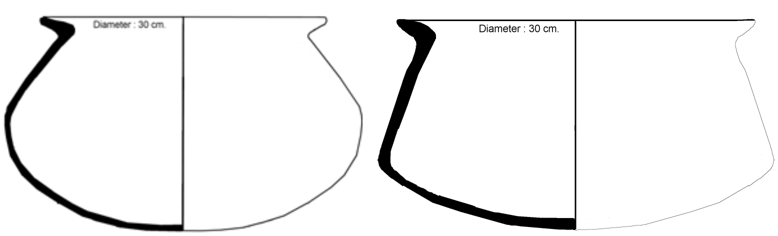


Figure 5.53 OT3 Vessels Shape Variations.

A rounder *Hard Red Slip* T2 phase (left) often made of a harder, darker ware with visible burnishing striations and a more angular round bottom *Red Slipped* T3 phase (Right) that is often orange and with a weaker yet homogenous slip. Specimens are from RA 2 and 9 respectively. Note: The thickness of the vessels shown above is not statistically representative of the population.

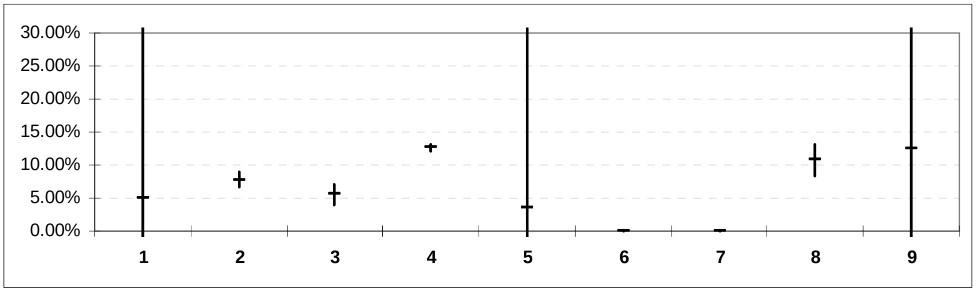


Figure 5.54 Proportions of T3 Phase OT3 Vessels by Residential Area.

T3 Storage, Fermentation and Feasting

Ceramics used for service and that are interpreted to be associated to feasting and storage have a similar distribution to the previous phase. However, the larger forms (TT) of T3 types are not found in as much abundance or proportions in area 4 as the T2 phase specimens. Area 9 has the highest proportion of this form but a small count. However, in terms of counts of TT forms, areas 3, 4 and 5 continue to have higher numbers. The compendium of very large forms (TT), OT1 forms and the similar JT6 and JT2 jars show an unusual pattern when compared to the T2 phase. Residential areas 5 and 9 have particularly high proportions of these groups of vessels a pattern slightly different from that from the T2 phase in that area 5 used to have. In terms of frequencies areas 3 and 4 continue to have high numbers. The slight change in area 5 can be interpreted as a shift or an expansion of residential area 4, which would result in middens having high proportions of the newer forms. RA 9 continues to have a particularly strong concentrations of storage forms for Sector 1. Service forms like the BT of T3 types are concentrated in residential are 4 and to a lesser degree in area 3, as they were in the previous phase, but with a slightly broader distribution of the form into areas 2 and 8 (See Figures 5.55 and 5.56).

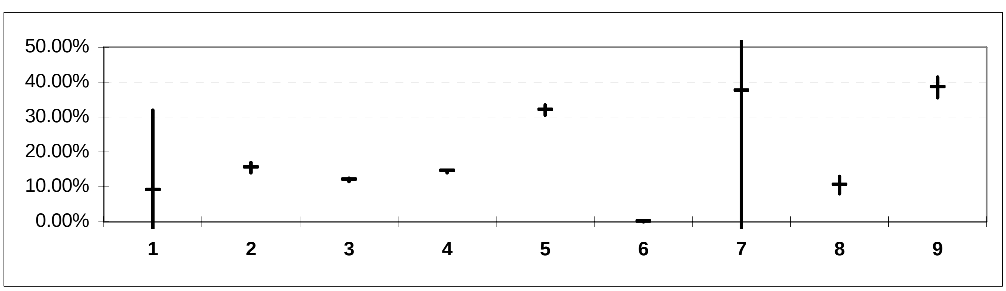


Figure 5.55 Proportions of T3 Phase TT, OT1 and JT6 Forms.
95% confidence level.

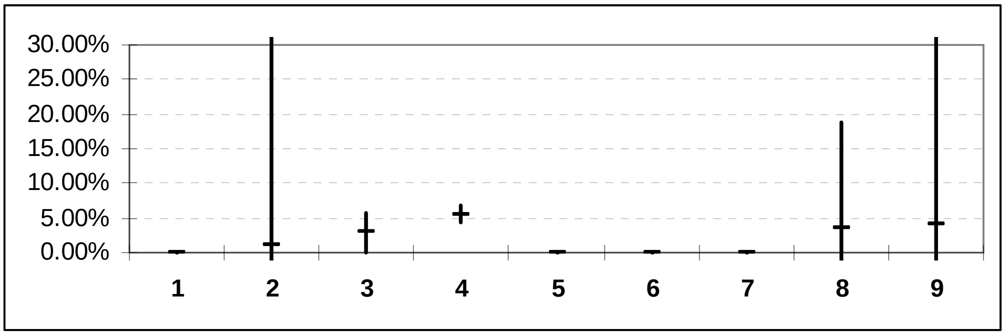


Figure 5.56 Proportions of BT Forms.
95% confidence level.

EXOTIC CERAMICS

Spanish Colonial Ceramics

The most evident and abundant exotic forms are probably the Spanish olive oil jars or botijas, which although somewhat varied in size have very particular ring-like opening, glaze and surface treatments that make them easily detectable (Lister and Lister 1989, Martin 1979). It has been suggests by Giraldo (2000) that these forms would have been preferred exchange items with the Europeans because they would contain fortified wine that would be easily preserved and of a higher value than the domestically produced “chicha. Furthermore, he suggests that fortified wine would have been an item controlled by the elites by establishing exchange relations with the Spanish that would have been hard to contest by any of the commoner households.

However, the distribution of these ceramics in Chengue shows a very homogenous pattern; there are no clear concentrations that would suggest that these containers were controlled by elites in Chengue (Figure 5.57 and 5.58). It is likely that being a coastal village it would have been a preferred exchange “port” between the Tairona and the Europeans. As mentioned by Castellanos (1944:348) in 1572 Chengue was commonly hosting French “pirates” or corsairs that routinely used the cove due to its very calm waters during tempestuous weather and evidently there were no Spanish to repel them most of the time. Castellanos narrates a specific event that took place in Chengue, in which a Tairona leader called Jebo (Xebo) exchanges gold artifacts for guns, ammunition, knives and swords.

Apparently, the first attempt from the French pirates, using a Basque interpreter, was to exchange wine from Sorrento, axes and machetes and body armor not gunpowder and swords which Jebo specifically requests. However, the most important piece of evidence other than the actual exchange is that the French and other Europeans had already established a rapport in their trade relations with the Tairona and that exchange was apparently routine. Unfortunately, it is likely that many of the relationships of Europeans with the Tairona were characterized by plunder and enslavement since the first contact in 1501 (Tovar 1993:100-110).

It would not be unusual for the French to exchange Spanish items as well, after all the particular group of pirates mentioned in the 1572 account had recently looted a Spanish ship which would provide the inhabitants of Chengue a relatively abundant, and somewhat unrestricted supply of exotic items, in exchange for gold artifacts and conceivably precious woods. It would appear that an abundant and continuous supply of exotic artifacts would have been progressively harder to control by the local elite which would have eroded the traditional Tairona diacritical feasting pattern (Dietler 2001). In terms of the ceramic distributions at hand the observed pattern of Spanish ceramics more closely resembles the distribution of common culinary items than those of feasting vessels, like the BT form. It is likely that the colonial economy slowly eroded the traditional boundary between elites. The distribution of Spanish ceramics is not a good indicator of Tairona status because in the 150 years of Tairona contact with the Spanish. Reutilization of Spanish, wares and the degradation of the Tairona social order may have produced the widespread distribution of artifacts observed. The deterioration of the capacity of the elites to maintain the value differences necessary in diacritical feasting and the differences with the commoners may have created the pattern observed for these ceramic types (See Figures 5.57 and 5.58). It is not unlikely that the use of botijas would have been so unrestricted that the container itself became a commodity and evidently was incorporated into the most common of Chengue's domestic environments. Additionally, the economic and political influence of the settlement of Santa Marta, however weak, was of importance in the exchange strategies of the Tairona, and the foundation of a Franciscan mission towards the end of the XVI century in Chengue probably made Spanish objects part of everyday life (Castellanos 1944,Tovar 1993:83). Furthermore, it is evident in the early 17th century documents that the Spanish targeted the Tairona elites first, weakening them and eventually destroying them which presumably would have resulted in the widespread use of items that were formerly restricted to the elite only years before the European contact (AGI 1602, Tirado 1937).

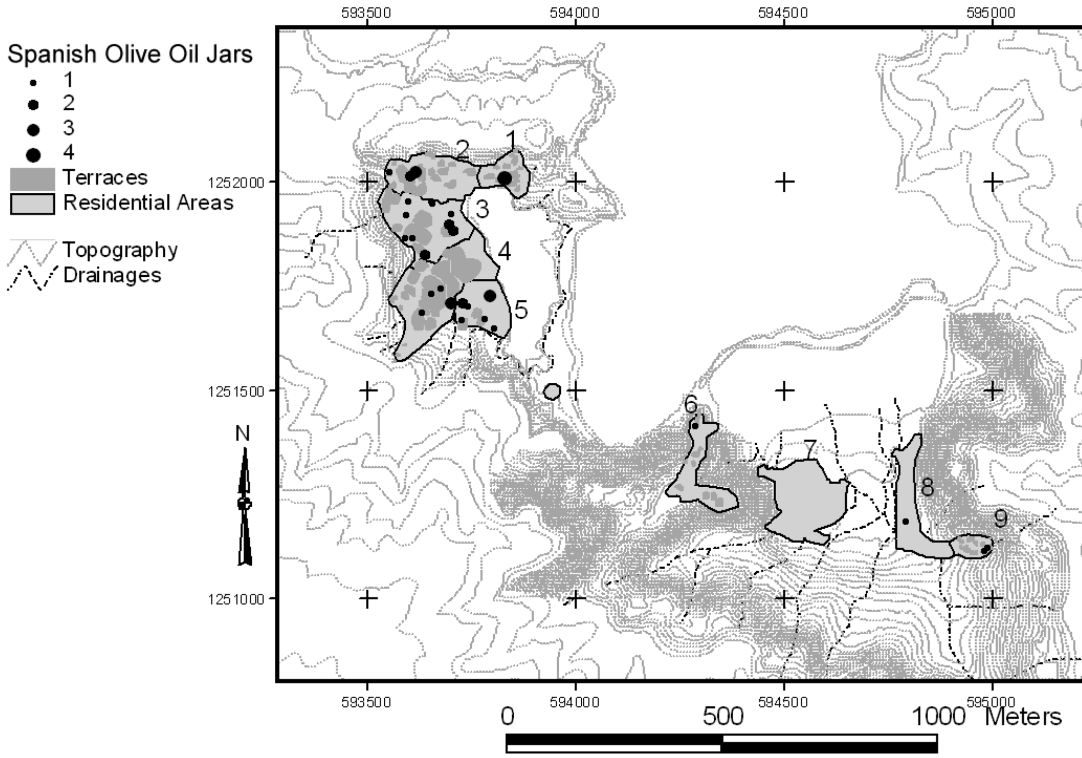


Figure 5.57 Distribution of Spanish Colonial Ceramics.
All of the Colonial ceramic forms identified were Spanish olive oil jars of various sizes (Lister and Lister 1989). Shown are counts of fragment per lot.

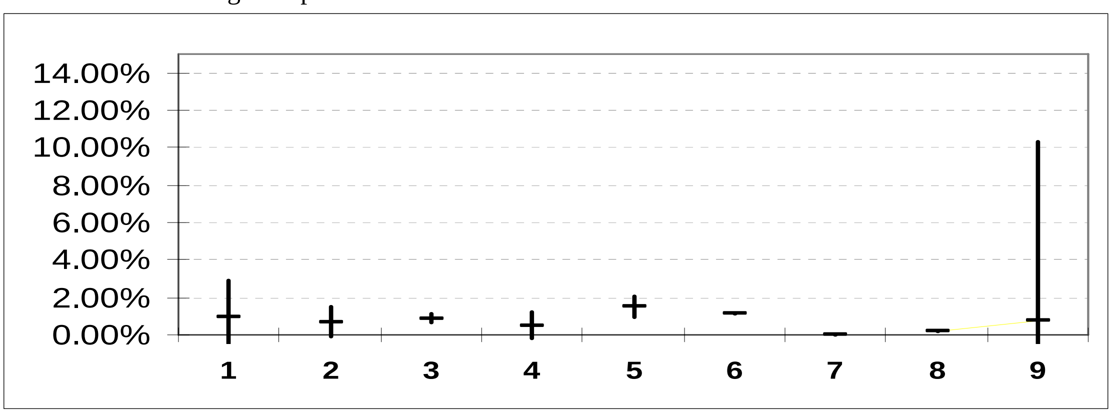


Figure 5.58 Proportion of Spanish Colonial Ceramics.
80% confidence intervals.

Dense Crème Ceramics

As it was mentioned in chapter 2, *Dense Crème* ceramics have been found in high proportion in the upper stretches of the Río Frío Valley located approximately 34 kilometers southwest of Chengue (Groot 1985). This type of ceramics is made of a very different material and styles to the common Tairona ceramics of any phase described until now, although it is strongly associated to the T3 phase (Murdy 1984:18). The amount of ceramics is minimal, it was found in most areas between 0% and .5%, only residential area 4 had a level of 1.5% which is barely a significant difference at the 70% confidence level. However, the fact that there were several areas with no ceramic at all helps to build a stronger argument that these ceramics were part of an exchange network that to which only some households had access. In fact, the distribution resembles that of feasting ceramics and small tetrapod vessels (Figure 5.59 and 5.60). This suggests that the local elite may have been more involved in medium range exchange networks

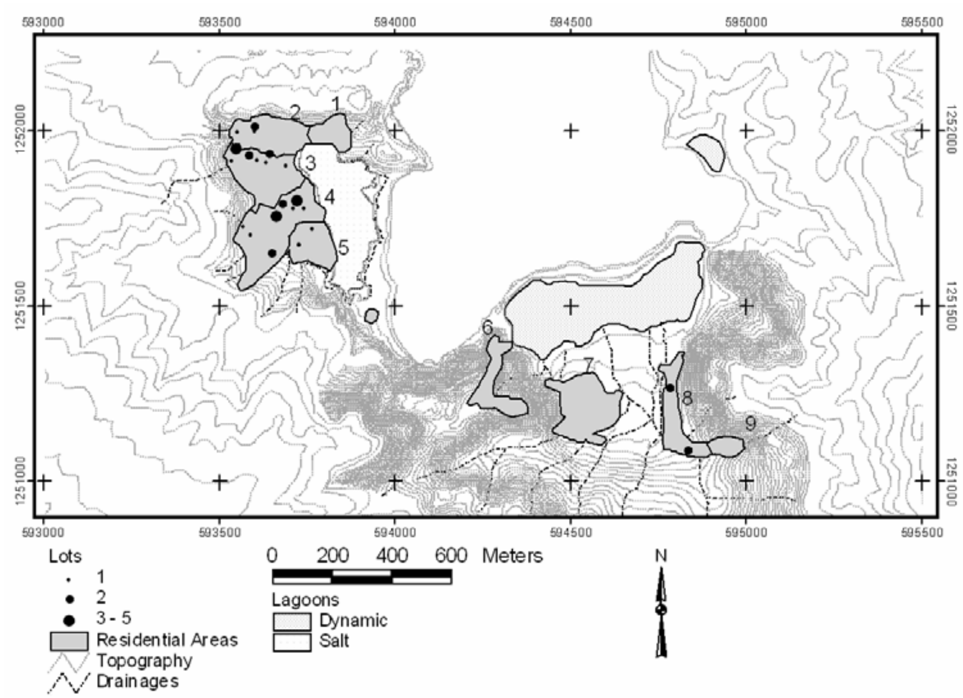


Figure 5.59 Distribution of Exotic Dense Crème ceramics.

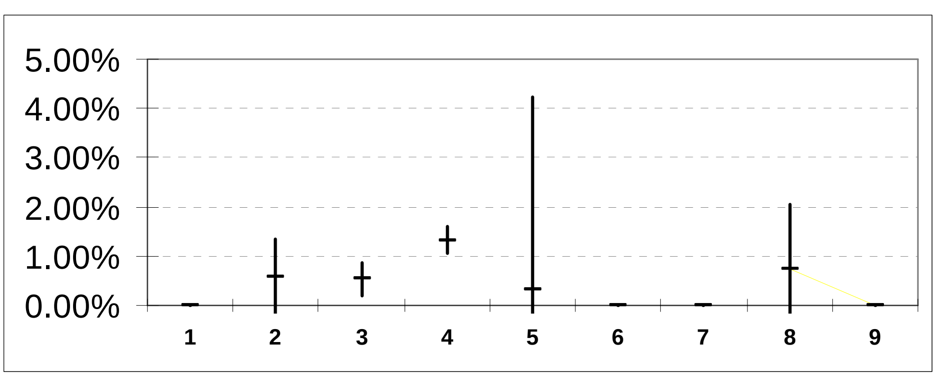


Figure 5.60 Proportions of Dense Crème Ceramics by Residential Area.
70% confidence intervals.

DEMOGRAPHIC IMPLICATIONS OF WELLS AND RESERVOIR

A particularly conspicuous part of the residential areas are wells and reservoirs. Only one true well was found in RA 4, which was until recently entirely paved in stone. The well is very deteriorated, mostly by looting and recent vandalism which makes it impossible to estimate the amount of water it yielded. There are 8 round water reservoirs, one that has been completely destroyed, 2 that still have stone fences and staircases around them and others that are not fenced of which 3 are heavily damaged and as a result measurements and function are unreliable (Figures 4.13, 4.14, 5.3, 5.4 and 5.8). The five best preserved reservoirs would have an estimated capacity of about 400 m^3 the other three perhaps around 290 m^3. Assuming that a family of 6 consumes a very conservative 13.5 m^3 of water per year (Scarborough 1988:30) only the 5 reservoirs would sustain 29 families or about 174 people, and if the remainder reservoirs were indeed used for water storage the 690 m^3 of water would have sustained about 59 families or 300 people for 12 months. However there is considerable precipitation during 3 months of the year which would allow water for 500 people for 9 months or 1000 people for 6 months. It is likely that the short rainy season in May could have replenished the reservoirs and other storage vessels until the stronger rains of September through December came. However, the reservoirs are not the only source of water in Chengue. Presumably the water well in RA 4 and domestic storage in large ceramic vessels could have supplied the remainder of the water needs for a population of about 1000 people, under the semi-arid conditions of Chengue. It is likely that the population in RA 4 and 5 controlled a considerable proportion of the water resources for Chengue during the month of February through April, which would be the dry season and the time when salt was extracted. It is not unlikely that the households in RA 4 would have been able to obtain an advantage and some degree of control over the labor of the rest of the population if they were able to produce more and better chicha during the salt harvest. In turn this may explain the distribution of feasting wares associated to this part of Chengue.

Figure 5.61 Detail of the Remains a Circular Stone Fence Around a Reservoir in RA 4.
The stones are about 1 m tall and are still placed all around the reservoir measuring about 16 meters in diameter

CHAPTER SUMMARY.

The distribution of ceramic forms of the residential areas of Chengue over time shows an increment in its variability from the N1 phase to the T2 phase. The trend also shows that there are increasingly significant differences in the distribution of some ceramic forms that are indicative either of religious specialist, in the case of ceremonial vessels or storage and feasting specialists in the case of larger forms and some service vessels. The distributions for feasting vessels and specially decorated and fine ceramics tend to coincide with the distribution of larger residential platforms, large water containers and reservoirs and denser ceramic deposits. The distribution of ceramics in area 7 during the B1 phase and area 4 during the entire Tairona period, but particularly during the T1-T2 phases, strongly suggests that there was some form of social differentiation between households. However, these differences are not very evident until the T2 phase when the ceramic distribution suggests economic differences between residential wards. It appears that the residential areas with the highest ceramic densities also have a more diverse set of ceramics and particularly of larger forms and ceremonial forms (VTMT and offering urns) which in turn suggests that elites in the T2 phase had a greater access to regional exchange networks than before. Judging by the presence of *Dense Crème* ceramics and the documented use of gold artifacts the exchange network was at least 35 km in radius extending from the Rio Frio valley where *Dense Crème* ceramics is thought to have originated and to the Buritaca valley, where it is likely that gold artifacts were produced.

Some residential groups that appear to have had lower status families appear to be relatively short lived, particularly evident for the T3 phase remains, and were located in areas that had less and smaller houses, little or no stone structures, limited access to fresh water and located on steeper slopes. These areas appear to have lower densities, smaller forms, and fewer if any ceremonial forms and would have been inhabited relatively late in the sequence, probably towards the end of the T2 phase or later. Residential areas 1, 5 and 9 appear to have characteristics that show changes in the social structure towards the T3 phase.

Residential Area 9, in Sector 2 appears to have similarities to the peripheral areas of Sector 1, although the terracing in this area is very evident it is not particularly large, and has few indications it was a well-off part of the community as area 4 appears to have been. Furthermore, areas 8 and 9 may have been part of the neighboring community, Gairaca, more than part of Chengue. For one part, there is a relative population vacuum in area 6 and 7 during the phases of higher population concentration and the distance between areas 8 and 9 and those in Sector 1 are about the same as the distance between the most densely settled area of Gairaca, about 1.4 kilometers. There are also particular concentrations of service and ceremonial ceramic forms that are probably associated to feasting and that are very rare in areas like areas 1 and 6.

This suggests that there were two or three distinct social groups that were probably hierarchically organized. During the Tairona period the two sectors of Chengue were possibly two different villages organized around different economic activities. The one in Sector 1, having a well defined territory and clearer differences between residential groups that seem to last for a fairly long time, would appear organized in a more hierarchical way than in Sector 2. The Sector 2 residences had distributions of feasting and ceremonial ceramics that are somewhat analogous to those found in Sector 1, but at a much smaller scale which reinforces the idea that there was a similar yet independent social structure to that of the community associated to salt production. Table 5.1 shows a ranking of the residential areas based on the distribution of ceramics, and architectural elaboration for the T2 and T3 phases, which suggests that most of the population could be classified as high ranking or “elite”. For the other phases N1-T1 it is impossible to produce this type of ranking between residential areas.

RA	Population Min.	Population Maximum	Proportion
1	63	79	6.0%
2	155	194	14.6%
3	172	215	16.1%
4	420	525	39.5%
5	35	43	3.3%
6	26	32	2.4%
8	154	193	14.5%
9	38	48	3.6%
Total	1066	1333	100.0%

Status	RA	Population	Proportion
Poor	1,2,6,7	307	23.0%
Middle	3,8,9	457	34.3%
“Elite”	4,5	570	42.7%
Total		1333	100.0%

Table 5.1Proportion of the Population by Rank.

The demographic calculations are based on terrace size, except for RA 8 which a based on the population density is found in RA multiplied by the area of RA 8.

CHAPTER 6: ENVIRONMENTAL, ECONOMIC AND SOCIAL CHANGE OF CHENGUE

INTRODUCTION

In the previous chapter, the settlement pattern data suggested that there were significant transformations in the size of the settlements of Chengue that were probably the result of changes in the domestic economy over the 1800 year sequence. The most evident changes were the formation of a very small village (1.3 ha to 3 ha) in the N1 and B1 phases and a transition to a very large village (17ha) in the T1 phase that culminated in the T2 and T3 phases, both closely associated to the salt producing lagoon of Chengue. The settlement distribution alone suggests that the domestic economies of the population must have been severely altered during the T1 transition. Although the Nehuange and Buritaca phases continue to have a myriad of unanswered questions about their social organization, architecture, economy, politics and lifestyles, there are some hints about their domestic economies, coming from the collection of lithic, botanical and faunal remains that will be discussed in this chapter.

THE SUBSISTENCE ECONOMY AND ENVIRONMENTAL CHANGES IN CHENGUE

It is likely that the marine environment of the Bay during the Nehuange and Buritaca phases was not radically different from the modern environment. However, small changes in sea level can produce large changes in coral reef productivity for a few decades, while the ecosystem adapts. It has been suggested in chapter 3 that these changes were caused by tectonic uplift in 575 AD as suggested by Oyuela-Caicedo (1987a) and Van de Hammen and

Noldus (1986) although new calibration methods for C14 dates and new evidence strongly suggests this event occurred ca. 950 AD. The Santa Marta area is classified as an area of moderate tectonic activity. The environmental changes produced by tectonics and climate changes may have resulted in strong economic impacts on human populations living off these ecosystems. However, it is unlikely that any of these events would have completely obliterated the ecosystems surrounding Chengue, because of their high diversity; multiple yet small food sources may always be available for the very low human population sizes during the N1 and B1 phases. However with larger populations the pressure on the ecosystem would have produced a strong effect on the human population assuming that the communities maintained self sufficient economies. Evidently, this is not the case, in the Tairona period there was a regional economy that allowed the population living in Chengue to supplement the diversity of their resources through exchange.

From a strict agronomic perspective the food producing prospects of the region are fairly low (Langebaek 2005: 45, Langebaek and Dever 2002) and using only this perspective would strongly bias the estimates of the resources available to a settlement in Chengue. From a hydrological point of view Chengue and the other coves are challenging environments for agriculture; however agriculture is not the only source of food available in any of the bays. Even under ideal hydrological conditions it is likely that fishing, gathering and hunting would outweigh the capacity of the region's agricultural potential. In terms of their overall biotic capacity, the bays of the Parque Tairona and surrounding area are particularly productive. Chengue, as well as all the other bays, has a range of biomes that are rated as the most productive in the world in terms of food-producing capacity and other renewable resources and services. Estuaries, sea grass beds, algae beds, coral reefs, tidal marsh, mangroves and continental coastal environments are all present in Chengue and all of them are among the highest food producers in the planet (Constanza et al. 1997:256, Garzón y Rodriguez 2003, Dias et al. 2000). However, food production is only one of the benefits of living near these environments and many services are provided by coastal ecosystems that may compensate, at least in part, for the difficulty of obtaining fresh water and limited agricultural potential. An important aspect that has to be considered is that these environments have the highest capacity in the world to absorb and recycle waste into nutrients. Under these premises it is conceivable that large human population could in fact contribute to the ecosystem's capacity to produce food and at the same time get rid of most waste accumulations, something that the Tairona seem to have had in mind when Pueblito, B200 and other villages were built.

Furthermore, it would be possible that the past human occupations would have stimulated the growth of coral reefs, sea grass beds and intertidal mollusk populations (44 species were identified from archaeological remains). The sanitary benefits may be considerable also and would have allowed for the higher population densities, as observed in Chengue. Large and dense populations are likely to over exploit the land resulting in severe deforestation and the resulting erosion can harm the coastal environments and severely reduce their productivity; this may have happened at time during the T2 and T3 phases. Although the levels of deforestation necessary for this type of dynamics have only been observed under industrialization process and urbanism (Downing et al.1999) there is strong evidence that destruction of the forest by human influence was a reality since the very beginning of the archaeological sequence (Herrera 1985, Cavelier et al 1998:909). Although it is likely that high population densities, as those seen in T2 and T3 phases could negatively impact the biotic productivity and reduce the carrying capacity of the lagoons, it is also very likely that the economy of the villages at this stage is radically different from the earlier periods and specialization and exchange allowed the local population to obtain much of its food from other communities that had higher agricultural productivity. This means that in the initial stages there may have been very little problem sustaining Chengue's resident population, but towards the end of the sequence this may have been increasingly difficult.

Chengue's Paleoclimatic Record

As it was discussed above Chengue's semi-arid environment is particularly susceptible to precipitation changes, for this reason, special attention will be paid to this aspect of the paleoclimatic record (See Figures 6.1 and 6.3). Several of Chengue's excavations showed changes in the rates of sedimentation and grain size or texture of the soils that can be interpreted as a paleoclimatic signal. The geomorphology and geology of the small drainage is a key factor in the interpretation of the paleoclimatic record reconstructed from the sedimentology of excavations along the floodplain of Sector 2. Although the drainage is barely 5 kilometers long, it has a very steep slope which results in a very energetic water torrent that is able to transport fairly large amounts of sediment of fairly large grain size. The size and speed of the deposition of this material on the flood plain appears to be directly related to precipitation. During periods of higher precipitation thicker and heavier material would deposit in a slightly larger area along the edges of the floodplain. Excavations 2, 7 and 9 were particularly deep and located in a part of Chengue that would be susceptible to flooding during periods of particularly high precipitation. In all excavations Buritaca phase (B1) ceramics associated to carbon dated to ca. 500 AD were found directly above or embedded in a thin stratum of thicker gravel. The sediment below this layer is characterized by very fine particles and practically no gravel. The soils immediately above the gravel layer are finer but still contain a somewhat coarser texture. The next significant break in texture occurs in stratums that were associated to Tairona ceramics and were carbon dated to the T2 phase. The thick gravel associated to these deposits shows signs of being transported by higher volumes of water. Under normal modern conditions a site near a drainage would typically have a very slow seasonal surface flow. The layer of gravel observed in all excavations along Residential Area 8 is significantly thick and composed of larger gravel than the ca. 500 AD stratum (see Figure 6.1). These very thick gravel layers are likely to have been transported by precipitation much higher than the one observed today and a possibly combined with deforestation. However, the fact that there were several burials detected on the upper strata of these excavations suggests that precipitation rates are responsible for the gravel deposits, and that these deposits would have been formed at an earlier time than the moment of the burial. This would suggest that there was higher precipitation during the T2 phase and lower precipitation during the T3 phase ca. 1450 to the 1500's. The strata composed of silty clay soils is characteristic of hot and dry environments where very small particle size is produced by microbial action in well aerated soils, not necessarily by slow deposition of small particles as it would be expected in clays formed by alluvial action. This suggests that silty clayey soils were formed under hot and dry climatic conditions similar to the present ones and have low formation rates. For example the rate of .58 mm/yr in Excavation 9 between ca. 200 BC and ca. 500 AD increases to .82 for the period between ca. 500 AD and ca. 1350 AD and then drops to .52mm/yr between then and the time the modern surface is formed (see Table 6.1). The variability in the deposition rate is greater the closer the site is to the drainage, as in Excavation 7 where rate is 1.4 mm/year since ca. 500 AD but shows extreme variation in the grain size which suggests that there were periods of extremely high formation rates possibly between 1200 AD and 1400 AD. This implies that there was a dry period between ca. 300 BC and ca. 500 AD, a period with wetter than current conditions ca. 500, possibly between 450 AD and 550 AD and a somewhat dryer period between 550 AD and 1200 AD (see Figure 6.1, 6.2 and 6.3). It is unclear exactly how much drier this last period would have been but very thin layers of thicker material were observed which suggest episodes of a fairly humid environment, assuming that thicker gravel is the result of more abundant precipitation and energetic water flow. The 300BC to ca. 500 AD dry period has extremely homogenous rock free clayey soils which suggest very dry and stable conditions that allowed plants to form a soil with extremely small particle size. Below the earliest strata with cultural deposits there were soils of thicker gravel in excavations 7 and 9 which suggests wetter than modern conditions before ca. 300 BC. This lasts for a relatively short time and again there are soils that suggest dry condition. However, deforestation caused by humans can also increase erosion and the energy with which water torrents would flow through the drainages which can also increase the amount of gravel and seasonal flooding.

Another excavation that has a particularly clear and detailed record of the last 1000 years of climatic change for Chengue is Excavation 16. From a core extracted from the floodplain of the salt lagoon 2 radiocarbon dates determined that the oldest sediments were about 1000 years old and that the deposits were the result of a fairly constant rate of deposition (roughly 1 mm/year). As it is described in chapter 3, (Figure 3.4) the core shows variations in grain size, gley type soils and oxic layers that appear and disappear between zones of higher grained sediments which suggest fairly strong changes in precipitation and anthropic influence after 1200 AD. The same can be said in Excavations 2,7 and 9. Excavation 16 is on a floodplain and in an area that would record the highest range of variation in the extents of the lagoon because it is seasonally flooded by a very slow moving streams and completely dry during at least 9 months of the year. However, the drainage that feeds this floodplain is truly small, much smaller than that from sector 2; just about 2 kilometers long and located in an even dryer section of Chengue which results in very extreme seasonality. These factors in combination to the flat marine plain formed by the lake produce a very slow rate of sedimentation that currently deposits very fine material.

In the past, very dry years would have produced oxidation of the surface that created very hard layers of mineralized deposits when the surface was baked by the sun. These oxic layers intertwined with very thin deposits of fine gley soils and charcoal, the result of waterlogged soils. This pattern composes the modern sediment and the sediment deposited in the past 150 years, assuming the 1mm/year formation rate. Older deposits are extremely hard and show oxic layers that very extremely resistant. The yearly seasonal variation is so extreme and the sedimentation so fine that each yearly cycle of desiccation and flooding can be counted on the first 15 centimeters of the deposit. The variation in grain size and the apparently cyclical disappearance of the oxidized layers can be interpreted as periods of wetter than current conditions and periods of similar to modern conditions.

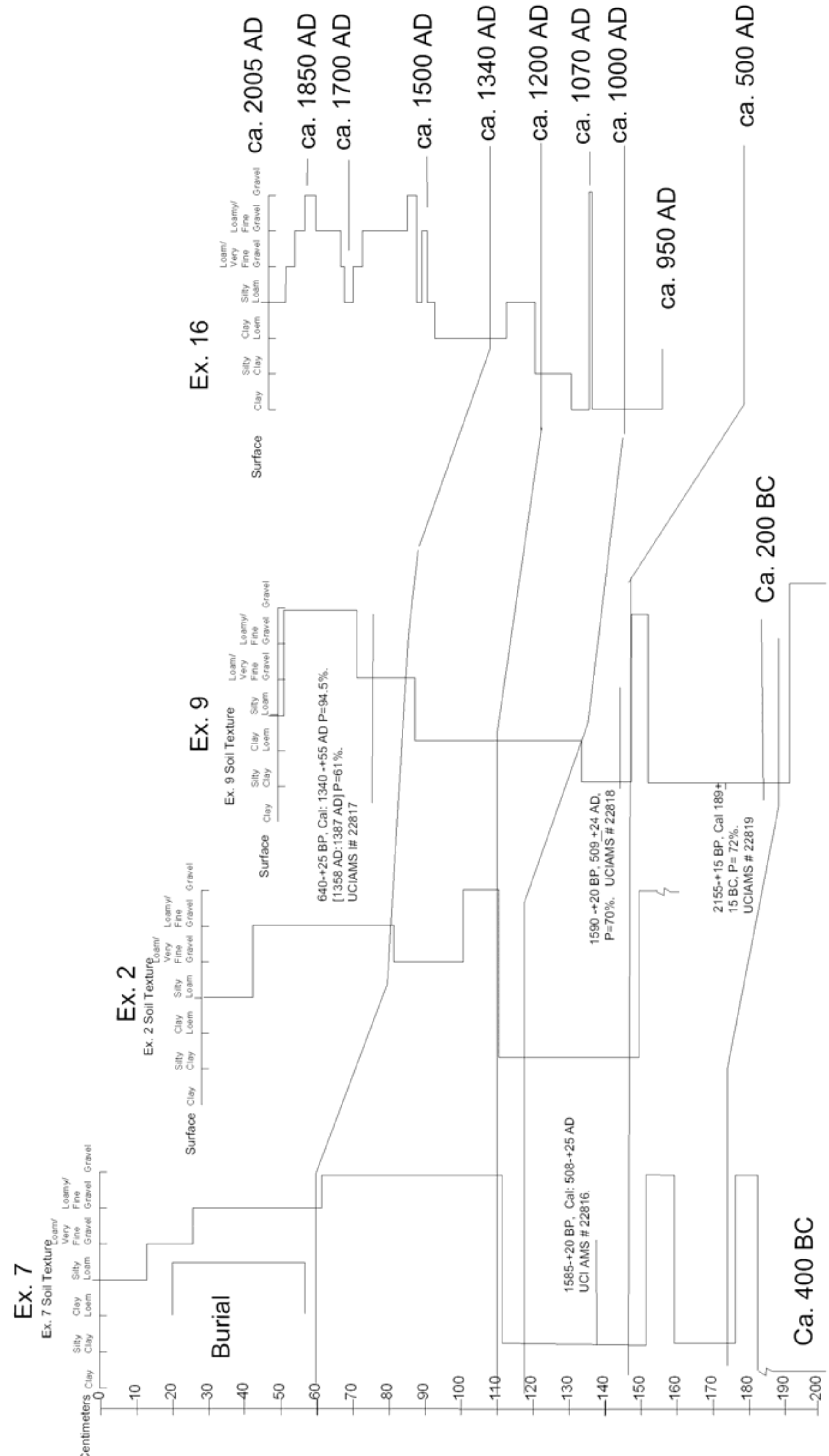


Figure 6.1 Soil Texture and Radiocarbon Dates of Excavation 2,7,9 and 16.

It is hard to establish if the dry conditions of the past were dryer than current conditions or not. However, the reconstructed climate for the last 1000 years in Chengue suggests that there were dry conditions during most of the T2 phase, between 1200 AD and 1350 AD (73 cm and 58 cm in Figure 3.4 and 6.1), and progressively wetter conditions between 1350 AD and ca. 1600 AD (50 cm and 45 cm.). However, this last wet zone has variations in grain size that appear to be very erratic towards the end. It would seem that the following 150 years, between ca. 1600 to ca. 1750, the climate had extreme seasonality and was very dry, much like what is observed today, followed by a wet period that peaked at around ca. 1870 AD and then a progressively dryer environment from then on (see Figure 6.1 and Table 6.1).

Excavation	mm of soil/ year	Years	Soil in Cm.	Time Segment
9	0.52	640	330	Present to 1340 AD
	0.82	850	700	1340 -509 AD
	0.58	690	400	509 AD-189 BC
7	1.4	1000	1400	ca.1500 to 508 AD
16	0.93	806	750	Present-1198
	1.33	181	240	1198-1018 AD
Cienaga Grande de Sta. Marta.	1.4			
14	10	200	2000	ca.1600-1405
15	6.84	117	800	1488-1371
	1.19	504	600	Present-1488
12	5.41	185	1000	ca.1550-1335 AD
Abandoned stone floors	0.025	400	10	Present-ca. 1600 AD

Table 6.1 A Soil formation Rates for Excavations 9,7,16,14,15,12 and Stone Floor in Sector 2. Cienaga Grande de Santa Marta sedimentation (1.4 mm/year) from (Van der Hammen and Noldus 1984:584). The data can be interpreted as a baseline sedimentation rate for a relatively stable environment.

Paleoclimatic Reconstructions of the Parque Tairona

There are recent paleoclimatic reconstructions that evaluate multiple signals and reconstruct the climatic variation in the northern part of South America by taking into consideration some of the specific causes for these changes, such as solar forcing evident in glacial advance and retreat, variations in the ITCZ and atmospheric temperature. The reconstruction proposed by Polissar et al (2006) coincides quite well with the climatic reconstruction obtained from Chengue's sedimentology. Polissar et al's conclusions support the idea that glaciers are more susceptible to solar forcing than any of the other factors alone, but remain as a good indicator for precipitation. Other reconstructions of the paleoclimatic record question the use of glacier advance measured by ELA (equilibrium line altitude) for paleoclimatic reconstructions at a continental scale without further research (Lachiniet and Vazquez-Selem 2005). However, these signals appear to be useful at a wide scale yet they are more reliable only a very local scale (Lachinet and Vazques-Selem 2005:142). The most commonly used climatic reconstruction for the Santa Marta region is the Van der Hammen and Noldus (1986) report. Several of its observations on peat, pollen and sedimentology of the Magdalena River and the Cienaga Grande costal lake have been used to reconstruct a series of variations in the precipitation of the region (Langebaek 2005, Langebaek, Cuellar and Dever 1998, Ardila 1996). Van der Hammen's reconstructions are problematic for Chengue's case because they are intended to explain trends at very large scale; affected by the complex Cauca and Magdalena basins that are affected by precipitation systems from the Pacific littoral and the Amazonia along 1500 kilometers. For this reason the variations in the level of the lower Magdalena River measured from peat deposits are an indicator of the general conditions in the Colombian northern Andes but are not as a reliable record for the climate of Chengue, which is pretty much an isolated basin. Furthermore, Chengue's location at 11.4°N is at a latitude that is likely to be strongly affected by variations in ITCZ (Inter Tropical Convergence Zone) than most of the Magdalena river basin. For this reason the paleoclimatic record of high Andean lakes and lakes fed by high glaciers at similar latitudes are likely to be a more reliable signal for paleoclimatology of the Santa Marta region.

Van der Hammen (1984:569) demonstrates that there is a glacial advance between 1500 and 1850 which coincides with the magnetic susceptibility observations for lake Mucubaji in Venezuela (Polissar et al 2005:8938) which provide higher resolution data than moraine dating which is the data provided by Van de Hammen. This suggests that although there were multiple factors influencing the climate of the region, similar wetter conditions were present during this period in the Venezuelan Andes and the Sierra Nevada de Santa Marta. However, the compendium of data from Polissar et al (2006) also shows that there was a great deal of climatic variation between 1200 AD and 1800 AD, with glacial advances and retreats that apparently are not necessarily indicative of precipitation variations in the subregion specific to Chengue. However, the indicators for precipitation derived from magnetic susceptibility alone would be indicative of the sedimentological pattern observed in Chengue and a good match for Lake Mucubaji signal and the *Cyperaceae* pollen record shown in the same publication. This suggests that periods of higher precipitation tend to coincide with glacial advances in the Venezuelan Andes and the Sierra Nevada de Santa Marta. This creates a basis for the estimation of the precipitation based on the sedimentology of isolated coastal basins like Chengue (Table 6.2).

Years AD	Phase	Climatic Variation.	Dry	Wet	Wetter.
2000		Modern condition, Dry			
1950					
1900		Progressively dryer			
1850		Wetter than modern			
1800		Progressively wetter			
1700		Similar to modern dry			
1600		Progressively dryer			
1500	T3				
1400		Wetter than modern			
1300	T2				
1200		Dry similar to modern or dryer.			
1100		Wetter than modern.			
1000	T1				
900					
800		Very dry, similar to modern.			
700					
600	B1	Somewhat wetter than modern.			
500					
400					
300					
200		Dry, possibly dryer than modern.			
100	N1				
0					
-100					
-200					
-300		Possibly wetter			
-400					

Table 6.2 Summary of Precipitation Change in Chengue's Archaeological Sequence.

As a result most of the salt production in Chengue occurred during a period of relatively cold and wet weather. However, the surface conditions of the salt lagoon suggest that the lagoon was drained or modified in a way that aided in the desiccation process. The specific relations between climate and economic processes will be discussed further in the following sections.

The effects of rainfall in the marine ecosystem

Rainfall has a strong effect in the productivity of the marine ecosystems of Chengue and its neighboring bays. In turn this would have affected the subsistence economy and sustainability of fishing and gathering households. Coastal ecosystems, like Thallassia testudinum (sea grass) are very fragile and can be severely affected by sea level change and rainfall which in turn would have affected the availability of food, particularly mollusks. The relation between rainfall and food productivity in Chengue's Thallassia beds shows a nearly perfect correlation between rainfall and productivity (Garzón–Ferreira and Rodriguez–Ramirez 2003). Furthermore, the overall abundance of all species is greatly affected by rainfall received in the bay, surrounding area and possibly human intervention. A comparative study of the bays of Chengue, Nehuange and Cinto showed that the bays with larger human activity and population had progressively higher abundance and richness of the species commonly found in sea grass. The cause of this is an increase in runoff of nutrients into the Thallassia testudinum prairies provided by local drainages and in a lesser degree by seasonal shifts in the currents that cause upwelling and variations between 23^{o}C and 31^{o}C, which is considerable for a tropical environment, and tend to allow the entrance of more benthic fish into the bay (Garzón-Ferreira and Rodriguez-Ramirez 2003a). However, the diversity of the marine populations is not affected and Chengue remains the ecosystem with the highest diversity, although it has the lowest abundance and richness. Furthermore, comparative studies on the proportion of chlorophyll dissolved in the lagoons and Thallassia fields strongly suggests that Chengue is not an oligotrophic environment (nutrient starved), but rather the contrary. This is important because it shows that the capacity of the ecosystem to react to slight increases in precipitation is enormous. The study was conducted in a time period that included relatively dry years, so it shows next to worst case conditions for dryness and loss of productivity between dry and rainy season for Chengue and Nehuange and an inverse scenario for Cinto, which increased its productivity threefold in the dry season. Very detailed studies that have systematically collected data for more than a decade show the extreme effect rainfall and possibly low density human habitation (Cinto was the only one with a small permanent human population) have on Thallassia ecosystems productivity (Franke 2003, Garzón-Ferreira and Rodriguez-Ramirez 2003a). However, Franke (2003) concludes that the variations in productivity seen in Chengue and Cinto are the result of a strong variation in rainfall between bays, being the ones on the west progressively dryer to those in the eastern side of the Parque Tairona. This suggests that with higher rainfall, like the one present for a short time between the N1 and B1 (ca. 500 AD) periods, the carrying capacity of the ecosystem in Chengue would have been similar to modern times in Cinto, but during most of the N1 and B1 periods the environment was consistently dry, similar to what it is today. This means that peaks in rainfall, like the one that is evident around 500 AD to 550 AD would increase the productivity of the whole ecosystem, marine and terrestrial by more than 300%. This is considering that the increase was similar to Cinto's modern rainfall, that is significantly higher rainfall than Chengue, between 500 and 750 mm or about 2 to 3 times and consequently an abundance index more than 300% higher. The study on Chengue's overall environmental productivity shows that the current dry environment barely sustains mangroves; a slight variation towards a dryer environment could kill the Rizophora colonies and probably destroy the coastal lagoons; salinity levels in Chengue frequently reach 40% which is near the edge of the tolerance for *Rizophora M*. (Garzón-Ferreira and Rodriguez-Ramirez 2003a, 2003 b). The death of all or part of the mangroves would have severe changes in the coastline, erosion of the sand banks would be very likely, but the conditions for Thallassia and various types of coral colonies and other invertebrates would remain minimally affected. A scenario where the mangroves were not present or severely effected by dry climate is possible during the Nehuange phase. Coring of the Salt Lagoon showed that there were strong changes to the climate of the lagoon over the past 1500 years. In Excavation 16, below the sediment characteristic of mangrove growth, and under strata containing the remains of *Mytilus Sp* or *Brachiodontes Sp.* colonies, there is very sandy gray sediment and below this sediment resembling that of a sandy beach, which could be as old as the N1 phase. This would be possible only under conditions very different to the present and it would probably occur in the event of conditions dryer than today's where fresh water was scarce enough to prevent the formation of mangrove colonies and the sea level was high enough to erode the sandbanks that form today's lagoons.

The effects of sea level change and tectonics in Chengue's ecology

During the Tairona 1 phase a tectonic event severely affected the coastal lagoons, sea grass beds and coral reef around 950 AD. Van de Hammen and Noldus (1984:584-587) reported that a sediment containing large amounts of shells was found 1.5 to 1.25 m above the maximum extents of modern sea level at El Rodadero, a few kilometers west of Santa Marta. Radiocarbon analysis from the shells reported dates 1430±40 BP; the calibrated date (see Figure 6.1 and 6.3) resulted in a date between 875 AD and 1056 AD. When compared to the sedimentology of the Sector 1 lagoon from Excavation 16, an event that dried the lagoon in very short time is evident in the sedimentology ca. 1100 AD. Carbon dating from sediment before and after this event falls within the same range of the El Rodadero date. Based on the sedimentation rate for the lagoon (see Table 6.1 and Figure 3.4) it can be estimated that the 9 cm between the sediment changes produced by the tectonic event and the position of the carbon sample took 6 years to form, at a rate of 1.3 cm/year, which places the tectonic event between 900 and 950 AD (See Figure 6.3). The implications for a sea level change on the topography of Chengue are considerable because it can be expected that the maximum lagoon and sea levels would be between 1.25 and 1.5 meters above the current maximum extents, assuming a negligible sea level rise in the last 1000 years. This event not only changed the coastline but the extents of the mangrove populations and distribution of the *Thalassia* beds and coral reefs with its consequences on the health of the ecosystem and its capacity to produce food. Furthermore, the inhabitable area would have been transformed in a considerable way and the dry, salt producing lagoon would have been formed in a very short time. The sedimentology suggests that after this event the lagoons surface was in contact with the air in a seasonal pattern, but it was not identical to the modern conditions in its length either. The gley-like soil with micro stratums of oxic layers from Excavation 16 core was probably formed between 1070 and 1220, which suggests a relatively dry environment similar to modern conditions, but a far more stable pattern of seasonal desiccation and flooding. Below, this stratum is a peat that may have formed between 1070 AD and 800 AD under *Rizophora Mangle* roots and under this layer a colony of *Mytilus Sp.* that usually live attached to *Rizophora Mangle* or hard rocky surfaces in intertidal zones (Figure 6.4). This type of environment exists today in a niche on the sea side edge of the Sector 2 lagoon and on the northern part of the Sector 1 coastline. This suggests that during the Buritaca phase at least and possibly part of the T1 phase the lagoon did not exist as the brackish seasonal lagoon of today but it was a beach next to a very shallow section of the bay and may have had higher precipitation levels than today.

It is likely that the dense population of *Mytil*us Sp. present before ca. 800 AD to 950 AD would have thrived in a more humid environment; perhaps a more humid period before 800 AD would have allowed the formation of denser *Rizophora Mangle* and *Avicenna Germinans* populations and consequently the formation of a lagoon (Figure 6.2). The lagoon before 950 AD would have been deeper than the present one probably until ca. 1070 to 1100 AD and with a higher level of water exchange with the sea which results in a lower sedimentation rate than the current conditions but a higher biomass which explains the dark gray peat. This environment may have been present during most of the Buritaca period, however, for the Nehuange period the conditions are relatively hard to reconstruct based on this evidence. The effects of sea level changes on the living conditions for the settlement of

Sector 1 and 2 would have been considerable. Sector 1 was completely transformed, not only did the inhabitable area of the small valley expand as the lagoon shrank with a sea level drop, but also the distribution of the vegetation. Obviously, the *Rizophora Mangle* vegetation must have been destroyed and replaced completely by *Avicennia Geminans* in a distribution similar to what is seen today. This would have reduced the density of the vegetation; A. Mangle has a smaller root system and is much less dense which provides easier access to the lagoon. However, the sea level drop also affected the food productivity and ecology of the area. An examination of the topography and satellite imagery of Sector 1 suggests that the lagoon may have been smaller and further inland than what its current extent is. A higher sea level could have eroded much of the sand bank present today. The remnants of a sand bank can still be seen in the satellite images; coring confirmed that the sand bank could have been part of a coastline in the distant past (Figures 1.1, 1.2 and 6.3). A core from the salt lagoon showed sandy deposits in excess of 3.5 meters, with unstratifed sand and coral fragments 130 meters from the current beach. This deep deposit of sand and coral has a fairly limited distribution and stratigraphy. It is present at similar depths along a strip parallel to the sea, but further inland the sediment changes to the pattern described in excavation 16. The situation for Sector 2 would have been considerably different. Today's lagoon is deeper than that of Sector 1 and slightly more vulnerable to waves, which suggests that the lagoon in Sector 2 may have not existed before 1070 AD. Rather, the conditions would have resembled the coastline of Chengue's neighbor bays Concha and Gairaca that have no lagoons but fairly open beaches. If this is the case, which is quite likely, the opportunities for collection of some mollusks would be severely reduced (Figure 6.3).

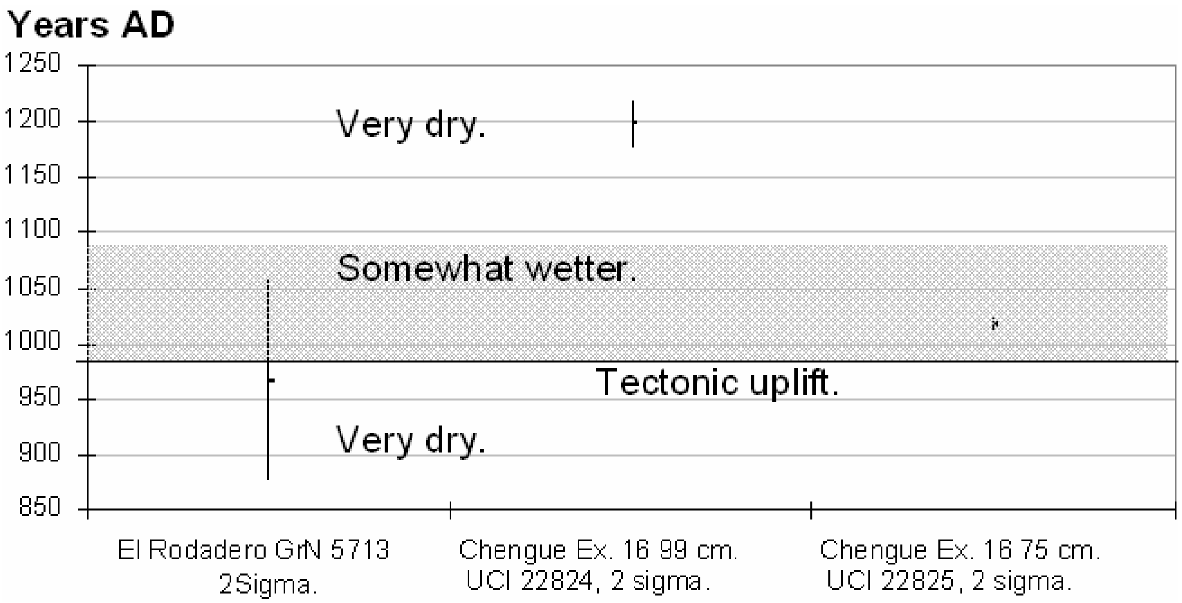


Figure 6.2 Dating of the Tectonic Event that Uplifted the Lagoon in Sector 1.

A tectonic event probably uplifted the coastline around 950 AD. The date for a shell deposit that is 1.5 m above the maximum sea level at El Rodadero came from C14 from shells that were deposited in the uplifted lagoon sediment. The 1430±40 BP(from Van der Hammen and Noldus 1984:584-587)date was calibrated using Marine04, . In Chengue the same event was dated with charcoal samples embedded from after the event, before the event the bottom of the lagoon was colonized with *Mytilus Sp*., whose shells survive in a densely packed layer, and were killed and preserved by relatively fast deposition of alluvial sediment. After this 9 cm of sediment were formed at 90 cm depth, which were carbon dated to 1009 AD, at the 1.3 cm/year rate of deposition and would take 67 years to form placing the event's date ca. 950 AD.

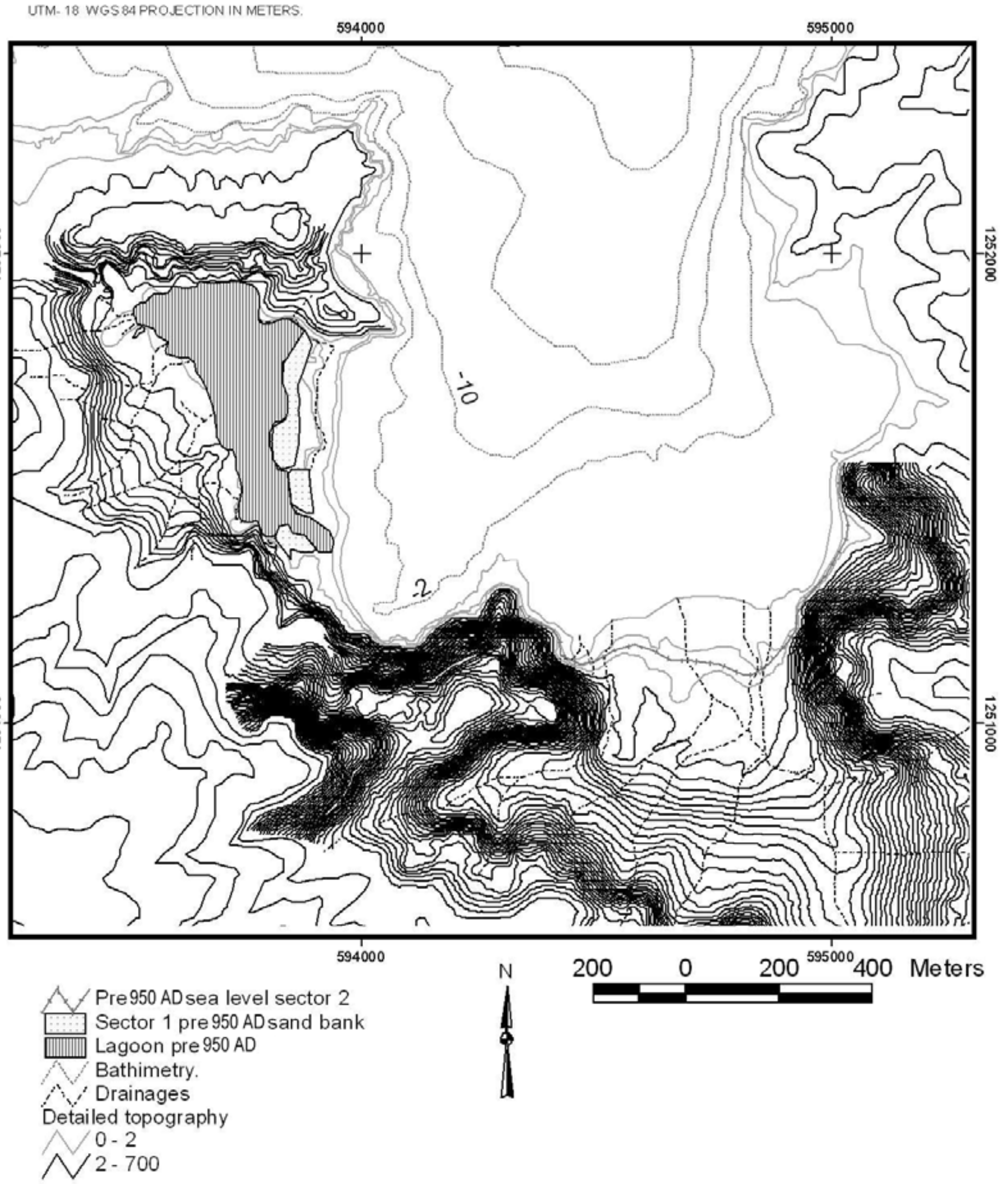


Figure 6.3 A Probable Scenario for the Sea Level Before ca. 950 AD.

The southern lagoon would be under sea level by 1.5 meters, the Sector 1 lagoon would be higher, the remains of an ancient sand bank still remain. It is likely that the inhabitable area of Sector 1 would have been greatly enhanced after the sea level drop.

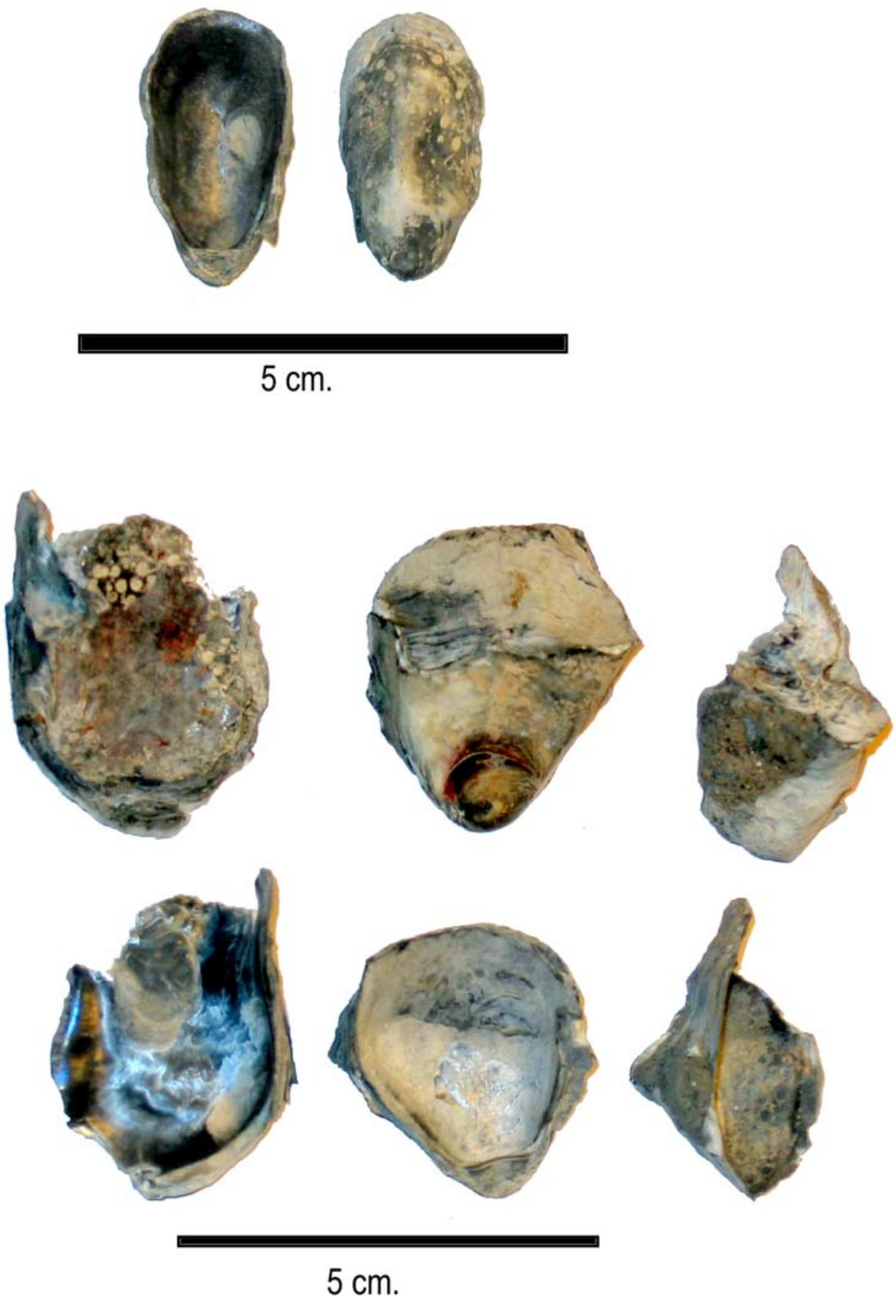


Figure 6.4 Specimens of Mytilus Sp. Shells from Excavation 16, 116 to 120 cm.

THE NEHUANGE PHASE ENVIRONMENT AND ECONOMY

A critical aspect of the development of a political economy of the Tairona is the relationship between the concentration of resources and the level of control of these resources by individual households. The fundamental aspect of the Bottom-Up scenario, introduced in chapter 1, assumes that the starting point in the process is a relatively simple social organization with very little or no social stratification. In the case of Chengue, the N1and B1 phases would represent the initial distribution of the population. The Top-Down scenario would require the N1 and B1 phase remains to show strong evidence of social differences that would promote the creation of a colony like village or hamlet, which was specialized in the production of salt as a commodity and that relied on its "parent" community for most resources. It is reasonable to assume that a highly concentrated resource would be relatively easy to control from a very early stage. The capacity to make decisions on the way the resources are obtained and distributed is outside of the producing community and it would be the result of a political decision not the result of the impetus of an entrepreneurial household.

Although sparse, all data associated to N1 remains suggests that the economy was not strongly dependant on agriculture. Most of the evidence useful in the reconstruction of the N1 period comes from a small sample of stone tools, ceramics and phytoliths. Ecosystems like the one found in Chengue can be very productive in many ways other than agriculture; the diversity of the environment allows the exploitation of numerous communities of mollusks, fish, mammals and reptiles in different seasons during the year. In fact, the phytolith evidence for Chengue between 200 BC and 500 AD (N1 period) suggests that there was little consumption of Manioc or *Zea Mays* (see table 6.3). The evidence from this early stratum suggests that there was some clearing of the forest that was replaced by grass (Pariana sp.) but there is very little evidence for agriculture, or food processing associated to maize or manioc. The absence of grinding stones associated to these remains creates a puzzling scenario that would ultimately suggest that most of the livelihood for the settlement of Chengue in this period came from gathering and hunting at a very small scale and that there was little exchange of staples or agricultural production. There are however, quartzite micro-cutting tools that are the only lithics associated to the stratums corresponding to the N1 phase in excavations 9 and 7. These tools are simple cutting or scraping instruments made of the very abundant local quartzite that continues to appear in the following phases. This suggests that food processing was made using a different technology, perhaps hard wood tools.

The evidence suggests a scenario where N1 phase occupation looks like a single hunter gatherer group living in an agriculturally marginal area. This is further supported by the sedimentology of excavation (2, 7 and 9) that suggest that the conditions in this phase were dryer than those circa 500 AD, perhaps similar to modern conditions or perhaps even dryer. The faunal remains for this phase are very poor, there are a few shells of eroded *Strombus Sp*, but presumably most of the smaller fish bones are strongly underrepresented in the sample possibly due to poor preservation. However, it is not impossible that taphonomic processes would have been more aggressive in the older and more acidic soils of Sector 2. More research is necessary and larger area excavations designed to identify and preserved faunal remains (like otoliths) will yield better results in gathering data to reconstruct the N1 economy.

Based on this data in can be concluded that the environment for the Nehuange (N1) vas very dry, and as a result productivity of all ecosystems was relatively limited, which would have been a threat to the households trying to live in a sedentary village as population density increased. Evidently the population size during the N1 phase is very small, the total populated area would have been about close to 1.3 ha, which suggests that one or two small hamlets or even isolated households or a seasonal camp could have been the sole population of Chengue during the N1 phase. The majority of the N1 population is concentrated along the slopes and valley of Sector 2, at a slightly more distant location from the beach than the B1 population. This vaguely suggests that the sea level may have been higher in the N1 phase than in the B1, although large coral "heads" were observed in the middle of the N1 distribution of Sector 2, which is not proof that the site was under water in the more distant past, but it is a matter that should be further investigated.

THE BURITACA PHASE ENVIRONMENT AND ECONOMY

The Buritaca economy seems to be very different from the pre 500 AD economy in Chengue. This period is characterized by evidence of cultivation or consumption of *Manihot Sp*, apparently for a period possibly less than 100 years (see Table 6.3). The presence of Manioc (*Manihot sp*) and palm (Palmae sp) phytoliths coincide with a peak in the grain size of the sediment in excavation 2, 7 and 9 that has been interpreted as a "wet" period. This "wet" period; occurred between ca. 450 AD and 600 AD and but does not necessarily coincide with a population increase after this short period, it would appear that the duration of the higher population density of the Buritaca phase was longer than the high humidity episode. However, most of the Buritaca period is dry and relatively stable. The data from Polissar et al (2006) show an increase in precipitation in the Venezuelan Andes, but it would appear to be relatively small when compared with the higher precipitation levels seen in the T2 phase. Phytolith data also suggests that cultivation of *Zea Mayz* was successful in the southern sector of Chengue after 500 AD. Stone axes similar to the Tairona, but smaller and with more acute shapes appear in contexts with Buritaca ceramics. These are made of Chert, similar but not identical to their Tairona counterparts although the sample is small (2) it coincides with Wynn's (1975) observations of Buritaca lithic tools (see Figure 6.5). Some types of grinding stones that are made of local materials are also present, but are relatively rare, although identical ones are reported by Wynn (1975). This accounts for a shift in the subsistence toolkit that suggests the onset of agricultural practices in Chengue. From this perspective it would be evident that the Buritaca village had some capacity to sustain a self sufficient yet small sedentary population through fishing, hunting and agriculture. The size of the population would be about 5 times the size of the N1 population, if we compare the maximum extents of each phase.

X9	*Manihot sp*	E. Coca? (Type 3)	Palmae indet.	Graminea indet.1	Spongillidae indet.	*Zea Mays*	Pariana sp.	Graminea indet. 2	Total identified phytoliths	Total found
10-14	5	2	1	7	2	7	3		27	44
14-40						1			1	4
40-50				1	2	4	8	1	16	20
50-77						4			4	5
77-100				2		3			5	12
102-110	3		1			9	4	1	18	21
110-120				1	1	7			9	13
120-155							1		1	2

Table 6.3 Phytoliths Counts for Stratums in Excavation 9.

Stratum 110-120 is classified as N1 phase, dated before 500 AD and after 200 BC, See Figure 3.17,*Zea Mays* was identified according to Pearsal and Piperno (1998). Phytolith photos in Annex B.

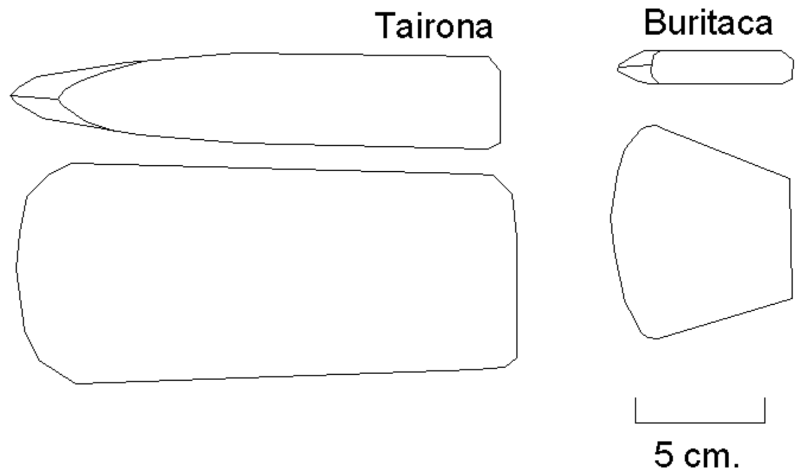


Figure 6.5 Buritaca and Tairona Chert Axes.
Buritaca axes are scarcer, smaller, thinner and more trapezoidal. This design optimizes the relationship between the edge and the total mass of the tool, so less stone is used to produce a relatively large edge. Tairona axes are heavier and could have been sharpened many more times, extending the life of the tool but requiring a larger block to start with. The Buritaca tool design suggests that Chert was scarcer for the Chengue population before salt specialization.

Most of the B1 occupation lived in Sector 2, the primary advantage of this area is the somewhat larger size of the valley combined with slightly higher precipitation and water shed; this creates conditions appropriate for a denser forest, with larger herbaceous vegetation and taller tree species. Surface water is available in the southern drainages during the rainy season something that occurs for a shorter time and in a lesser degree in Sector 1. Considering these variables a very likely scenario is that the Buritaca period households were producing most of their food through agriculture in small fields or gardens in the immediate vicinity of their village. Phytolith data from soils associated to a peak in the Buritaca phase remains in excavation 9 shows that there was *Zea Mays* and *Manihot Sp*. plants present at the time. Furthermore, the properties of the soil associated to Buritaca phase ceramics are more favorable for agriculture than the ones associated to Tairona 1 or 2 phases. This may be the result of slightly wetter and colder than modern conditions before ca. 500 AD. However, nowadays it is not inconceivable to produce a successful crop of *Manihot Sp, Alocasia Macrorhiza* (Malanga) or other root crops although it would be risky due to the long maturation period of root crops. *Alocasia Macrorhiza* is sometimes grown in Sector 1 in a small irrigated plot by the caretaker of Chengue but it takes more than a year produce a crop.

THE TAIRONA 1 PHASE ENVIRONMENT AND ECONOMY

This phase can be seen as a transitional phase in which the shift from a Buritaca village to a Tairona village occurred. The settlement distribution change could also be explained by a process of intensification of the local agricultural resources in which the population inhabits the least productive soils that in turn would have allowed more intense agricultural production in Sector 2. However, this is probably a less important than the tectonic event and environmental changes that followed.

The Tairona 1 and the Buritaca economy can be thought of as a very small and local economy, with less trade, lower population levels, less intensification of production and little if any exchange. The T1 phase appears to have been slightly more humid (See Table 6.24). In the previous phase changes toward a dryer climate that occurred during the later part of the Buritaca phase and early Tairona 1 phase would have increased the risk of depending strongly on agricultural production during most of the year and probably decreased the productivity of the marine ecosystem. In turn the dryer environment towards the end of the T1 phase increased the salt productivity of the lagoon in Sector 1, creating an opportunity for salt production late in the T1 phase. However, the deeper excavations of Sector 2 show a strong stratigraphic difference between the Buritaca and Tairona 1 phases, as well as a peak in shard frequency well into the Buritaca stratums. It would appear that during the transition between Buritaca and Tairona phases the population of Sector 2 suffered a severe but somewhat gradual decline and probably relocated to the areas surrounding the salt lagoon. It is hard to be more precise about the way the transition occurred without detailed household excavations, but the data from the excavations in Sector 1 suggest that Buritaca ceramics were used at the onset of the Tairona 1 phase. Very small proportions of Buritaca phase ceramics were found in all of Sector 1 excavations, with the exception of excavation 17 and 13.

THE TAIRONA 2 AND 3 ECONOMY

Cultivation and Agriculture

Phytolith data from Excavations 14 and 15 shows that there was consumption of maize but there is evidence of Maize phytoliths since way before 500 AD according to the data from Excavation 9. What differs in the T2 and T3 contexts is that *Zea Mays* phytoliths are more strongly associated to consumption; they are found in small quantities in most of the levels except those that are associated to hearths or ash deposits where they are found in very high numbers (Table 6.4 and 6.5). This is more consistent with a pattern of consumption than that of cultivation because it is primarily present in domestic contexts. There were a few *Zea Mays* phytoliths associated to the carbonized remains found in the inside of pot shards taken from levels 10 to 20 of Excavation 14, but their frequencies were very low (Table 6.5). There were no macrobotanical remains for *Zea Mays* in any of the contexts only phytoliths and some pollen associated to the T1 phase. However, there were macrobotanical remains of several cultigens and plants that are present in Chengue and can be used as food. There were a few carbonized *Pithecellobium sp*, probably of the *dulce* species which is a common tree found in Chengue's tall dry forest and gallery forest, also called Guamacho or Tamarind from which a refreshing drink is often made by modern populations. A few seeds were found in Excavations 14 and 15 from at least 3 species of *Cassia Sp*, which could have been consumed crushed, and *Manihot Sp*. seeds (See Annex B).

	Manihot sp	*Zea Mays*	E.Coca	Palmae indet.	Spongillidae indet.	Pariana sp.	Gramineas	Others Unident.	Total
Ex. 14									
Ollas		5			4		0	1	10
Lvl.8		1			1		5	2	9
Lvl12		5			1		3	1	10
Lvl 14				1		3	2	3	9
Lvl 16							0	1	1
Lvl 18		1			2		1	4	8
Lvl 19		2				2	2	7	13
Lvl 20		12	2		2	5	8	6	35
Total	0	26	2	1	10	10	21	25	95
E-15 L.7		71	2		2	2	42	50	169

Table 6.4 Phytolith data from Excavations 14 and 15. ca. 1400 AD.

	Manihot sp	*Zea Mays*	E. Coca	Palmae indet.	Spongillidae indet.	Pariana sp.	Gramineas	Others Unident.	
Ex. 14									
Ollas		50%			40%		0%	10%	
8		11%			11%		56%	22%	
12		50%			10%		30%	10%	
14				11%		33%	22%	33%	
16							0%	100%	
18		13%			25%		13%	50%	
19		15%				15%	15%	54%	
20		34%	6%		6%	14%	23%	17%	
Total		27%	2%	1%	11%	11%	22%	26%	100%
X15 Lvl. 7		42%	1%		1%	1%	25%	30%	100%

Table 6.5 Phytolith Data from Excavations 14 and 15 Extracted from Ceramic Shards.

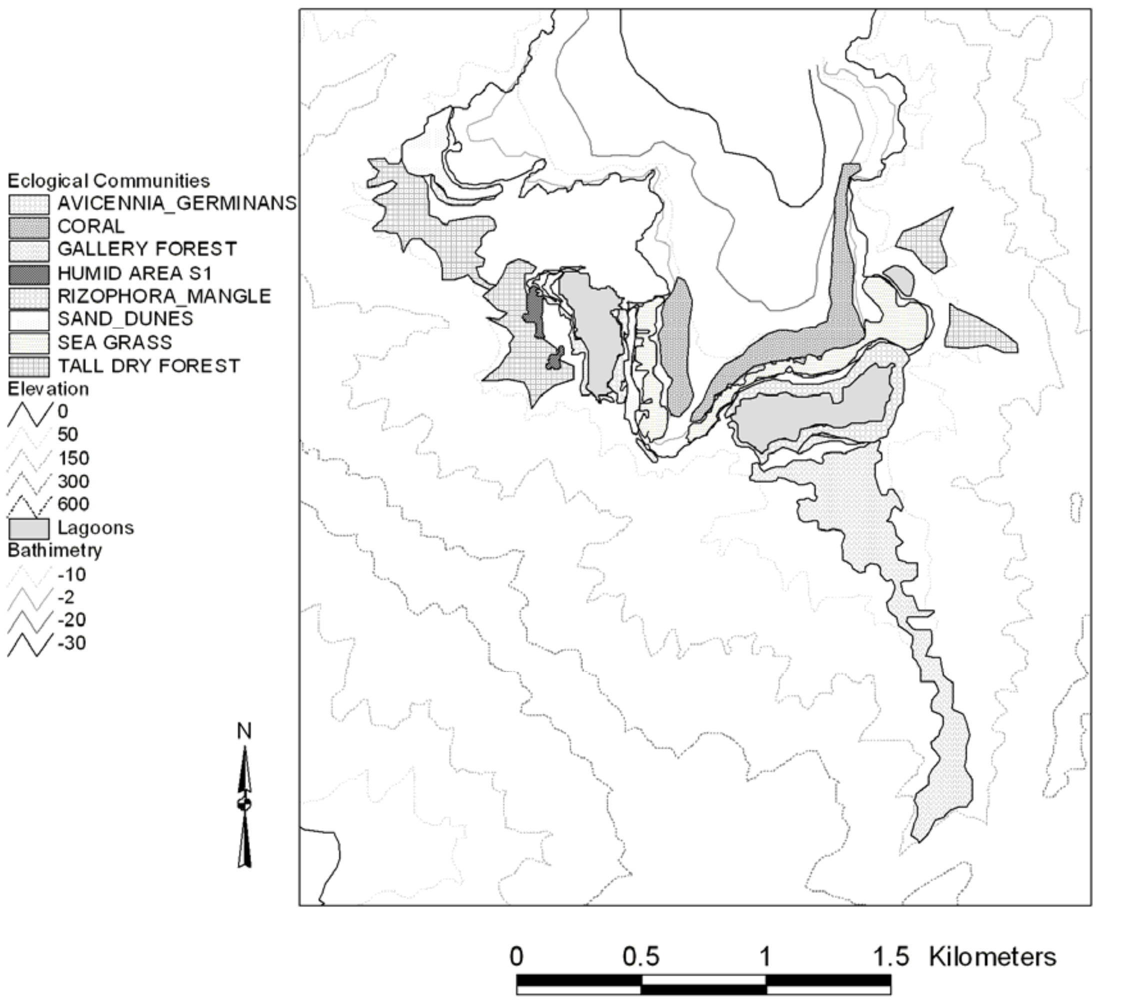


Figure 6.6 Ecological Communities Mentioned in the Text.

About 10 ha of the area classified as gallery forest has soils that may be productive although limited by boulders and stones. The rest of Chengue is covered by dry deciduous forest on the hills and some grass along the coast.

The Salt

Salt production in Chengue does not require a large population; a few dozen people could have extract the salt Chengue produces today with the technology the Tairona had. The distribution and exchange of salt is a more complex problem because the population size observed in the last phases of Chengue suggest that it was larger than what the local ecosystem could sustain or what would be necessary for the extraction and even transport of salt to the neighboring villages or towns like Bonda. The distribution of the population does show what would be a form of intensification of the small amount of farm land in Chengue. The 4 ha found in Sector 2 could have been exploited communally or controlled by local elites, which implies a social structure very different from what was observed for the N1 and B1 phases. The larger houses, denser and more diverse use of ceramics, water management structures and artifact distributions strongly suggest an institutionalized social difference associated to the salt flat.

Today, salt production in Chengue uses very simple technology. The steel shovels used by modern workers would have been easily replaced by wooden and stone scraper tools. A few flat stone scrapers made of locally available micaceous schist were found in RA 3. It is unclear how the scraper could have been used but its soft and rounded edges suggest that it may have been mounted on a wooden handle. Similar sickle tools have been registered ethnographically for collection of mollusks such as *Crassostrea Rhizophorae* and *Anomalocardia Brasiliana* in Brazil (Nishida, Nodi and da Nóbrega Alves 2006: 137). In any case these spatula-like tools are useful in manipulating soft sediments such as the muddy bottom of a coastal lagoon or scraping off salt (Liot 2000).

Figure 6.7 Micaceous Schist Scraper Tool.

There were 8 of these artifacts found in Chengue, although only 2 were found in one piece, all associated to T2 and T3 artifacts and households in Sector 1. Salt can be easily collected by scraping the surface of the lagoon. The picture, taken in February 2005, shows salt foam being formed on the shore of the lagoon, the evaporation process would continue From January to April when, the totality of the surface is covered in salt.

The presence of some form of public works can be conceived as the result of a community level social organization orchestrated but not necessarily governed by local elites. With this in mind it is plausible that the social organization of the Tairona villages can be better explained. In the case of Chengue, it would appear that the control of incoming food, granite, ceremonial ceramics, chert axes, coca, cotton, gold and cornaline beads was the key to control the outgoing flow of salt and salted fish. Based on the distribution of ceramic forms from chapter 5, it would appear that there were local elites that controlled production by controlling exchange through something like a patron role feast and the control over small religious artifacts. Possibly religious practices or some kind of diacritical feasting (Dietler 2001) may have also been involved. Both mechanisms may have been ultimately guaranteed dependency on the regional Tairona economy and strongly suggest a top-down relationship between Chengue and other larger chiefdoms, like Bonda during the T2 and T3 phases.

The larger extents and density of the T2 population must have produced a severe impact on the environment of Chengue, not only because of the higher demands on wood and food, but also because the flat areas that would be easily turned into living spaces started to be scarce. However, there is little evidence that the T2 occupation used the flat areas in Sector 2 to their full extents contrasting with the village in Sector 1 that increased its density rather than expand. The high demand for living space and the decision not to live in RA 7 resulted in increasingly intense building of terraces, paved paths and contention walls. The building episodes were probably not large events and it seems unlikely that they were orchestrated by elite because there is a great deal of what appears to be non-elite domestic space somewhat intertwined with areas that appear to be public spaces. Other communal areas, like water wells and reservoirs could have been built by very local efforts; the size of the organization necessary for these construction efforts was probably the neighborhoods or residential areas outlined in chapter 5.

Figure 6.8 Stone Fence Around the Lagoon.

Only a few protrude over the surface, excavations on several points of the fence showed that it is a continuous structure about 40 centimeters tall and 400 meters long. The fence bends at a close to 90 degree angle, at the vertex there are 3 white quartzite boulders. There are also quartzite boulders at the edges of the fence. It is speculated that the fence would help keep the lagoon and the salt clear of domestic refuse. A small triangular fence at the northeastern edge could have been used to slow the water and stop the debris from the drainages during the rainy season.

Hunting and Terrestrial Vertebrates

There is scant evidence that the T2 and possibly the T3 inhabitants of Chengue ate a wide range of terrestrial vertebrates. Although the analysis performed on the sample and the collection techniques of shovel probes were not optimal, the thin .2 cm mesh used in the larger stratigraphic excavations did yield some interesting results. There were rodent bones, lizards, dear (Odicoelus Virginianus), hare, iguana, turtle and crab, all locally found animals today. A few long bones found in excavation 14 were large and thick enough to have been from a peccary, which was commonly found in the region until a few years ago, and dear which is easily sighted in Chengue today. Although the analysis is not exhaustive it shows that there was consumption of a wide range and sizes of animals. The vast majority of the faunal remains were collected from Excavation 12, 14 and 15, which were dated to the T2 and T3 phases and associated to somewhat extensive landscape modifications. Bones pertaining to monkeys were not identified although Capuchin monkeys are fairly abundant in modern day Chengue and the identification techniques were not as thorough as they should be to discard their consumption.

Mollusk Collection and Consumption

Unlike the Buritaca and Nehuange period remains, Chengue's Tairona period remains are overwhelmingly interspersed with sea shells. Practically all Tairona (T1-T3) contexts are associated to shells; from burials, to middens and natural sediments. The particular ecologies of mollusks provide an interesting piece of evidence on the domestic economy. The most notorious conclusion that can be derived from this body of evidence is that the T2 domestic economy was producing a considerable stress on the ecosystem. It would appear that the subsistence base had shifted to depend in greater part on small bivalves that thrive in the lagoon sediment, sandy bottoms near the beach and on the sea grass beds.

Almost all the shells in the collection were recovered in excavation containing T2 contexts, (1812 individuals most from excavations 12 and 15). The systematic collection procedures yielded 842 individuals. The gastropod *Melongena Melongena* was one of the most common large mollusks found. and is easily caught in fishing nets today in Chengue's southern lagoon. It is a very good source of protein; a single adult individual can yield 2 to 3 pounds of almost pure protein which could have placed it high in the list of preferred foods. Adult *Melongena Melongena*, *Strombus Gigas* and *Gallus* are fairly common archaeological shells in Chengue (3.75% of systematic collections)and if their size is taken into consideration they were probably significant from a nutritional point of view. Others, like the medium sized *Lucina Pectinata* (2.7%) oyster would provide a fairly large sized mussel (about 5 cm) easily gathered from the shallow sea grass beds. Five large specimens of *Strombus Sp* from excavation 12 were found in a single level, associated to charcoal dated to the T2 phase show intentional perforations that suggests they were used as musical instruments, which mean that they may have been intentionally preserved and used in social contexts. It is possible that they were perceived as heirlooms for some long time before being discarded in what appeared to be a single episode. In other occasions concentrations of large conchs are found associated to burials, which may also help in their preservation. However, the vast majority of the mollusks were most likely used exclusively as food.

Although large conchs and shells are fairly abundant in the archaeological record of Chengue, the most abundant species are small shells (3 to 4 cm long) from the lacustrine and beach ecosystems. Two bivalve species are particularly outstandingly abundant: *Anomalocardia Brasiliana* (43% of all individuals from lots and 47% from excavations) and *Codakia Orbicularis* (11% of all individuals from lots and 35% from excavations). Both species are completely ignored by modern fishermen and residents of the vicinity. Two other species, a bivalve and a gastropod are 3rd and 4th in the popularity ranking of Chengue, *Crassostrea Rizophora* an endemic species commonly called mangrove oyster (9.45%) and *Cittarium Pica* 2.9%, that is a snail easily found in intertidal waters to the rocky shores of Chengue; the *Crassostrea Rizophora* specimens are a good indicator that there was collection in the mangrove environment found currently only in the eastern and southern part of the bay. There are also present in a few of the auger probe samples from the salt lagoon; in all cases they are found below the 55 cm mark in lots 1 and 2, which tend to be associated to the end of the T1 phase but in the case of lot 2 it is associated to Buritaca phase ceramics which reinforces the scenario of a dynamic *Rizophora Mangle* lagoon and swamp during the B1 phase in what today is the salt lagoon. The location of these shells in naturally stratified glay type sediment coincides with the pollen evidence in that the dry salt lagoon did not exist until late in the T1 phase or the early part of the T2 phase. All evidence points to the likelihood that the modern climatic conditions of Chengue are quite similar to the T2 phase. In turn this supports the assumption that the T2 distribution of *R. Mangle* is similar to the modern distribution. The bivalve distribution suggests that practically all of the T2 households did intense collection of at least 5 species of mollusks found in the mangrove or mangrove related sediments from the lagoon in sector 2. The distance from the lagoon to the residences is minimal; most of the mollusks could have been collected within a distance of 1 to 3 kilometers from any of the residences in Sector 1.

Very robust modern colonies of *Anomalocardia Brasiliana* were found in the core samples from the coastal lagoon in Sector 1. It appears that most of the lagoon's sediment is saturated by *A. Brasiliana*, something that is not surprising if the relative abandonment of the bay is considered and the low value of this food type for the local population. Recent ethnographic studies that describe an extraction process of *A. Brasiliana* suggest that it could be collected by almost any member of the population excluding very small children because it demands the removal and then sifting of fairly large volumes of the lagoon sediment, a task that requires significant strength. Two other species are of particular interest: *Cittareum Pica* and *Chiton Sp.* Both are gastropods that live in the shallow and rocky intertidal zone and regardless of their strange appearance are edible. The *Chiton* is easily collected from algae covered rocks yet its rarity in the samples suggests that was a less than preferred food source and probably less abundant than the bivalves judging by its limited habitat. Although the small populations, low proportions and overall small size of the specimens suggest that the *Chiton* would have had little nutritional effects in the human population.

Other species appear to have been collected for purposes other than food. The most obvious examples are the *Strombus Sp*. musical instruments, but smaller species appear to have been used as materials for button-like beads and bells. A few specimens of *Cipraecassis Testiculu*s and *Oliva Sp*. show perforations that suggest they were used as bells. Shell beads seem to have been a common craft more commonly associated to RA 3,4, 8 and 9. A few very small cut fragments of *Strombus Sp*. columnella that appear to be part of the manufacturing process for beads were found associated to T3 artifacts in RA 9 as well as *Spondilus Sp*. “button” beads from RA 3.

Figure 6.9 Shell bells made of *Cipraecassis Testiculus* and *Oliva Sp*.
Excavation 12 level 4 and Excavation 15 level 5 (this level corresponds to the T3 phase), respectively.

Fishing

The Tairona 2 and 3 phases have the clearest and most robust evidence for intensive fishing. Lithics that were probably used as anchors, line weights and net weights are common in the contexts of Sector 1 above any other part of Chengue. Fish remains were also abundant in all the excavations in Sector 1 and but rare in Sector 2. Although it was impossible to identify most of the fish species there were some fish bones that showed hyperostosis, a pathology that is often associated with very old fish of about 92 species. Hyperostosis is a swelling of skeletal bones that appears to be particularly common in Snappers, who have coral reef habitats of which many species are commonly found in Chengue (Smith-Vaniz, Kaufman and Glowacki 1995). Although a conclusion from this evidence would be biased it does show that there was fishing of the most immediate fishery, the shallow coral reef, which could have been accessible from the beach and would require a minimal effort. A few specimens of parrot fish mandible bones support the conclusion that coral reef fishing was commonly practiced. However, the coral reef ecology of Chengue contains a fairly low population of fish. In the region the larger fish populations are of pelagic species that inhabit areas further away from the coast. It is very likely that the Tairona villagers would have been more involved in deep water fishing, which is also a very accessible resource from Chengue because there is no continental shelf and the cold abysmal waters are less than 2 kilometers away from the coastline. Furthermore, Chengue has a natural port just 300 meters north of the most densely inhabited area of Sector 1 which gives very easy access to deep waters versus the central part of the bay that has fairly large areas with extremely shallow waters.

The T3 phase appears to be very similar to the T2 phase although it is characterized by the disappearance of the Tairona economy and social organization. However, early accounts for the Santa Marta bay are particularly enlightening of the fishing techniques and craft of the Tairona. Registered by Angheira from events witnessed in 1514 by Pedro Arias at the bay of Santa Marta (Angheira 2004):

> According to the report of Pedro Arias and the narrative of Vespucci, the harbour is three leagues in circumference. It is a safe one, and its waters are so clear that at a depth of twenty cubits, the stones on its bottom may be counted. Streams empty into the harbour but they are not navigable for large ships, only for native canoes. There is an extraordinary abundance of both fresh- and salt-water fish, of great variety and good flavour. Many native fishing boats were found in this harbour, and also a quantity of nets ingeniously made from stout grasses worn by friction and interwoven with spun cotton cords. The natives of Caramaira, Cariai, and Saturma are all skillful fishermen, and it is by selling their fish to the inland tribes that they procure the products they need and desire. (Translated by Francis Augustus MacNutt).

Figure 6.10 Stone Net and Line Weights.
Net weight, fishing line weight and “anchor” weight of sandstone, micaceous schist and andesite correspondingly. All from Sector 1, RA 2, 3 and 4.

Part of the usefulness of this account is the description on the use of a combination of textiles in the elaboration of fishing lines, rope and nets which are evident in the notches and rings found in the stone weights, which apparently combined domesticated and wild plants (Figure 6.10). It also coincides with later accounts on exchange of goods between coastal villages and inland agriculturalists, which may sound as a trivial element, but it is particularly important when combined with another description of the agricultural practices of the region. It has been theorized that the Tairona had a micro vertical economy in which part of the population moved to areas that required seasonal labor much like the modern Kogui. However, few of the accounts mention this type of seasonal migration and the archaeological record does not show that this is the case, although a small part of the population may have had itinerant behaviors and there are descriptions of traders or merchants (Castellanos 1944).

Labor as an elastic resource

Studies on Tairona agricultural production tend to coincide in the idea that for centuries before the time of Spanish contact ca. 1520 agriculture was highly intensified. Irrigation channels, terracing, slash and burn agriculture and varying degrees of ecologic stress are indicators of the intensification of agriculture widespread through the Sierra Nevada de Santa Marta and Ranchería valleys (Herrera 1985, Cavelier et al 1998). The data from Cavalier et al (1998) suggests that the carrying capacity of the ecosystem in the region had been expanded through slash and burn practices, irrigation and terracing to allocate progressively larger human populations over the last 3000 years. Changes in the agricultural practices, the development of specialized community economies and greater complexity in the social organizations are probably leading factor in this process.

Ethnohistoric and archaeological data strongly suggest that the Tairona cultivated extensive fields of Maize, fed by irrigation channels and managed through terracing, a similar strategy of intensification of production may have been in place in Chengue, but oriented towards salt production. It would appear that Chengue had a seasonal excess of labor because it is in an area of poor agricultural productivity and salt can only be produced for a short time of the year. This may have produced a dependant relationship with the fertile and highly productive valleys south of Chengue (Tovar 1993:141). If labor of the lower status households is seen as an elastic resource the relationship between Chengue and the community of Bonda may be better understood. Ethnohistoric evidence overwhelmingly and systematically shows that the, the valley of Concha (Chengue's neighbor) was part of the territory of Bonda. This is easy to understand because it is geographically part of the same population cluster and literally its back door (AGI 1603) of Bonda. Furthermore, the extremely wide diet of Chengue suggests that it was hardly able to sustain its population through fishing judging by the rapid increase of very intensive exploitation of mollusks in the T2 and T3 phases. It is likely that the very large populations and possibly worsening conditions for even local garden cultivation would have pushed towards further specialization of the neighborhoods, which may have culminated in the development of very low status temporary or seasonal neighborhoods. Clearly, it is not that the entire population of Chengue was moving in and out of the bay every year, but it would appear feasible and practical that if agricultural and fishing productivity was near its limit the only resource that can be further intensified is labor (Knerr 1998). It would appear that the more mobile segments of the population could have lived for several months of a year in Chengue but moving to agriculturally productive areas during planting and harvesting seasons. This could go on perhaps for years or generations, judging by the still very high ceramic densities of these areas. These may have been neighborhoods that were dependant of the higher status residents, two that appear to be particularly evident are RA 1 and 5. However, these two areas would represent only a small percentage of the entire population of Chengue, possibly 80 to 100 people (approximately 10% of Chengue's population at its peak). This suggests that there may have been a small floating population that would allow the local economies to intensify various forms of production. Whether or not the elites directly controlled this population is unclear but in Chengue's case the absence of feasting, granite grinding stones (see Figure 6.11) and finer portable ceramics suggests that some well-off families may have been able to request labor in exchange for esoteric, social and staple goods.

There is also ample ethnohistoric evidence, well documented and too detailed to review in this chapter that the Tairona were relatively effective in resisting Spanish military intervention since the very first contacts; this appears to show fairly belligerent relation between chiefdoms (Redmond 1994:32-34, Tovar 1988, 1993, 1997, Reichel-Dolmatoff 1951, Castellanos 1944 to name a few). Although this belligerence seems to have been the result of complex chiefdoms allying with the Spanish from time to time and somewhat ritualized confrontations that did not necessarily lead to extensive destruction there seems to be a clear leadership in these events and a centralized form of control over war preparations. In the most notorious case, the Chief of Bonda ordered fields to be planted to produce resources for a campaign against the town of Posigüieca in 1530 (see Figure 4.1). The Chief rallied 600 warrior and led the attack accompanied by 300 Spanish soldiers, only to reach a standoff near the town and return to Bonda without really attacking, just burning and cutting down some corn fields on the periphery of the town. A day later the Spanish attacked Posigüieca without defeating it and taking so many losses that they had to retreat defeated to Santa Marta. It should be noted that this was the third unsuccessful attempt to destroy Posigüieca with Spanish forces far exceeding those used in the conquest of the Muisca and Inca. Those who survived were the few who were on horseback and then again it is inferred that about a third of them died of their wounds. The behavior of the Chief of Bonda appears to be consistent with a ritualized practice of "showing-off" his ability to amass a crowd. Adorned in feathers and fully armed, a typical behavior for a Chief more interested in acquiring prestige than conquest (Redmond 1994, Drennan 1995:305). It is likely that he did in fact score points in his favor within his chiefdom and with Posigüieca. He evidently obtained prestige without having to obliterate his “enemy” and in the process demonstrated his ability to organize labor and extract surplus from his followers under the pretext of war. His attitude results in a win-win situation where the only ones experiencing great losses are the Spanish. After all, the new fields were planted, the bows, arrows and maces furnished, the poisoned darts produced and the warriors concentrated under a single head. The objectives of the Chief of Bonda were met, and he gained prestige within his ranks and the Spanish, accumulated corn and for the time being gained political dominance (Tovar 1993). The size and resilience of the Chiefdoms of Bonda and Posigüieca suggest that the Tairona society did have a considerable capacity to articulate and manage its resources, material and human, into politically effective strategies but that war did not have the same objectives as in the European paradigms (Ferguson and Whitehead 2000).

In the case of Chengue, which is far from what could be called a Chiefly center there is some evidence for what appears to be a control mechanism over the scarce productive land in Sector 2. It should be noted that this Sector has the most productive agricultural land in Chengue yet it has the lowest density of T2 occupation and a slightly higher yet very scarce T3 occupation. This may have been caused by territorial disputes, which may explain the fort-like structure in RA 6, and the separate access of Sectors 1 and 2 to the valley of Concha. An alternative possibility, that by no means excludes the likelihood of conflict with the village of Gairaca at some point, is the intense use of the bottom of the main drainage as intensely planted farmland. With few residences occupying the valuable soil and a greater tendency towards inhabiting the slopes the productive land of Chengue would have been optimally used. From this point of view relocation of the population and agricultural production seems to be orchestrated by a political agent. It is very unlikely that there would have been vast fields of Maize in Chengue, as those described by multiple accounts Angheira (2004), Castellanos 1944, Tovar 1993), but it is likely that small seasonal gardens could have been grown, particularly in Sector 2 and tiny parts of Sector 1.

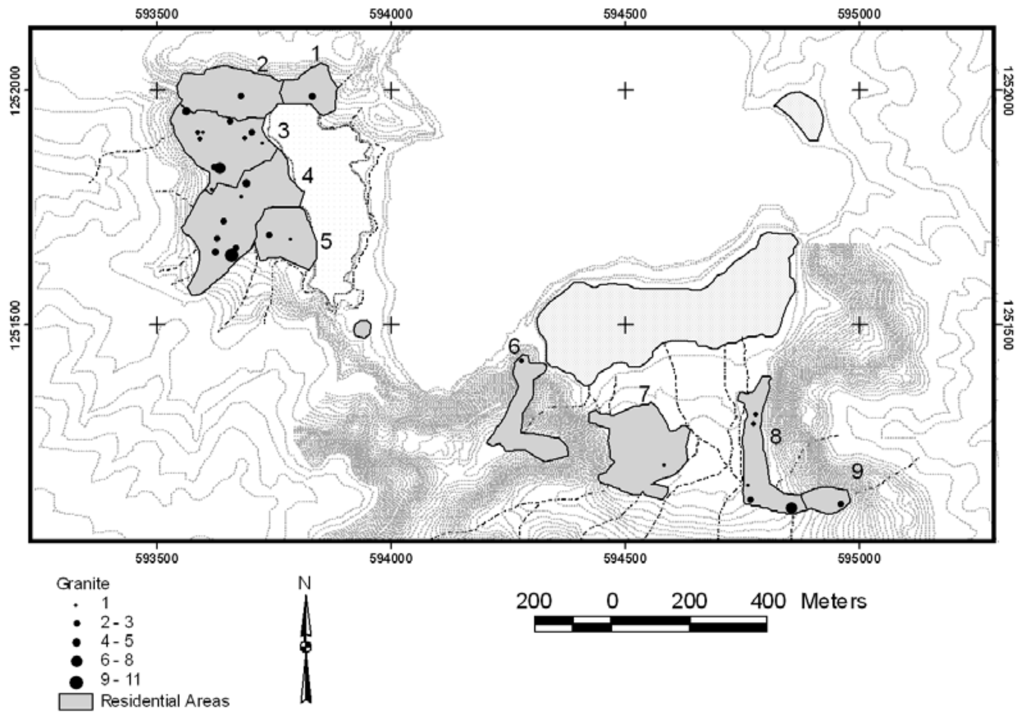


Figure 6.11 Distribution of Granite Artifacts.

Figure 6.12 Grinding Stones.

Although most of the larger granite artifacts were not collected, they were extremely abundant; most were grinding tools, or hammers of various types. Although not all grinding stones are made of granite. Two “mortar stones” (left) are made of locally acquired sand stone but tend to have a similar distribution to the granite artifacts (right).

CHENGUE IN THE REGIONAL ECONOMY

The data above and from chapters 4 and 5 suggest that Chengue and many of the coastal villages of the Parque Tairona were fairly dense, but that other larger villages associated to more productive land may have had lower population densities. This implies that the coastal villages placed along concentrated marine resources and in a topography that limits the size of the villages tend to have higher population densities than other settlements located further inland. From a comparative perspective Chengue's population density is about the same of Pueblito's and B200's. In terms of the size of the village, Chengue would be of a similar size to the mapped area of B200 and about half the size of Pueblito. From a regional perspective, the extension of the village of Chengue is not unusual (See Table 6.6 and Figure 6.13), which suggests that Chengue does seem to be a fairly dense village compared to other areas of the intermediate area (Cadavid and Herrera 1985, Drennan and Boada 2006, Drennan and Peterson 2006, Drennan 1988; 1996). The data from B200 and Pueblito also suggests that there are several unusual residences per village if we consider the distribution of terrace areas. The top-down models would suggest that Chengue could have been in a form of symbiotic or dependant relationship with nearby Bonda. However, the patterns shown in chapter 5 do not suggest that elites had true control over the economy, something that would be necessary for a true colony (Hayden 1994). The population for the region encompassing the entire range of villages shown in figure 6.14 (est. 30,000 in prehispanic times and 10,000 during the post-contact phase) would easily sustain elite households, however the proportion of elites is unusually high for the type of social organization that would be able to dictate the arbitrary foundation of villages. The proportions of elite population may be about 30% based on house size distributions of Pueblito's core and 10% for B200. Although based on the architectural elaboration all of B200 the entire settlement populated by an elites, and according to Cadavid and Herrera (1985) the settlement is about 3 times the size of the best built area which would place the "elite" households at something close to 30%. In the case of Chengue the present data provides a less detailed picture of the architecture but it appear that the proportion is much more diffuse. About 50% of the population may be classified as elite (see Table 5.1) or 30% if a more restricted parameter is used and only the extents of RA 4 are considered. If the degree of investment in domestic architecture is used, the differences in architectural elaboration and residence size between villages indicate that there are wealth differences between villages (Herrera and Cardoso 1985, Smith 1987, Santley 1993: 80). It is likely that there were not only wealthier individuals but also wealthier communities, although there is nothing that suggests a truly centralized form of control, being most of the architecture primarily residential. This suggests that within a community any community there were relatively large proportions of the population that could be classified as elite.

From a wider comparative perspective population densities of 120 people per km^2 and about 80 people per ha (See Tables 4.2 and 4.3) are relatively high compared to the 40 to 50 people per km^2 of chiefdoms in La Argentina in the alto Magdalena region (Drennan and Boada 2006:80). The estimates based on house distribution are consistent with this higher ceramic density at the regional and local scale. Chengue, B200 and Pueblito estimates based on terrace size and distribution suggest population densities that are within the range of Chengue. The estimated population for the mapped section of B200 is of 956 people or a population density of 73.5 people per ha. In Pueblito the estimate varies slightly depending on the data set. As mentioned, for the 264 houses the estimates are roughly 1424 people in a 25 ha village with a population density of 31.8 people/ha assuming a conservative 5.5 people per house. Using the more detailed but more limited data set from Mason (1931) and Cadavid (1993) the roofed area in Pueblito would hold about 545 people in an area of 7.1 ha or 76 people per ha. In any case the population densities are within the ranges of what is expected for Chengue (see Table 6.6). Compared to the neighboring villages Chengue appears to be fairly typical (Figure.6.13). This suggests that the immediate vicinity of Chengue had population sizes similar or greater than Chengue. It is hard to establish to what extent the neighboring population were specialized but Gairaca has access to much better agricultural land, fishing resources and Castellanos mentions Gairaca had households specialized in beekeeping. Concha may have been fairly productive from an agricultural point of view and Nehuange had salt flats and a fairly large bay. Cinto seems to have the advantage of having higher rainfall and probably had the capacity to be self sufficient.

It is very difficult to establish population densities at larger scales so the population density indexes are not viable for the current data set. More sophisticated interpretations of the data are possible and desirable but at the present state the Tairona seem to have a fairly compact settlement patterns with villages that may occasionally be about 4 times as dense as those from the Alto Magdalena (Drennan and Boada 2006). The pattern tends to resemble the distribution of other archaeological communities and along the Ranchería river and along the southeastern corner of the Sierra Nevada de Santa Marta. The same pattern of nucleated villages in the broader area of the Sierra Nevada de Santa Marta tends to be prevalent possibly since ca. 600 AD and contemporaneous to the Tairona phases for the most part (Langebaek, Cuellar and Dever 1998, Cadavid and Herrera 1985, Drennan 1996, Ardila 1996). However, the Ranchería river settlements are also under significant ecological stress and along a narrow strip of alluvial lands that would constitute an analogous distribution of resources to the ones found in the Parque Tairona. The population densities for these areas are lower, ranging in the vicinity of 25 people per ha, although community scale archaeology would be necessary to establish this with greater precision (Sanders, Parsons and Santely 1979). On the other hand the Muisca settlement pattern, which is also contemporaneous to the Tairona T2 and T3 phases has a predominantly disperse settlements for most of the later part of the sequence (1200AD to 1600 AD). There are very low densities before 900 AD but the distribution of the population during the later part of the Herrera period seems to be relatively compact (Langebaek 1995, Langebaek 2002, Boada 1998).

	Diagnostic	All	Population	Population	Total
Concha	6.2	6.5	496	195	691.0
Chengue	17.0	0.0	1360	0	1360.0
Gairaca	17.3	0.0	1384	0	1384.0
Nehuange	10.5	2.8	840	84.3	924.3
Cinto	22.0	5.0	1756.8	149.4	1906.2
Concha Valley	5.6	5.6	446.4	167.7	614.1
					6879.6
	Total area surveyed:	84.0 km^2		Pop/ km^2	81.9

Table 6.6 Ceramic Density and Population Density.

Assuming 60 people/ha with high ceramic densities and 30 people/ha with lower ceramic densities, based on as observed in Chengue's, in the 84 sq. km. survey zone the population density is of 81.9 people per sq. km.

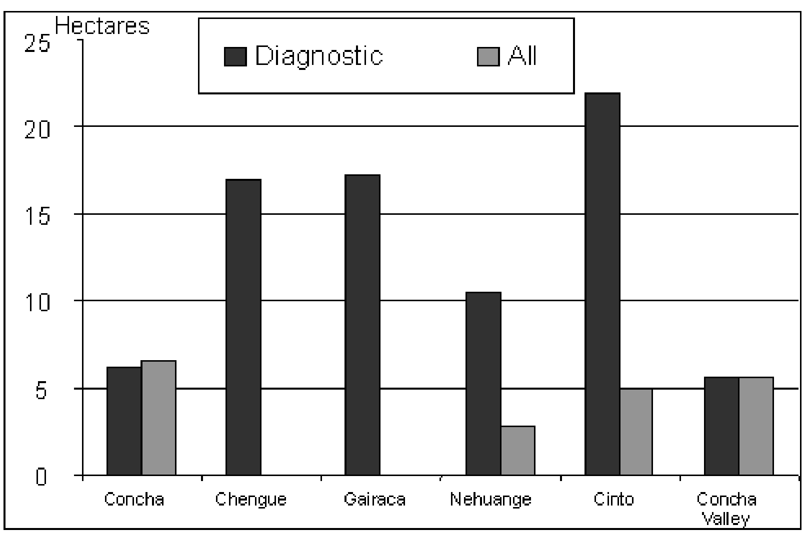


Figure 6.13 Total Areas of Lots with Very High Ceramic Densities in Surface Collections by Bay.

Lots that collected only diagnostic shards (rims and decorated shards) are of similar density to those of Chengue that had ceramic densities in the range of 400 to 800 shards per m^3. Shovel probes were not considered because they were used only in Chengue and are associated almost exclusively to Buritaca and Nehuange phase deposits in Sector 2.

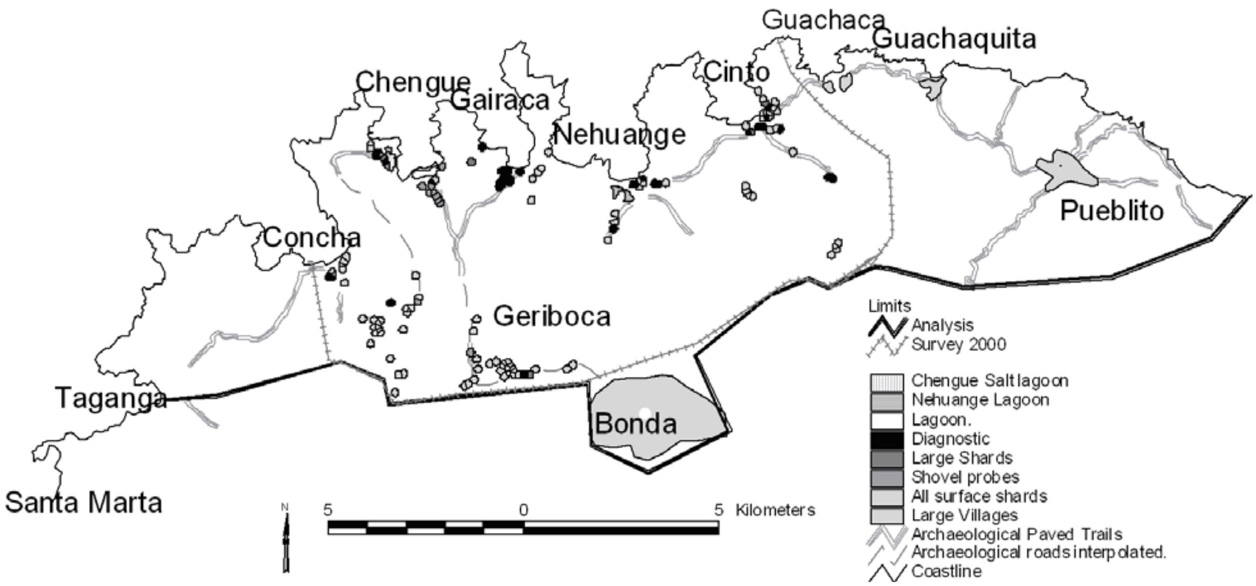


Figure 6.14 Ceramic Density and Population Density.

Distribution of lots, villages and archaeological roads registered by the systematic regional survey, non systematic regional survey and Chengue's community scale project. (Langebaek 2005, Cadavid and Herrera 1985, Herrera 2000).

CHAPTER 7: CONCLUSION

A BOTTOM UP SEQUENCE WITH A TOP-DOWN FLAVOR

The primary intention of this research has been to establish the way in which a specialized community was formed. In the top-down scenario the community would be the result of an external agent that has sufficient authority to "create" a community to extract a highly concentrated resource, marine salt. In the alternative scenario the community would become specialized as a result of a slower process in which the changes that lead to specialization are the result of decision of the individuals who resided in Chengue before specialization took place. Consequently the role of the individual agents (individuals and households) at a very small scale, what has been called a bottom-up process, is the primary force in the formation of a specialized community and the production of surplus.

The data compiled in the past chapters suggests that formation and growth of the village or community of Chengue appears to be predominantly a bottom-up process. The ceramic distributions from chapters 4 and 5 show what seems to be a small population (20 to 300 people at different times) that continually inhabits the bay from ca. 200 BC until ca. 1200 AD. After the beginning of the late 11th century AD the population grows at a very rapid pace, which would be a consistent telltale sign of a top-down process. The top-down components of the process should not be ignored; they may be the result of interaction between kinship groups, factions or moieties but it is unlikely they are caused by centralized forms of power. The evidence for this is the appearance of stone infrastructure, predominantly in domestic contexts in all of Chengue and the sudden introduction of prestige items, exotic items and a reduction or rapid relocation of the population during the T1 phase. This could be interpreted as a take over of the salt production by an external agent (Hayden 1994). The quick change in population size and location could imply that an elite controlled all production or that control over the resource occurred under some form of exploitation of the "commoners" (Saita 1994). However, the whole process of specialization of the village when studied in greater detail does not appear as a top-down process. The sharp demographic changes during the T1 phase is the only one of the expected indication of a top-down aspect of this process that appeared. Furthermore, there is no evidence of truly powerful elites, and the radical changes in the distribution and size of the population tend to coincide with environmental changes of the salt lagoon which in turn suggests that the exploitation of the salt resources may be the result of the decision of the few resident households. Therefore, the process of specialization starts with entrepreneurial households who intensify the production and incorporate it into an exchange network. Figures 7.1 and 7.2 summarize the evidence for the process mentioned above.

Evidence for:		If YES top-down	If NO bottom-up
Elites from the earliest phases.	NO		X
Large storage in earliest phases.	NO		X
A very compact settlement during the earliest stages of the occupation.	PARTIALLY YES	X	X
Management at the community level: i.e. Concentration of storage,	NO		X
Salt production is controlled by the elites.	NO		X
An abrupt change in the distribution of the population.	YES	X	

Table 7.1 Results Summary.

The B1 – T1 Transition

Although there may be many other social forces influencing the community of Chengue over the entire archaeological sequence, the most important part of it, for the purpose of understanding the most dramatic transformation in the village of Chengue, is the T1 phase. This can be described as a transition between two very different economies and forms of social organization. The small yet unmistakable scatter of B1 phase artifacts at the northeastern tip of the salt lagoon's shore (RA 3, see pages 138-148) suggests that there may have been a single household or residential ward in that sector. The location of these residences is near the end of a stone path that connects this section of Chengue to the Valley of Concha.

Although far more research is required at a household scale, it is possible that this small group of households would have the upper hand in the initial stages of the exploitation of salt. It is very unlikely that there would have been salt production other than for domestic consumption earlier than the 10th century AD. Although it is possible to produce salt without the complete desiccation of the lagoon, as it is evident in modern Chengue (see figures 3.4 and 6.9) there are indications that between 1000 AD and 1200 AD the conditions in Chengue would have been wetter than today, and the lagoon does not seem to have desiccated completely as it does today. With the ceramic chronology used in chapter 3 and the overall body of evidence it is hard but not impossible to ascertain when during the T1 phase the population shift occurred. It is likely that it happened after the time that the shape of the lagoon in Sector 2 changed and the inhabitable area around it increased (see Figure 6.5).

Furthermore, the most significant transformations made to the lagoon, which can be dated to the late 12th century AD are not monumental; they could have been constructed by a small resident population (see Figure 6.12). However, the stone fence seems to have the double purpose of protecting the lagoon from domestic debris and facilitating the collection of salt foam. It is quite likely that the blockage of the channel that connected the lagoon to the sea occurred naturally or was the result of a combination of relatively small investment of labor and a natural event. The transition to a long dry period after 1200 AD may have placed significant pressure on local agricultural production. At the same time, it would have rewarded the few households who had been living in what was formerly the less desirable rim of the salt lagoon. This scenario is reinforced by the lack of evidence supporting the presence of a local elite, or of some form of social hierarchy for most of this phase. The paleoclimatic reconstructions, sedimentology and ceramic distributions suggests that the process of population increase must have happened in less than 100 years towards the end of the T1 phase, that there were no truly powerful elites living in Chengue before or during this event, and that the general settlement pattern has a similar configuration until the Colonial period.

The evidence for Chengue does not show that there was necessarily an association between a hierarchical social structure in Chengue during the B1 phase, and the faint evidence for hierarchy during the T1 phase. For the T1 phase, social differentiation is perceptible only in the distribution of T1 mamiform tetrapod vessels. The presence of these very particular ceramic forms in Sectors 1 and 2 does suggest some regional exchange at this time, which could have been articulated through elite households, but it hardly supports the idea of a strong and decisive influence from an external political agent. The T1 artifact distribution in combination with the sedimentology of the lagoon suggests that most of the T1 phase artifacts are relatively late, probably from the 11th century AD, which implies that either the use of B1 type ceramics extends for a longer time than anticipated or there is a severe population drop between the 8th and 10th centuries AD. Only further research in Chengue and the region will help establish how this transition occurred.

Years AD	Phase	Dry Wet	Demographic changes.	Salt extraction and agriculture.
2000			No residents, small modern population.	Extraction by the Varela
1950			0 to 8 people, seasonally up to 30.	family starts in the 1970´s.
1900				
1850				Little or no salt extraction.
1800			Abandonment.	
1700	Col.			
1600			Population decline, Spanish conquest.	
1500	T3		Slight population growth.	Salt extraction peaks.
1400				*Manihot sp* seeds, z. maiz phytoliths.
1300	T2		Population peaks at about 300% of previous peak.	Figures showing coca chewing.
1200			Salt extraction starts at similar to modern levels.	Increase in shell counts.
1100			Population moves in to Sector 1.	Probably some amount of salt extracted
1000	T1		Possible population decline.	but intensive extraction not possible.
900			Sector 1 is almost uninhabited.	*Manihot sp*, Alocassia Macrorhiza and Zea Mayz pollen.
800				Salt extraction not possible.
700				
600	B1		Population increase to about 300 people	
500			or about 1000%.	*Manihot Sp*. and *Zea Mayz* phytoliths.
400				Some evidence of *Zea Mayz* and possibly
300			Extremely small population.	Clearing of forest.
200				*Zea Mayz* phytoliths.
100	N1		Possibly between 20 and 40 people.	
0				
-100				
-200				
-300			Probably uninhabited.	
-400				

Figure 7.1 Summary Timeline for Chengue.

Dry conditions assume precipitation of around 200 to 300 mm/year, similar to modern. Wet conditions could be as high as 700 mm/year, similar to the wetter bays of the Parque Tairona today.

The specialized T2 and T3 phase village is the result of an opportunistic group of families, probably long term residents. Aided by a tectonic event that lowered the sea level and made salt exploitation easier, they decided to turn the naturally shallow lagoon of Chengue into a salt flat that easily yielded many times the amount of salt that could be consumed by the local population. Although the process appears to be predominantly bottom-up the village does develop, in a broad sense, a more evident differentiation of the artifact assemblages of different households. This is a common pattern for Tairona region around the time that large scale salt production becomes possible (ca. 1200 AD).

Labor, Migration and Political change in Chengue

The exploitation of this new and renewable resource was followed by a rapid increase in the population which in turn created pressure in the ecosystem and forced even more changes in the domestic economy. The most evident of these changes, other than the association of most households to the salt flat, is the broadening of the diet to include a wide range of small mollusks found in vast numbers in the muddy bottom of the coastal lagoon of Sector 2. Given that this happened at the same time as a precipitous increase in population density , the local ecosystem may have been under significant pressure. Population probably exceeded the carrying capacity of the immediate ecosystem, particularly the most local agricultural resources. It was the development of a regional-scale exchange network interconnecting the whole of the Tairona area that sustained larger populations in marginal areas. The network of trails and interconnections between villages can be better explained by the will of the individual residents than by an overarching and centralizing agent. This suggests that immigration to Chengue probably occurred during the transition between the T1 and T2 phases, but there is little evidence to support the idea that this migration was propelled by paramount chiefs or an external political agent. The most plausible explanation for this phenomenon is the elasticity of labor in economies that are under stress, the creation of economic opportunity in a resource rich environment and a regional-scale economic process of growth under more complex emergent forms of social organization.

This emergence of a more complex social system in the latter part of the Tairona sequence seems to be attributable to horizontal components of the society than to the institutionalization of a hierarchy by external agents. Activities differed only slightly between B1 households, but new households that appeared from T1 onward had lower status. The groups of households in the T1 through T3 phases do show incremental differences in their ability to store and use food. These patterns of artifact distribution have generally been associated to feasting in hierarchical or transegalitarian social organizations (Dietler 2001, Hayden 2001). A relatively small proportion of the households seem to be particularly worse off than the others, a proportion that seems to grow in the T3 phase. These may be relatively young households, displaced by Spanish Colonial reorganization and poor households forced to “sell” their labor. This T3 concentration of resources and the somewhat more robust appearance of some households suggest that there is “vertical” component of social organization in the later part of the sequence. This add evidence in favor of a bottom-up scenario in which the formations of incipient elites are a result of specialization rather than a cause of it.

Nonetheless, there are indications that suggest there were settlement hierarchies at regional scales, and multiple other social, economic and cultural changes visible only at regional scales.

Specialization and Hierarchy

There is no evidence of specialization or of hierarchical social organization during the early occupations. The early N1 occupation, which can hardly be called a village, and the B1 village were located in the most humid sections of the bay, where vegetation is more robust; streams are longer and soils are deeper which provide more water. The B1 village is thus located in the area with the best chance of maintaining agriculture as a reliable source of food and good access to the sea and other villages, yet it remains an agriculturally marginal location. The Buritaca artifact assemblages have no granite artifacts and relatively few stone artifacts, shells or fishing weights which suggests that medium range exchange was very limited.

During the Tairona phases Chengue does show clear evidence for a specialized economy. Social differentiation seems to emerge from the uneven advantages that the “older” and perhaps founder households had over the younger ones. As was shown in chapter 5 the T1-T3 population was primarily located in the driest and least hospitable section of Chengue. Although not far from where the B1 village lay, the Tairona village is far larger and it surrounds what is clearly a salt producing lagoon. The artifact assemblages have an overwhelming proportion of granite artifacts, of all shapes and sizes. Grinding stones, hammers, polishing stones and parts of house foundations or boulders with engravings, were all made in imported granite. Other stone tools, made of locally obtained schist, resemble knives that may be associated to mollusk consumption or salt production, both of which where far more intense than in the earlier occupation. An interesting trait of the assemblage is the complete absence of spindle whorls, something presumably common in Tairona assemblages elsewhere, and this suggests that the inhabitants of Chengue did not produce cotton string, a common item of exchange for the contact period Tairona (Langebaek 1991:159).

Although there is some evidence for what could be called “class” differences at Chengue, the less sophisticated and probably worse off households do not amount to a large proportion of the population. In some areas of Chengue, the accumulation of wealth items and use of coca leaf suggests the presence of an elite, but only in T3 times at the very end of the sequence, at least two centuries after salt production was intensified. This does not imply that control over a resource means the destruction of more communal forms of production, but it does suggest that at Chengue such control was not important in the initial part of the process and therefore could not have been a cause (McGuire and Saitta 1996).

The territory of the community of Chengue seems to be structured at a level higher than the household or the village. Routes of access to the main population centers of Chengue can provide some insight into interaction between Chengue and its immediate neighbors. A few households may have been able to control access to neighboring communities aided by topography and structures such as terraces, stone paved paths and small forts. The community around the salt flat had relatively restricted access to the neighboring valley, the sea and the eastern sector of Chengue. This implies that an external agent would have had little success in exercising direct control over the village but a relatively good chance of influencing the community through the control of the exchange of regionally produced staples and possibly esoteric or religious services.

Religious and political specialization may play a key role in the formation of a hierarchical structure because it can help legitimize a form of managerial elite that may channel the exchange of locally produced staple goods through the control of exotic staples and esoteric goods or services (Earle 1987:292-297, Drennan 1996:31). The economy of Chengue did not have a homogenous distribution of resources, although physically all households had similar access to the lagoon; by the end of the archaeological sequence they did not have the same access to food, or to goods with esoteric value. In fact, the distribution of small elaborate ceramics suggests that the households who evidently controlled the exchange of these items lived better, in larger residences and with more and better artifacts. This suggests that, in relatively simple social organizations, control over the distribution of staple goods is more important than control over their production. Thus a regional exchange network for staple goods may be very effective in cementing social differences.

The Politics of Exchange

The centralized political structure of the Tairona is visible at Chengue only at the end of the sequence. Political influence over multiple villages required some level of control over labor and over the exchange network. Such control was articulated through war in the Colonial period as described in chapter 6 and by multiple authors (Carneiro 1981, Clark 1974, Bischof 1982, Redmond 1994:32, Reichel-Dolmatoff 1951, 1965). However, management of the distribution of the staple products would be the key to a sustainable social hierarchy at Chengue, even if the management of resources occurred in very discrete episodes.

The case of the Chief of Bonda described in chapter 6 may be a good example of the type of power that is exercised by the Tairona regional elites. It suggests that a hierarchical social organization structured under the social and economic pressures of warfare tends to develop with relatively simple rules which make it inherently unstable once the external pressures are removed. In Chengue it is evident that this difference between households became more evident and permanent with the introduction of the salt economy and the possibility of obtaining resources through a labor intensive production using excess labor from other communities or from the local population. Once the population reaches the carrying capacity of the immediate environment, exchange mechanisms and specialization can compensate for the low agricultural productivity. In turn this creates the opportunity for households who had a slight advantage under strenuous conditions to extract resources and consequently obtain labor from other members of the community.

It is likely that the exchange of some goods, like coca, stone axes and possibly gold, was restricted to a few families at Chengue, but, as mentioned in chapters 5 and 6 there is little evidence for long distance exchange (outside of the immediate vicinity of the Sierra Nevada de Santa Marta) in the Tairona phases and none at all in the B1 and N1 phases. If there was ever a long distance exchange network it must have been of a very small amount or perishable objects that were not detected by the archaeological analyses and samples obtained at Chengue. An exception could be a few fragments of Burnished Black Tan wares that are unusual, but this evidence requires further analysis to establish the source of these wares. Historical accounts suggest that, at the local level, the control over the production of gold artifacts associated with villages like B200 did allow the accumulation of wealth, evident in the more sophisticated and robust domestic architecture (Hirth 1993, De Marrais 2001, D'Altroy 2001:329). Again, all this evidence appeared fairly late and seems to be the result of specialization and the exploitation and local exchange of salt. The bulk of exchange at Chengue occurred at a fairly local scale; it appears to be primarily composed of staple goods and used a fair amount of infrastructure for this purpose.

This seems to be the norm for the Tairona who appear to have had a relatively fluid vertical economy. The road network of the Tairona and specifically at Chengue appears to be closely associated with the denser population sectors; it connects the two communities of the bay with at least two of the neighboring villages via two separate trails that end in the Valley of Concha and ultimately Bonda and Gairaca. These small roads or paved trails are probably similar in function to the Barinas causeways described by Spencer (1998), but unlike the Venezuelan counterparts the Tairona roads are very numerous, small and probably maintained by individual communities. They are not necessarily the result of highly centralized political enterprises. This suggests that the exchange of crafts may have been managed to some extent between elites of different specific villages. In the case of villages like B200 control over the production of gold or other crafts and esoteric assets may have played a role in creating some form of social dominance. However, long distance exchange seems to be a weak force in the transformation processes that led to the consolidation of the Tairona chiefdoms because the evidence from Chengue places this type of exchange towards the 14th or 15th centuries, after the densely populated villages and salt production were already well established. The demise of the Tairona chiefdoms did not occur from the weakening of long distance exchange. In fact the opposite occurred; it was the disruption of the very local and sub-regional exchange networks that caused the disintegration of the economy in a political environment that was never truly unified (Reichel-Dolmatoff 1951).

IMPLICATIONS OF CHENGUE'S PROCESS ON THE ARCHAEOLOGY OF TAIRONA SOCIAL ORGANIZATION

The Residential Ward as a Stable Unit in a Complex Social Organization

The Tairona complex chiefdoms emerged out of interconnecting household economies in what can be best described as a bottom-up process. The evidence from Chengue shows that the longest lived recognizable form of complex social organization is not the village but a simpler unit that was called a "barrio" by the 16th century Spanish documents. This can be seen as a stable component of the village. In the archaeological record of the Tairona, it seems that residential wards, clusters of residences, residential areas or groups of interconnected houses as described in chapters 4 and 5 are particularly common for the late phases of the Tairona sequence, but from the distribution of B1 and N1 material something similar may have existed since very early in the sequence.

It would appear that the society that gave rise to the Tairona regional networks was very diverse and is hard to characterize with the sketchy available data, which leads to the idea that there may have been multiple forms of social organization in the pre-Tairona phases and in the broad region of the Sierra Nevada de Santa Marta. This means that although there may have been a considerable population in the region before 800 AD, it did not really constitute a complex social organization, because the population was not well integrated politically or economically. Presumably there were clusters of very small villages or large households sprawling from the coast to the highlands. This distribution of settlements formed what may have been a complicated and loosely structured form of socio-economic integration, probably restricted to the immediate vicinity and based on kin relationships. The picture that can be derived from Chengue is that the pre 800 AD villages were relatively small and had a weak form of social hierarchy if any. However, the evidence for a regional distribution for this phase is very sketchy and more systematic data is necessary before this statement can be verified.

Contact period documents consistently suggest that there was some kind of elite in Tairona villages; there may have been multiple leaders who headed relatively small units within the community. The Spanish often mention “captains”, “caciques”, “maomas” and heads of “barrios” and “principales” or elites, which were male or female and could easily be identified as members of higher casts by their appearance and behavior. Some of these classifications seem to be strictly military or religious and others seem to be more permanent and with limited territorial influence, yet they are always associated to some kind of village and its surrounding territory. The so called “caciques” are rarely associated to entire valleys or larger territories and in most cases seem to be relatively ineffective in commanding the forces of multiple villages (Reichel-Dolmatoff 1951:49-51, Tovar 1993:199, AGI 1602, Langebaek 1996, Cardenas 1996:68, Oyuela-Caycedo 1998, 2002).

The Tairona residential ward, or the less precise residential area (see chapter 5), is clearly a pattern of interconnected houses with a population ranging from a few dozen to a few hundred. It would appear that by the T1 or T2 phase the residential wards may have developed a weak form economic and social hierarchy. The predominance of the bottom-up process in the formation of the local economy of Chengue and the relative frailty of the hierarchical social organization of the Tairona chiefdoms suggests that the more complex hierarchical aspects of the Tairona chiefdoms, such as paramount chiefs or warring chiefs, were short lived structures that resulted from smaller and more stable forms of social organization. Consequently, these small and autonomous networks of households, probably organized through kinship, allowed the formation of complex regional economies and vertically integrated economies in the Sierra Nevada de Santa Marta.

In chapter 5 it was concluded that there were differences in the distribution of artifacts and architecture that suggests that the proportion of the population that could be classified as elite was around 50%, another 30% of the population may have been slighter worse off and about 20% of the population would be classified as poor. This indicator was derived from storage vessel, cistern and well distribution, service vessels, lithics and architecture and suggests that the poorer households were unable to partake as hosts in feasting and possibly unable to live permanently in Chengue (see Figure 5.60). This hierarchical distribution of the population fits nicely into what Hayden (2001:257) calls a transegalitarian society. Thus the social dynamics of Tairona society are better described by bottom-up models, because the “elites” are far from a dominating minority, instead they are a majority, possibly the most common segment of society. This idea may articulate nicely with Clark and Blake’s (1994) model in which there is a transition phase between egalitarian and ranked systems, which would not show clearly as either egalitarian or ranked in the archaeological record. According to Clark and Blake’s model, later in the sequence, the local non-hierarchical forms of social organization would be used by local ambitious individuals as a means to administer labor to exploit the more abundant resources, in Chengue’s case salt. Localized and abundant resources may guarantee the persistence of this form of organization and a progressively hierarchical social structure sustained by a constant influx of goods and surplus labor, exchanged for salt through a set of particularly ambitious individuals. We can imagine that these individuals would serve as leaders of local groups of households, and that they would in turn compete for resources and prestige.

Clark and Blake’s ambitious individuals may be a necessary but insufficient condition for the emergence of hierarchy. As successful competing individuals increased their influence over local households, continuation of the process would be contingent upon the degree to which they were able to control highly concentrated and scarce resources, in the case of Chengue water (see chapter 5). Resource distribution and evidence for feasting suggests that the initial formation of a hierarchical social structure at Chengue could be explained through competitive relations between households and household groups (barrios) under an environment of resource abundance. Social hierarchy would be consolidated once the resources became relatively scarce and the risk for a growing part of the population became increasingly large. The geographic heterogeneity of access to resources in Chengue and its very limited inhabitable areas may have contributed to the process of social differentiation because the 20% of the Chengue’s population that is worse-off had literally no more room to grow and apparently a limited ability to exchange resources with the neighboring communities.

Labor

The role of labor and more specifically surplus labor from lower status households can be a very important aspect in the process described above. In chapter 5 the data from the distribution of ceramics by residential areas was interpreted into a model of the social hierarchy of the last phases of Chengue. The 20% of the population that is classified as poor and as discussed in chapter 6 could be seen as an elastic labor resource, manipulated by the rest of the population as a form of surplus labor. In the case of Chengue, the “poor” households would have had little chance to break the pattern of economic disadvantage that started when the founder households settled around the lagoon. This would inevitably result in permanent economic inequality (Netting 1993:197). The advantage held by the founder households seems to have set the stage for a hereditary social hierarchy. This complements the process outlined by Clark and Blake, because it implies that competition between aggrandizers leads to accumulation of resources. It also stimulates population growth that leads to environmental stress and heightens the disadvantages of parts of a relatively small portion of Chengue’s population. The process of social differentiation did not go on very long (part of the T1 phase) and did not result in the formation of strong political elite. Such an abrupt population growth is best explained as a bottom-up process where the involuntary effect of competing factions and cost/benefit decision making at the household level create a setting where opportunities for subsistence are finite and inequality becomes inevitable.

History

Most of the historical documents concerning Colonial period Tairona and their neighbors have focused on identifying bold courageous men whose actions molded the history of the conquest of the new world (Castellanos 1944; Reichel-Dolmatoff 1951,1978; Tovar 1993). These accounts are bound to produce top-down portrayals of Tairona society and are responsible for skewed and often contradictory impressions of the Tairona. Accordingly, most of the archaeology of region has been oriented towards the documentation of what presumed from the onset to be strongly hierarchical Chiefdoms with highly centralized political systems. Archaeologists expected to find dense urban populations with elites living in palaces and monumental architecture. Dense cities and pyramids have never been but sites like B200 and Pueblito have automatically been taken to be the seat’s of all-powerful chiefly rulers exercising state-like political power (Reichel-Dolmatoff 1965,1978:91,1986, EBO 2007). Tairona complex social organization has been thought the result of colonization from Central America. In a linear top-down process, the ready-made from which they developed these complex micro-vertical economies (Reichel-Dolmatoff 1978). Only the elites, craft specialists and merchants would be true agents in the social system. Within this top-down model, the agent (an individual) or an actor (a cohesive group of people in social organization that behaves as an actor and intentionally affect a series of events) is irremediably locked within a rigid system that inevitably reproduces a single structure over the entire Tairona cultural territory using resources (including labor) in an economically rational process where centralized accumulation is optimal (Yaeger 2000: 124, Isbell 2000). This model does not allow for practically any variation in the social structure other than organic growth and "adaptations" to local environmental conditions. There variations are the only part of such a model with bottom-up characteristics.

Scale

If the weak hierarchical structure of Chengue is the result of a predominantly bottom-up process, it would be, at least in part, the result of the specialization in salt production and incidental transformations of the environment. Models in which households or residential wards, groups of households, are the best fit for Chengue. The formation of these wards and the emergence of status differences between them took too long for any individual to witness. The stability of l ward suggests that the horizontal structures within them are the result of individual actors that had the intention of realizing their individual goals but that as an aggregate behave in fairly regular patterns (Drennan 1996, 2000; Brumfiel 2000, Clark and Blake 1994, Clark 2000). Such patterns would be observable only "as stable macroscopic or aggregate patterns induced by the local interaction of the agents" (Epstein and Axtell 1996:33). They thus become black boxes in most archaeological models, and this is undesirable because it hides what may be potentially important phenomena that can lead to the inference of micro scale rules. However, the micro and the macro are connected, the changes at the micro scale will produce change at the macro scale because it is all part of the same phenomenon (Drennan 1992, 1996, 2000).

In order to use the residential ward and its component structure, the household, as an agent, may require the use of these units as black boxes, which we would assume have multiple agents interacting within them. In order to look inside of these black boxes we must understand the formation and heterogeneity of households first. Once enough variants of the Tairona households have been characterized and a model for the internal workings of a residential ward has been built then it will be possible to use the residential ward as an ideal type. However, this effort may encounter the methodological problems typical of site archaeology where excessively small-scale perspectives would prevent us from seeing the forest for the trees. For the Tairona region, and for others I know well the Muisca area and Tierradentro where architectural remains are scarce, the most productive approaches may be inductive, parting from systematic macro scale research projects that allow the archaeologist to identify settlement patterns and relationships between macro scale actors that would otherwise take decades to identify, if ever. This means that before households and residential wards can be characterized, lower resolution larger scale data that incorporates most of the variation must be compiled. This approach can allow for the characterization of household based on the stratified sampling of villages and residences from all the range of settlement types, improving the quality of the sample by allowing all the variation to be considered with a relatively small sample (Drennan 1996:237). The methodological progression that was followed in Chengue went from a general approach to the region in the form of a systematic regional sampling program to a “village” scale study that identified even smaller structures composed of collectives of households and in some cases individual houses which in turn allowed a for the identification of micro scale patterns over relatively broad time units. Presumably, once the patterns at a micro scale are identified and linked to the macro social phenomena, the questions of the relations between households can be better addressed. Ideally, a more deductive phase in archaeological analyses may be able to fill in the gaps produced by the archaeological record and our sample limitations. The method of modeling these individuals may rely heavily on transforming them into some form of ideal type or agent that can be fitted into testable models.

Some Implications for Bottom-Up Modeling

Inductive forms of analysis such as agent-based modeling appear to have two characteristics which aide in the understanding of social change, particularly of bottom-up processes. The first is that the models are replicable, and the second is that multiple scenarios can be tested with one or more data sets which leads to the development of better hypotheses (Dean et al. 2000, 2006:91). The ability of these analyses to test the likelihood and logic of models can be a tool for the development of better theories of socio-cultural evolution. The modeling of social process that start with simpler actors or agents, like the initial stages of the Chengue sequence, and develop more components and interactions not only out of the aggregation of agents (population growth) but due to changes in the rules of interaction between these agents, may necessitate a technique that can model at least two distinct levels of complexity (Gilbert and Toitzsch 2005:13). This is theoretically problematic because it requires theory to explain multiple phenomena and account for the creation of new social structures out of the individuals, including sets of relations between actors that have never been ethnographically or historically witnessed or recorded (Carneiro 2000: 153). If our theoretical models don't allow this they will become excessively particularistic and unable to explain anything, or excessively reductionist and therefore dogmatic and ultimately unable to change and improve. Generative approaches, similar to the way the questions were approached in this dissertation, separate the components of the models used to create alternative scenarios and the methodology used to test them, which in turn allows the elimination of the components of the model that are not supported by the evidence (Netting 1993).

APPENDIX A

CERAMIC TYPOLOGY FOR CHENGUE

A.1 CONTACT PERIOD CERAMICS

The presence of European or Colonial ceramics is well documented for the Parque Tairona and neighboring region. It is known that there was a fairly intense exchange of artifacts with between Tairona villages and Europeans for a period of over a century, although the evidence is relatively faint (57 fragments, .2% of the whole collection). Contact ceramics (Glazed fragments and Botijas or Spanish olive oil jars) are characterized by tan, green or buff glazes and very hard and resistant wares. There are some horizontal undulations and scratching on the surface that are the result of producing these wares on a potter's wheel. The temper is often fused to the paste and it is very hard to detect visually; pastes are usually light crème and rarely have inclusions. Perhaps the resistance of Contact ceramics has preserved them very well and they may be frequently found in very large fragments on the surface and very rarely in middens, the most conspicuous being olive oil jars.

A.2 TAIRONA PERIOD CERAMICS

The primary component of the Tairona 3 phase are Red Slip and Coarse Red-Brown, however, some Tairona 1 types seem to be used in relatively high proportions (10% to 20%) until the end of the period. Tairona 2 ceramics constitutes 31.5% of the entire ceramic collection.

A.2.1 Tairona 3 (T3) Phase

Red Slip (7995 fragments, 23.4% of all the collection). What is often considered the most common Tairona type, is in fact not the majority of the ceramics in Chengue but it does represent the most recognizable of all types found at Chengue. This is outstanding because it is composed of a single class of ceramics. It is often found with only traces of a thick red slip, however, the paste is red to orange, smoothed even when the slip has eroded. In the cases when the slip is intact, the surface is very smooth although a closer look to the surface will reveal small cracks. The paste is usually very hard, resistant and with abundant temper, usually grit. The descriptions of Mason (1939) for the *Pueblito Red* tend to be very compatible with this type. The core is often gray although fully oxidized cores are not uncommon.

Coarse Red-Brown (2761 fragments, 8.1% of all the collection).This type was found consistently in all excavations with Tairona ceramics, in some cases on or towards the upper levels. It has a coarse red orange to light brown paste and surface, with a high frequency of large to medium grit as temper. It has no discernible slip and it is often found with the surface eroded. A few fire clouds are common, but it is a fairly homogenous paste. Reduced cores are common in abnormally thick walls, rims or bases. In surface levels or in severely disturbed contexts this type may in fact be eroded Red Slip which has similar characteristics and thus greatly diminishes the value of this type as a chronological marker, at least in the contexts found at Chengue.

A.2.2 Tairona 3 Fine Wares

Almost a class of its own, fine ware may have had different function to the more common Tairona 2 types. The Fine Plain Gray class has very strong loadings in group 3 of the PCA readout, which suggests that they may in fact be considered as a single thing, which confirms that the absence or presence of temper, which is the only real difference between these two classes, is not an important factor in differentiating Tairona ceramics.

Fine Plain Gray (476 fragments). Slightly coarser than most untempered classes, it has a gray to light brown exterior. The surface is dull and lighter than the paste creating the impression of a tan line following the contour of the paste. An outstanding trait is the appearance of lamination in the paste so that when fractured horizontal fractures may often be visible.

Dense Crème (81 fragments). The paste is very fine and hard with very fine temper. The surface is hard, rarely eroded and frequently burnished. The dominant color is a pale crème, or a sandy yellow on the outer surface; the inner surface is usually gray and very irregular. This type is identical to Gaira Amarillo (Reichel-Dolmatoff 1954a) or “Light-colored Ware” as described by Donald Horton (Mason 1939:407).

Heavy Fine Gray (22 fragments all in excavations). Identical to Dense Crème in all ways except surface color, that is always gray.

A.3 TAIRONA 2 (T2)

A.3.1 Black Slipped

This type is composed of two classes, Very Fine Black and Black Slip that share the outstanding trait of having a very smooth, shiny, notoriously black slip and having identical stratigraphic distribution. However the rest of the characteristics are quite different (2,331 fragments, 6.8% of the entire collection).

Very Fine Black (890 fragments), it has smooth and hard, resistant surface and untempered paste. In the cases when the slip has been lost a dark brown paste is the primary trait. The surface may have been polished with a cloth.

Black Slipped (1441 fragments) the paste may be reddish or gray, with medium sized temper made of grit. Slip, often shiny may have eroded in some patches, burnishing marks are visible.

A.3.2 Hard Slipped

(6,798 fragments, 19.9% of the whole collection). This type is a compendium of classes that can be described as very well fired and unusually hard ceramics, when compared to the rest of the groups, with resistant surfaces. The rest of the properties of this type vary considerably, they range from black to red to gray, and are usually slipped. The grouping is based predominantly on stratigraphic coincidences of the classes, dominated by Hard Red Slip.

Hard Red Slip (3117 fragments), the most abundant component of this type is, which can be described as a hardened version of Red Slip. The primary difference of HRS is the very resistant slip, hardness and evidence of very high temperature firing. The surface often has bubbles and a matte brittle surface that is very resistant, in some cases dark red burnishing marks that create a polychrome shiny surface are the most noteworthy characteristic. Decorations are somewhat rare. This type includes 94 fragments of Crème Paint which turned out to be shards of Hard Red Slip with the remains of a crème substance adhered to the bottom of cooking pots. These ceramics strongly resembles the ones described by Cadavid and Herrera (1985) for B200 and classified as Rojo Liso (Smooth Red), furthermore, the relative stratigraphic position of Rojo Liso and Rojo Burdo is similar to that between Hard Red Slip and Red Slip.

Fine Red Paint (116 fragments), can be classified as a variant of Hard Slipped, it is a very thin ceramics with fine temper, usually not very resistant with very fine slip applied to the outer surface. The slip creates a very smooth and occasionally shiny surface, much smoother than Red Slip, the interior surfaces may show dripping and running that on a first impression looks like a design but in a closer look it is evidently accidental. It is probably caused by dipping the vessel into a very thin mineral emulsion intended to decorate only the outer surface. It is fairly rare.

Plain Gray (249 fragments), has a hard gray paste and surface that is often burnished but tends to be matte, perhaps due to weathering. This class seems to be fine but somewhat thicker and stronger than other thin types. It is in most ways identical in appearance to Fine Plain Gray, except for the presence of temper.

A.3.3 Burnished

This type is characterized by well finished ceramics that tend to be fairly resistant to erosion. The predominant colors are tans and browns and occasionally very dark browns or black. Mostly with unslipped surfaces the Burnished finish can be shiny, with dark cores and medium sized temper. The Burnished type represents 16.7% of all the collection, however most of the fragments come from excavations (4132) followed by lots (1588).

Burnished Brown (3197 fragments) and Burnished Tan (1891 fragments) were originally classified by Jack Wynn as two classes and during the analysis the shards were differentiated, but having identical stratigraphic distribution and being identical in all ways except color they will be treated as a single class called Burnished Brown-Tan (totaling 5088, 15.2% of the collection). The Burnished Brown-Tan surface treatment is generally robust and shiny, it has clear, thin burnishing streaks. The texture is smooth and has medium to fine temper composed mostly of what appears to be sand or medium sized crushed quartzite. The class Coarse Burnished Tan and Coarse Burnished Brown were also integrated into this category because it was impossible to differentiate. This type is one of the mayor types of Tairona 1 ceramics

A.3.4 Plain

This type is composed of four classes that share the trait of having a relatively dull appearance. They are generally tan, gray or brown with no slips or burnished surfaces. Generally sand tempered, with cores that can range from the surface color to dark brown, medium temper frequency. The absence of temperless ware is notable. Plain wares are (6.3% of the entire collection).

Fine Plain Tan (2059 fragments). Sand tempered ware with dark tan surface and some dark cores, medium frequency temper and a medium to coarse texture and smooth to coarse surfaces. Relatively thin vessels.

Plain Brown (2059 fragments) and Coarse Burnished Brown (8 fragments). Sand tempered dark brown surface with light brown or darker than surface cores. Medium frequency temper with smooth matte surfaces. Coarse Burnished Brown was originally a separate class but it was impossible to differentiate it from Plain Brown.

Plain Tan (2419 fragments). Although it shows a relatively weak association with Hard Slipped types in the PCA grouping this is not the case in other PCA analysis done in a slightly different manner. This type it tends to be associated with other Hard Slipped ceramics in a fairly consistent way. It is characterized by medium sized grit as a predominant feature in the paste giving it a coarser texture. The interior face may be darker than the exterior and a gray or dark brown core may contrast with the tan surface color. On occasions eroded shards of Plain Tan can be confused with Caramel, from the Buritaca phase due to the frailty of its surface.

Fine Tan (240 fragments) this class seems to be a thinner version of Burnished Brown-Tan that has little or no temper and a very soft friable surface, leaving a dull sandy surface that is easily eroded by touch. The color range is identical to Burnished-Tan although the paste has a smoother texture.

A.4 TAIRONA 1 (T1) PHASE CERAMICS

Burnished Black-Tan (311 fragments). Although relatively rare it is easily identified. The few examples of this type are considerably hard, with a very resistant shiny polychrome surface that ranges from tan in the interior surfaces to black, changing gradually to reddish-tan in the lower or middle sections of the exterior surface. The polychrome effect is achieved through burnishing, and possibly re-firing, there are no designs or evidence of paint. This class is not slipped but very well burnished to the point of having a deep shine that is very resistant to erosion. The surface is smooth and the paste is very compact with very fine sand for temper that is often hard to see. However, a few cases of a coarser temper were observed.

Coarse Plain Gray (19 fragments).Medium sized grit temper is a predominant feature, although sand is a common component. Of medium texture the interior face is lighter than the dull exterior surface. The paste is dark gray to a lighter gray.

Coarse Burnished Black (172 fragments). Although fairly rare this class is easily identified. It has a hard black surface and paste with no discernible change in color between the surface and the paste. It is mostly sand or medium grit tempered, the temper contrasts strongly with the paste. Some burnishing marks are visible in the outer surfaces.

Fine Burnished Gray (189 fragments) and Fine Burnished Brown (120 fragments). These two classes are almost identical, only color on the outer surface marks the difference. These can be classified as one of the thinnest classes, with no temper, smoothly burnished surfaces and dull interior faces. The surface is often burnished gray, and commonly has red inclusions in the paste.

Fine Burnished Tan (233 fragments). This type is exceptionally well finished with a shiny and fairly resistant surface. The paste contains no discernible temper, it is thin and very finely textured.

Very Fine Black. Some of these ceramics have been found in pure Buritaca contexts (Excavations 3,4,5) and they may in fact be used for the last part of the Buritaca and the Beginning of the Tairona periods. The slip of the wares that are found in these contexts have a reddish paste, with sand or grit temper. The slip is often very thin and has eroded in the parts of the vessel that protrude, such as rims, bases or extruding parts of the decorations.

A.5 BURITACA AND NEHUANGE PHASE CERAMICS

(17.6% of the collection). Buritaca ceramics are easily differentiated from Tairona types by a few traits that may be associated with a smaller scale or more domestic production of wares. Concentrating on the material of the vessels, generally, Buritaca ceramics is weaker, less resistant and more friable than Tairona wares. A series of generalizing traits can include the use of sand as temper, more porous pastes, a considerable variation in color within a single shard, the lack of red slip and the reduced caliber of the shards. Porosity of the shards was observed with the use of a magnifying glass, although it is noticeable when classifying a batch of Tairona and Buritaca shards almost instantly. Buritaca cores are usually darker and temper is finer and sand more abundant. These traits can be caused by smaller, perhaps simple kilns that use less fuel and that burn for a shorter time probably the result of domestic production vs. specialized production for the Tairona wares. Another trait that is not exclusive to Buritaca shards, but does seem to be more evident in these types than in Tairona ones, is the presence of mica in the paste and surface. This may be caused by the darker cores, the use of locally procured micaceous schist as temper and higher proportion of temper in Buritaca pastes, which would make mica more notorious. On occasions mica seemed to have been added to the fabric of the vessel and its interior surface burnished in such a way that it created a sparkling effect on the surface inside of the vessel, this is more prevalent in wide mouthed forms such as bowls that have self slipped and burnished inner surfaces. In general terms Buritaca ceramics is cruder than Tairona, burnishing is frequently less thorough, edges commonly show unevenness and bases have sloppy unburnished surfaces in areas that would have rarely been seen. Occasionally burnishing is not complete even in the most visible exterior surface of the vessel, and the rolls used to build the vessel are visible, particularly in cooking pots.

Most of Wynn's types were found at Chengue, Red on Crème was very rare almost absent in all the collection (29 fragments), one decorated fragment in excavation 7 is the only evidence completely consistent with Nehuange type descriptions. The classification of this type in most cases is somewhat uncertain because most red on crème wares did not have strong evidence of paint and could be the confused with the Red Slip type.

Thirteen classes were used to describe the Buritaca ceramics and use similar criteria to the classes used for the Tairona wares. They were further divided into two categories Buritaca 1 and 2. The criteria for this division comes primarily from the PCA, excavations 9 and auger probes and cores and will be discussed in chapter 3.

A.5.1 Buritaca (B1) Phase

Burnished Gray. (72 fragments) Medium sand and coarse grit tempered with burnishing marks visible on its surface. Occasionally mica is visible in its interior and exterior surfaces.

Caramel (903 fragments). Of medium coarse texture with a smooth surface that is often found crackled and can fracture and fall off under pressure. The cores are frequently notoriously dark and vary from shades of brown or tans on the same shard. The temper is mostly composed of sand or fine grit that contrasts strongly with the paste. On occasion this type can be mistaken with Plain Tan, but a closer look to the surface and porosity and frailty differentiate it from the Tairona ceramics.

Coarse Sand (1091 fragments). Sand tempered with medium textured paste and a smooth and relatively homogenous surface, although color variations do occur they are of a lesser intensity when compared to Dull Brown. The dark brown surface contrasts with gray cores that outline the paler medium fine temper. The surface may be smoothed on both faces and may be burnished to a shine although rarely will burnishing marks be visible.

Fine Black Slip (325 fragments). Medium to fine in texture it often has a gray core with a fine brown surface. Temper is found in medium frequencies of grit or sand not visible on the surface. The surface is burnished, slipped or painted black to a lead-like matte surface. When weathered it may appear dull gray.

Fine Gray (112 fragments) Very fine texture gray cores, gray surfaces some crème interior surfaces. The very fine white temper contrasts strongly with gray paste. Smoothed but rarely shiny. able 2.2 Summary Table of Number and Proportions of Shards per Type.

A.5.2 Nehuange 1 (N1) Phase

Red on Crème (29 fragments). Medium textured paste with small grained temper, smoothed surface with some irregularities on the rims. Red and white lines painted towards the areas near the edge of the vessel. The paste is similar to Fine Red Orange. These wares are difficult to classify as N1 or because they are found in stratigraphic excavations, before the peak of Buritaca ceramics and never in the levels below. This group may be classified in the future as a separate phase N2, if larger samples of this “transitional” type are excavated.

Coarse Red-Orange (1596 fragments). A medium texture paste that ranges from light red-orange to dark with frequent tan fire clouds. The greatest difference with Coarse Red-Brown is that it is sand tempered while Coarse Red-Brown has abundant grit in its paste. The surface is burnished and self-slipped. This group may also be classified as an N2 or late Nehuange type in the future.

Burnished Thin Brown (37 fragments).The paste is fine to medium textured with a light gray core evenly colored with ferrous inclusions. The temper is fine grained grit with occasional larger pieces and some mica, which may show on the surface. The surface is smooth and may have a thin dark slip on one or two surfaces. On occasions the mica will cause the slip to fall off in very small section of only millimeters across. Similar characteristics of the surfaces were observed in treasure jars like the ones found in the Nehuange burial by Mason (1931).

Crème (57 fragments). Medium to fine textured paste with gray cores and fine brown surfaces. Grit or sand tempered in medium frequencies not usually visible in the surface, which is burnished or slipped. On occasions the upper sections of the vessels may be painted red, but this is extremely rare.

Fine red orange (83 fragments). Has a fine textured paste brick red to orange with shades of lighter and darker tones frequently without cores. Gray firing clouds are very common, it is often very hard and the surface is often slightly coarse. Similar to Coarse red-orange it is a thin version of it with finer temper, usually burnished but completely dull.

Dull Brown (1059 fragments). Smoother than the other coarse classes. Color variations are considerable; it goes from dark brown to near brick in the same shard. The temper is visible in large grains of quarts and sandstone in high frequencies, mostly due to the strong contrast of the dark core. Not very hard, it can be easily broken between the fingers. Burnishing is common but of friable nature the surface can peal off under pressure. Temper shows in the interior surfaces that are frequently poorly finished although a shiny surface can be even in vessels that seem to be dull. The dullness seems to be caused by the frailty of the material not necessarily a lack of burnishing.

Dull Tan (114 fragments). Of fine to medium textured paste with ferrous inclusions there is relatively little variation in this the shards, the cores are generally light gray and internal faces usually lighter. The temper is made of fine grit or sand in low frequencies. The surfaces are usually dull tan, smoothly burnished and crackled, occasionally large pieces of mica shows through.

Orange-Crème (122 fragments).Of medium texture with light orange-crème paste and surface, and a lighter core although gray cores are found. The temper is made of fine grit or sand in low frequencies and some mica and ferrous inclusions. The temper blends in with the color of the paste. The surface is burnished and may have a self slip, but due to weathering the temper not may be visible, some burnishing marks and mica are visible.

Fine Sand (156 fragments). The paste is fine textured, evenly colored from tans to brown and some light gray cores. The temper is very fine sand and mica, very hard to see on occasions. The surfaces are slightly burnished but frequently eroded completely.

Fine Brown (139 fragments). The paste is medium textured and evenly colored tan or brown with fine grit or sand. The surface is burnished smooth but not polished.

APPENDIX B

CLASSIFICATION AND MORPHOLOGY OF PHYTOLITHS

B.1 EXCAVATION 9 PHYTOLITH IMAGE KEY.

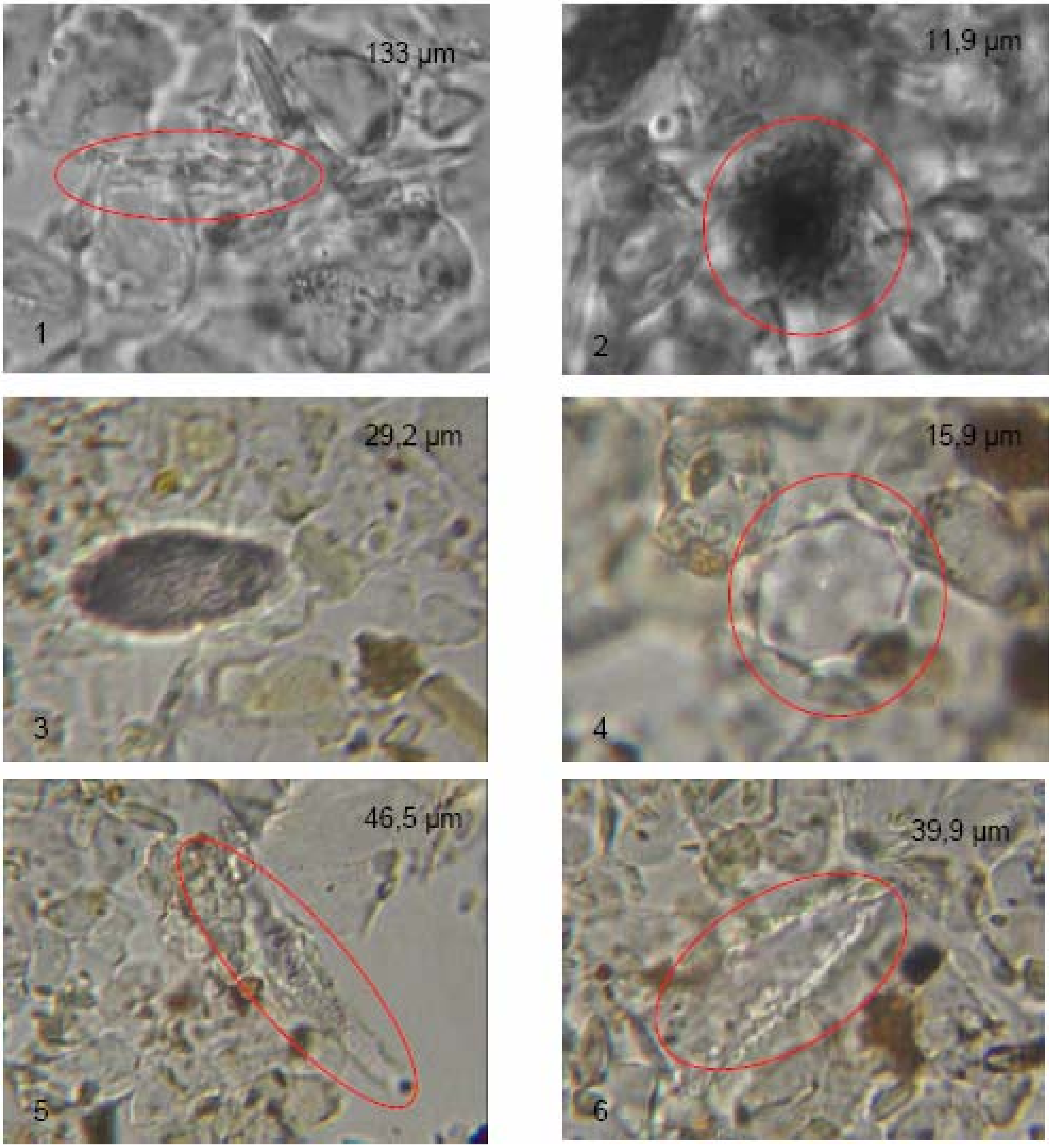
Image #	Species	Class	Description
1	Type 1		Rectangular, larger edges are serrated.
2	Manihot. sp.	Euphorbiaceae	Semicircular, small circular structures in its interior.
3	Type 3 (possibly E. Coca)		Ellipsoid, serrated edge.
5	Type 5		Elongated rectangular, One of the edges shows a sharp edges.
6	Type 6		Conical form, serrated edges.
7	Undetermined 1	Graminea	Sinusoidal edge.
8	Palmae indet.		Star shaped, outstanding edges.
9	*Zea mays*	Graminea	Trapezoidal; small siliceous body.
10	Type 10		Elongated rectangular, edges are continues.
11	Pariana sp.	Graminea	Rectangular, sinuous edges, very eroded.
12	Type 12		Semicircular, sinusoidal edges.
13	Tpe 13		Elongated, sinusoidal edges divided by segments.
14	Undetermined 2	Graminea	Two short and rounded lobes.
15	Type 15		7 straight edges.

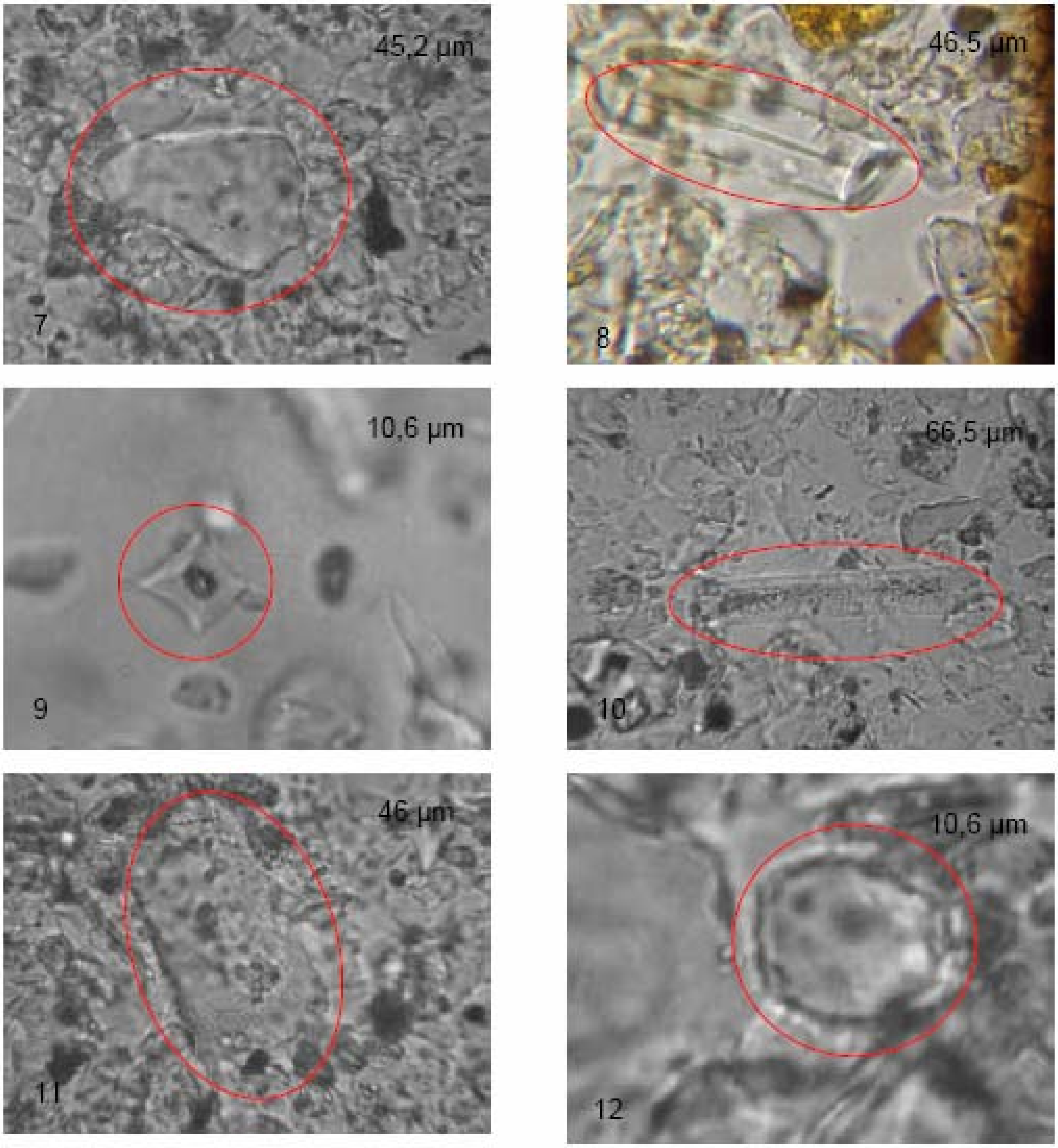
B.2 EXCAVATION 9 AND EXCAVATION 15 LEVEL 7 PHYTOLITH COUNT

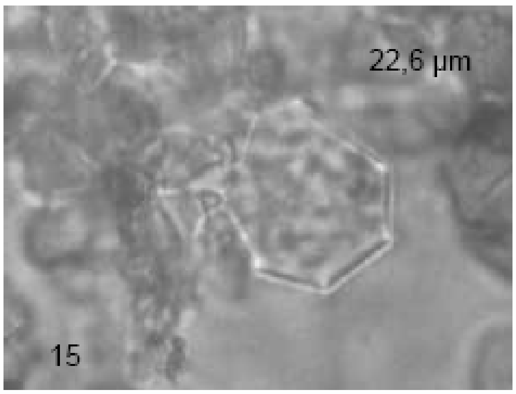
Image	1	2	3	5	4	7	8	9	10	11	12	13	14	15
10-14	1	5	2	2	2	7	1	7	5	3	5			
14-40				1				1			1			
40-50	1				2	1		4		8		2	1	
50-77								4	1					
77-100				1		2		3	3			1		
102-110		3					1	9	2	4	1		1	
110-120					1	1		7	3					
120-155										1				1
total	2	8	2	4	5	11	2	35	14	16	7	3	2	1

Ex. 15 Lvl. 7			2	2		5	20		71	7	2		41

B.3 PHYTOLITH IMAGES FROM EXCAVATION 9 AND 15



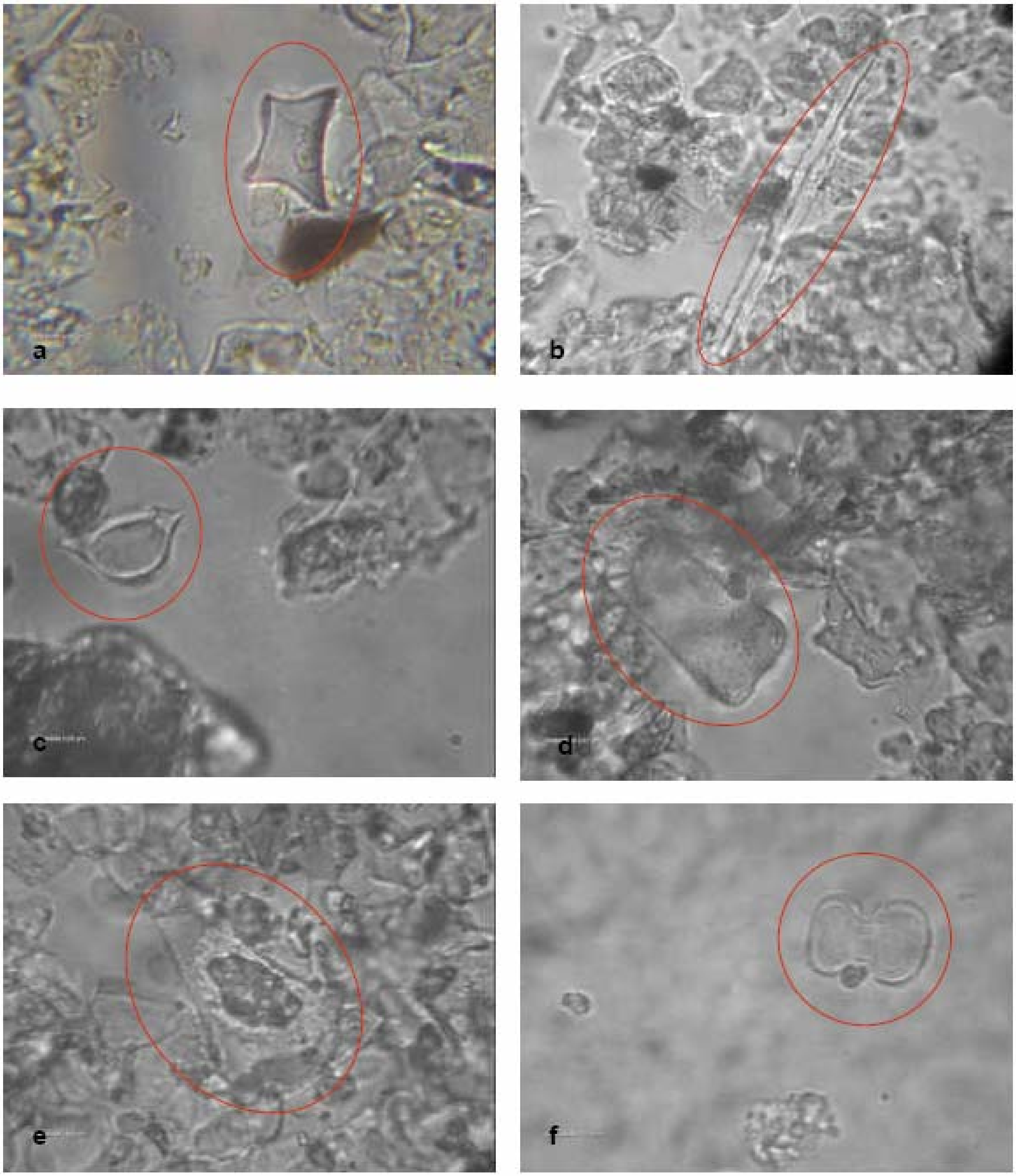

45,2 µm
7
46,5 µm
8
10,6 µm
9
66,5 µm
10
46 µm
11
10,6 µm
12

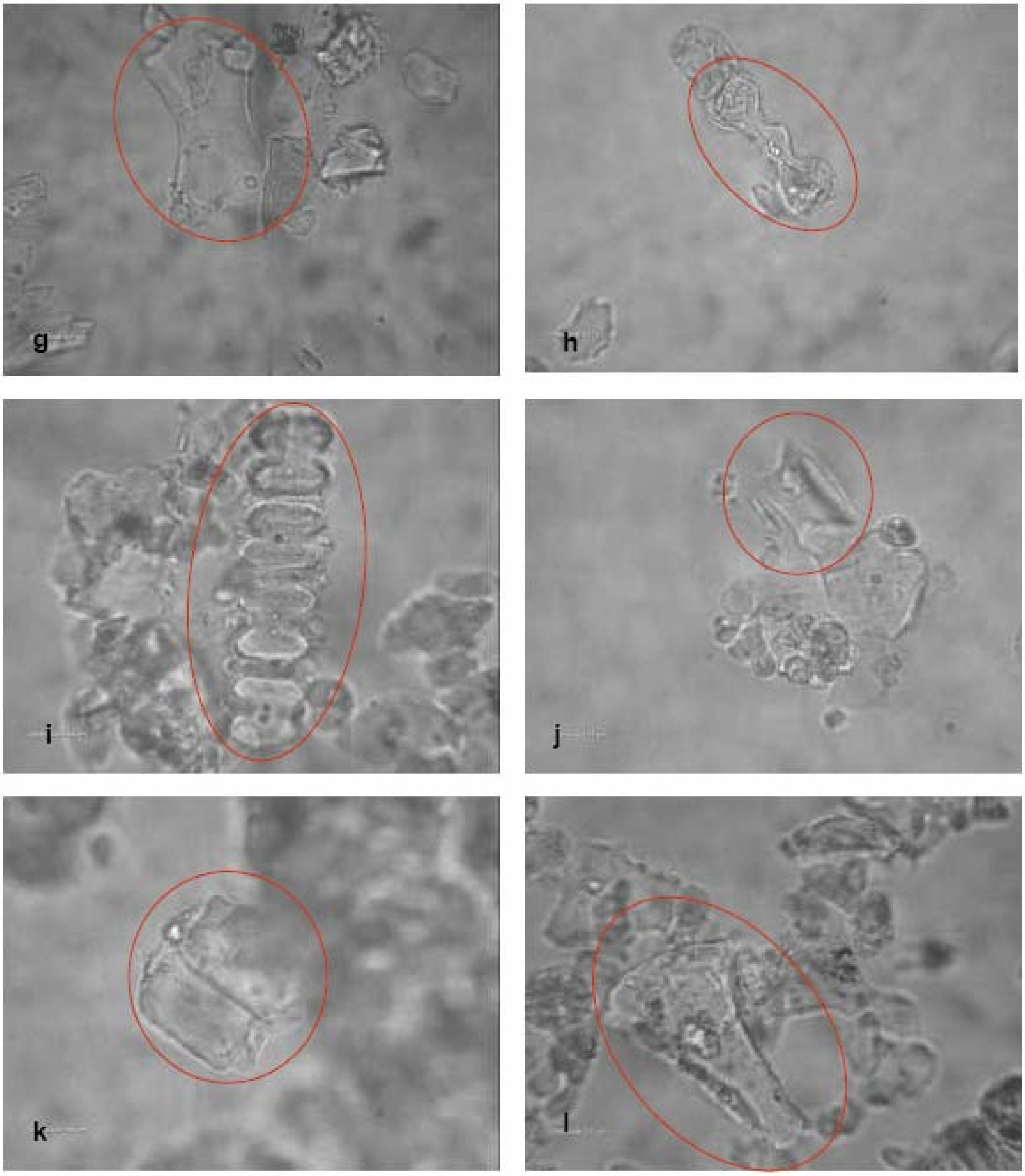


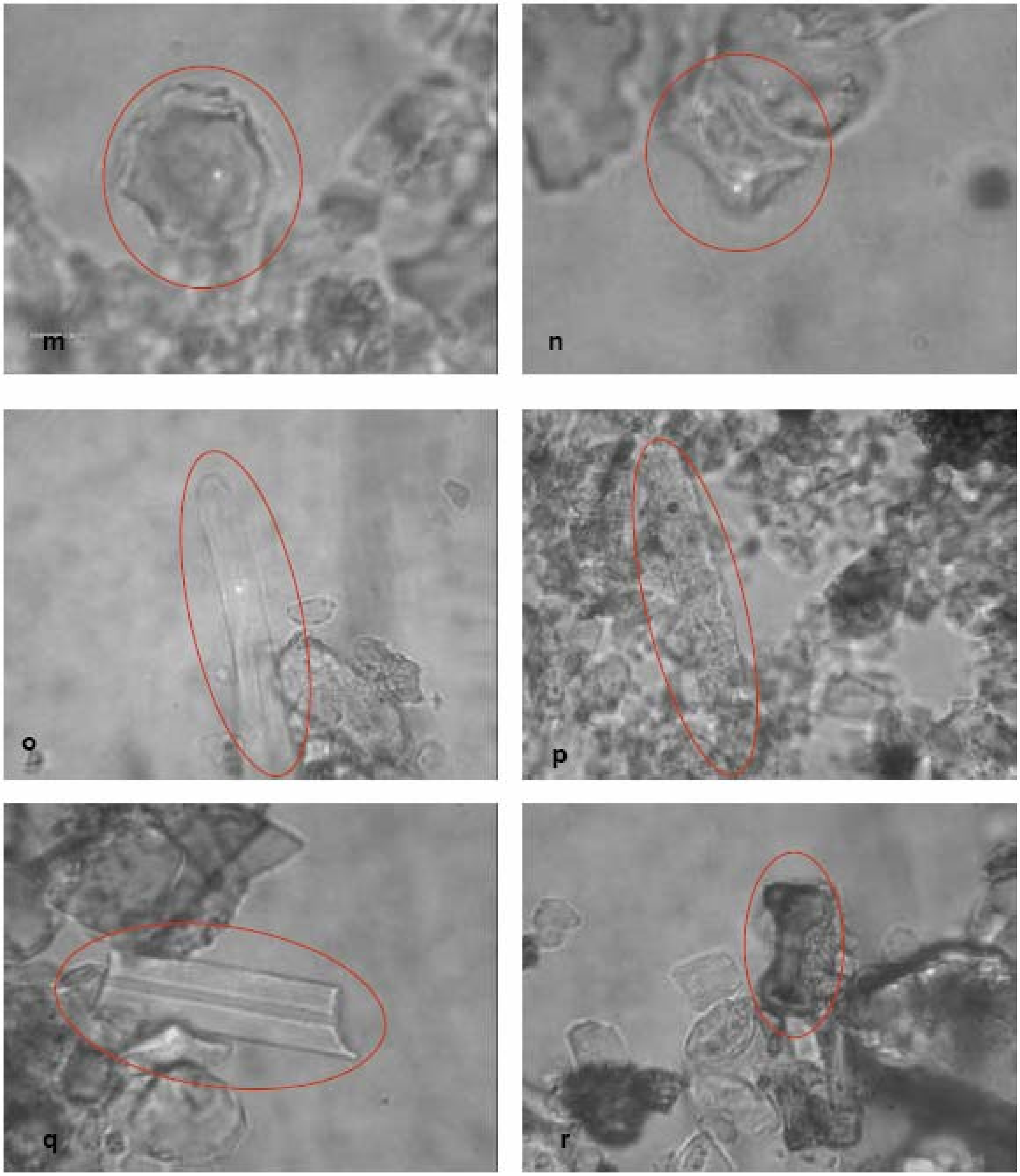
EXCAVATION 14 COUNTS FOR PHYTOLITHS BY SPECIES AND IMAGE KEY.

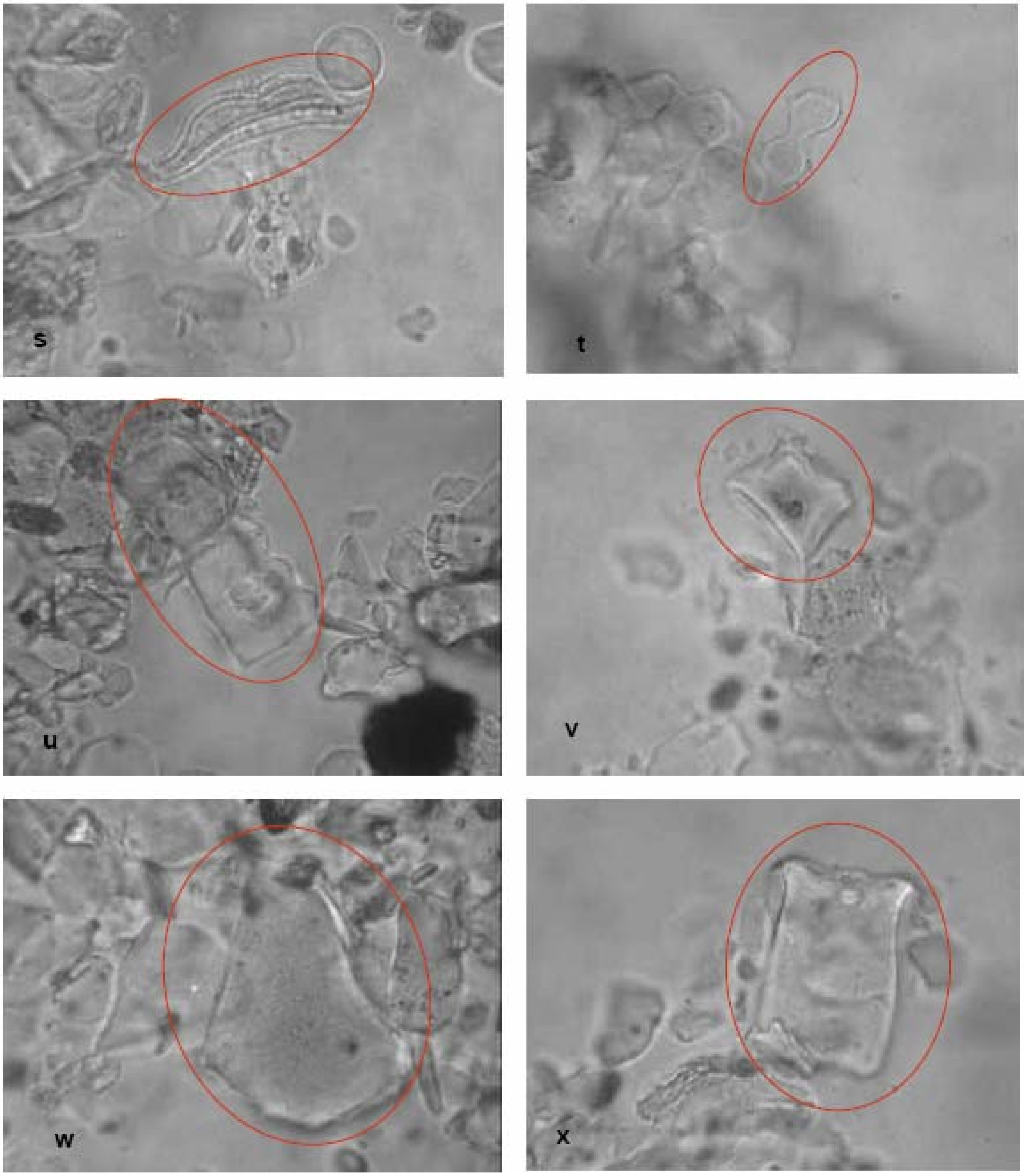
	Zea Mays	Type 3 (E. Coca)	Palmae indet.	Spongillidae ± Diatom.	Pariana sp.	Gramineae indet.1	G.indet. 2	G.Indet. 3	G.indet. 4	G.indet 5.	Others no id	Type 16	Type 20
Ex.14											0		
Ollas	5a			4b							0	1c	
Lvl.8	1			1		1d	1e		2	1	2	2	
Lvl12	5k			1	3k		2h	1			1		
Lvl 4			1m							2l	3		
Lvl 6											1	1	
Lvl 8	1n			2o,s			1				4		
Lvl 9	2				2		2y				4		3u
Lvl20	12	2 aa		2	5x	1z, ac	4t			3	6		2
Total	15	0	0	4	2	0	1	1	2	4	21	3	2

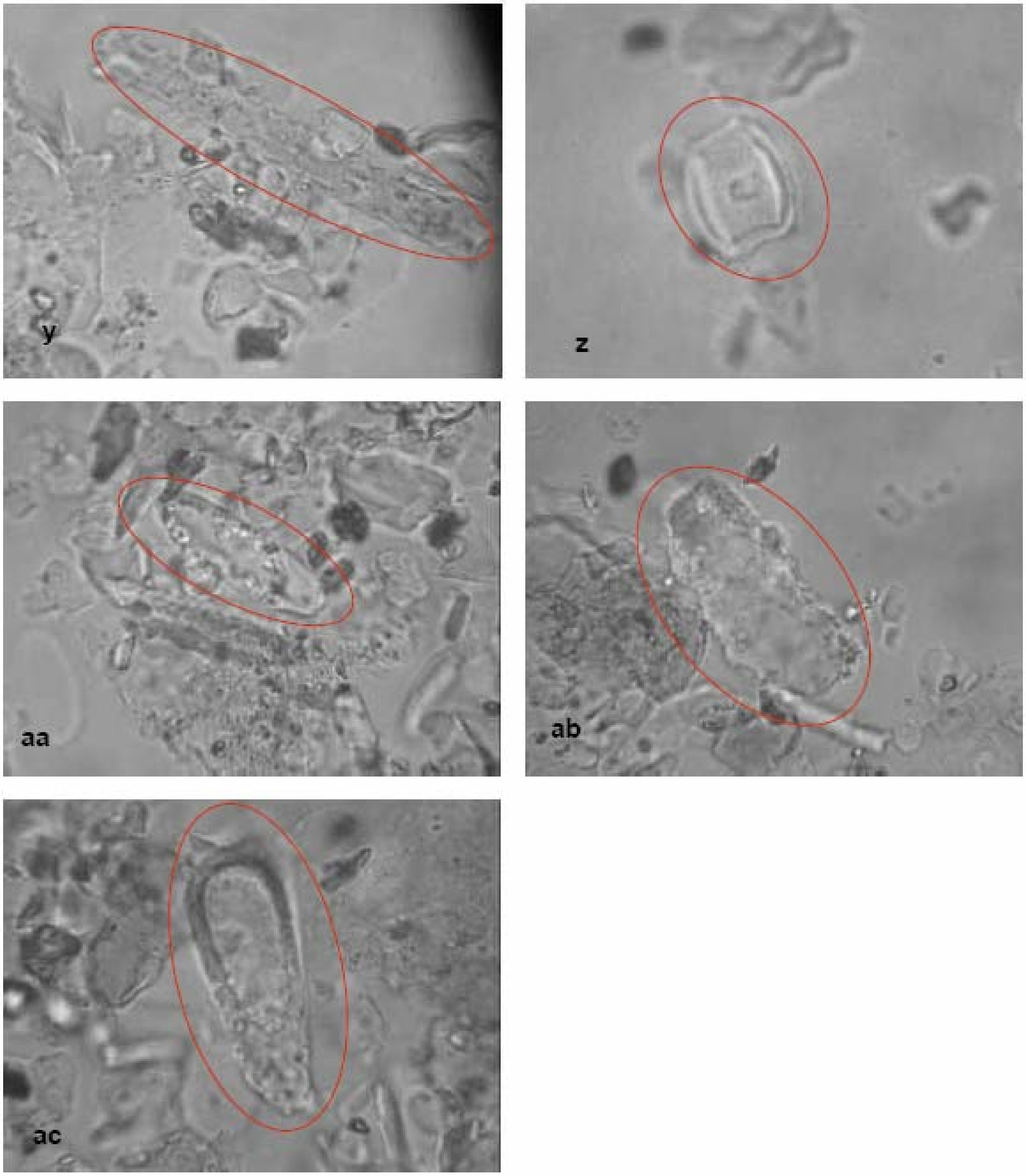
B.4 PHYTOLITH IMAGES FROM EXCAVATION 14




g
h
i
j
k
l


m
n
o
p
q
r


s
t
u
v
w
x


y
z
aa
ab
ac

BIBLIOGRAPHY

(AGI), Archivo General de Indias

1574 Santa Fé 70 N12 3, Date: 2 Julio 1574, unpublished manuscript. Seville, Spain.

1602 Santa Fé 96, *Cartas y expedientes de personas seculares*. Dates: 1601/1602 Reference number: ES.41091.AGI/16403.11.5.36.17//Santa Fe 96, unpublished manuscript, Seville, Spain.

1607 Santa Fe 230, Date: mayo 30 de 1607, unpublished manuscript, Seville, Spain.

1717 Santa Fe 533, Date: diciembre 24, 1717, *Fray Antonio Obispo de Santa Marta*, unpublished manuscript, Seville, Spain.

Alberti, Giorgio and Enrique Mayer

1974 *Reciprocidad e intercambio en los Andes peruanos*, Instituto de Estudios Peruanos, Lima.

Aldenderfer, Mark

1993 Domestic Space, Mobility and Ecological Complementarity, in *Domestic Architecture, Ethnicity, and complementarity in the South-Central Andes*, edited by M. Aldenderfer, University of Iowa Press, Iowa City: 13-14.

Ardila, Gerardo

1984 Contribución al conocimiento de la arqueología del alto Buritaca. *Revista Colombiana de Antropología* 25:263-284.

1986 Dos Fechas de C-14 de el Alto Río Buritaca. *Boletín de Arqueología* 1(1):38-39.

1996 *Los Tiempos de las Conchas: Investigaciones arqueológicas en la costa de la península de la Guajira,* Editorial Universidad Nacional, Bogotá, Colombia.

Angheira, Pedro Martyr

2004 (1533) *De Orbe Novo, vol. 1 (of 2): The Eight Decades of Peter Martyr D'Angheira* Translated by Francis Augustus MacNutt, released May 24, 2004 [EBook 12425] produced by Ted Garvin, Lesley Halamek and PG Distributed Proofreaders.

Arnold, Jeanne. E

1984 Economic Specialization in Prehistory: Methods of Documenting the Rise of Lithic Craft specialization, *Lithic Resource Procurement: Proceedings*, paper presented at the Second Conference on Prehistoric Chert Exploitation, Carbondale.

Barrios, Lina María, Diana Isabel Gómez'Lopez and Phanor Montoya Maya

2003 Estructura de la comunidad biológica asociada a las praderas en Colombia, in *Las praderas de pastos Marinos en Colombia: Estructura y distribución de un ecosistema estratégico,* edited by: Juan Manual Díaz Merlano, Lina Maria Barrios Suárez, Diana Isabel Gómez-Lopez, Invemar, Serie Publicaciones Especiales No. 10, Santa Marta, Colombia: 81-111.

Berman, Mark
1994 *Lukurmata: Household Archaeology in Prehispanic Bolivia*, Princeton University Press, Princeton.

Bishcof, Henning
1969a Contribuciones a la cronología de la cultura Tairona, Sierra Nevada de Santa Marta. in *Verhandlungen des 38 Internationalen Amerikanistenkongresses*, Stuttgart-Munchen, 12. Bis 18, August 1968, 1: 259-270.

1969b La Cultura Tairona en el Área Intermedio, in *Verhandlungen des 38 Internationalen Amerikanistenkongresses, Stuttgart-Munchen,* 12. Bis 18, August 1968, 1: 271-280.

1982 Indígenas y españoles en la Sierra Nevada de Santa Marta, siglo XVI. *Revista Colombiana de Antropología*, 24: 75-124.

Blanton, Richard, Gary M. Feinman, Stephen A. Kowalewski and Peter Peregrine
1996 A Dual-Processual Theory for the Evolution of Mesoamerican Civilization, *Current Anthropology,* 37, (1) Feb.: 1-14.

Boada, Ana Maria
1998 *Bases of Social Hierarchy in a Musical Central Village of the Northeastern Highlands of Colombia,* Dissertation Anthropology PhD, University of Pittsburgh.

1999 Organización social y económica en la ladea muisca de El Venado: valle de Samacá, Boyacá, *Revista Colombiana de Antropología*, 35:118-145.

Boserup, Ester
1965 *The conditions of agricultural growth: the economics of agrarian change under population pressure,* Aldine Pub. Co., New York.

Brumfiel, Elizabeth and Timothy Earle
1987 Specialization, Exchange and Complex Societies: An Introduction*,* in *Specialization, Exchange and Complex Societies*, edited by: E. Brumfiel and T. K. Earle, Cambridge University Press, Cambridge: 1-9.

Cadavid , Gilberto and Luisa Fernanda Herrera de Turbay
1985 Manifestaciones culturales en el área Tairona*, in Arqueología de la Sierra Nevada de Santa Marta*:, instituto Colombiano de Antropología, Bogota,1: 5-54.

Cadavid , Gilberto
1986 Análisis de C-14 Para un basurero en Buritaca 200. *Boletin de Arqueología,* FIAN 1(1):21-28.

1993 Proyecto de preservación y restauración de Pueblito. *Boletín de Arqueología,* FIAN.8 (1):35-45.

Cardale de Schrimpff, Marianne
1976 Investigaciones arqueológicas en la zona de Pubenza, Tocaima, Cundinamarca. *Revista Colombiana de Antropología* 20:335-469.

1981 Las salinas de Zipaquirá: Su explotación indígena. FIAN, Bogotá.

Cárdenas-Arroyo, Felipe
1988 Importancia del Intercambio Regional en la Economía del Área Tairona, *Revista de Antropología* 4(1):37-64.

1996 Complex societies in pre-Hispanic Colombia: The Tairona as a case Study, in *Chieftains, Power and Trade: Regional Interaction in the Intermediate Area of the Americas,* edited by: Carl H. Langebaek and Felipe Cardenas Arroyo, Departamento de Antropología, Universidad de los Andes, Bogotá, Colombia: 63-74.

Cardoso, Patricia
1986 Nuevos aportes para el conocimiento cronológico del área Tairona, *Boletin de Arqueología* 1:(1):39-42.

Carneiro, Robert
1981 The Chiefdom: Precursor to the State., in *Transition to Statehood in the New World*, edited by G. Jones and R. Kautz, Cambridge University Press, Cambridge:17-30.

2000 *The Muse of History and the Science of Culture*, Kluwer Academic. Plenum Publishers, New York.

Castellanos, Juan de
1944 *Elegías de varones ilustres de indias*, Biblioteca de Autores Españoles, Madrid.

Chaves Mendoza, Álvaro and Lucia de Francisco Zea
1977 *Los Ijca: Reseña Etnográfica,* Colección Publicaciones especiales, Instituto Colombiano de Cultura, Bogota, Colombia.

Chayanov, Alexander V.
1986 *The Theory of Peasant Economy*, University of Wisconsin Press, Madison.

Clark, John E.
2000 A better explanation of hereditary inequality, in *Agency in Archaeology*, edited by Marcia-Anne Dobres and John Robb, Routledge, London and New York: 92-112.

Clark, John E. and Michael Blake
1994 The power of prestige: competitive generosity and the emergence of rank societies in lowland Mesoamerica, in *Factional Competition and Political Development in the New World,* edited by: Elizabeth M. Brumfiel and John W. Fox, Cambridge University Press, Cambridge: 17-30.

Clark, John E. and William. J. Parry
1990 Craft Specialization and Cultural Complexity, *Research in Economic Anthropology,* 12: 289-346.

Clark, W. Douglas
1974 *Pattern of Indian Warfare in the Province of Santa Marta* University of Wisconsin, PhD in History, dissertation, University Microfilms, Ann Arbor Michigan.

Cohen, Mark N.
1977 *The Food Crisis in Prehistory*. Yale University Press, New Haven.

Cook, Sherburne and Robert Heizer
1967 Relationships among houses, settlement areas, and population in aboriginal California, in *Settlement Archaeology*, edited by K.C. Chang, National Press, Palo Alto: 79-116.

Costanza, Robert, Ralph d'Arge, Rudolf de Groot, Stephen Farberk, Monica Grasso, Bruce Hannon, Karin Limburg, Shahid Naeem, Robert V. O'Neill, Jose Paruelo, Robert G. Raskin, Paul Suttonkkand Marjan van den Belt
1997The Value of the World's Ecosystem Services and Natural Capital, *Nature*, 387: 259.

Costin, Cathy Lynne
1991 Craft Specialization: Issues in Defining, Documenting, and Explaining the Organization of Production, in *Archaeological Method and Theory*, vol. 3, edited by: Michael B. Schiffer, U. Arizona Press, Tucson: 1-56.

D'Altroy, Terrance and Timothy Earle
1985 Staple Finance, Wealth Finance, and Storage in the Inka Political Economy, *Current Anthropology* 26:187-206.

D'Altroy, Terrance
2001 From Autonomous to Imperial Rule in *Empire and Domestic Economy*, Interdisciplinary Contributions to Archaeology, edited by Terence N. D'Altroy, and Christine A. Hastorf, Kluwer Academic Press, Plenum Publisher, New York: 325-339.

Dean, Jeffrey S, George J. Gummerman, Joshua M. Empstein, Robert L. Axtell, Alan C. Swedlund, Miles T. Parker, Stephen McCarroll
2000 Understanding Anasazi Culture Change Through Agent-Based Modeling, in *Dynamics in Human and Primate Societies: Agent-based modeling of social and spatial processes*, edited by Timothy A. Kohler and George J. Gummerman, Santa Fe institute Studies in the sciences of Complexity, Oxford University Press, Oxford and New York:179-205.

2006 Understanding Anasazi Culture Change Through Agent-Based Modeling, in *Generative Social Science*, edited by Joshua M. Epstein, Princeton University Press: 87-117.

De Marrais, Elizabeth
2001 Architecture and Organization of the Xauxa Settlements, in *Empire and Domestic Economy*, Interdisciplinary Contributions to Archaeology, edited by Terence N. D'Altroy, and Christine A. Hastorf, Kluwer Academic Press, Plenum Publisher, New York: 115-154.

Denevan, William
1992 *The Native Population of the Americas in 1492*, University of Wisconsin Press.

Díaz, Juan Manuel and Mónica Puyana Hegedus
1994 *Moluscos del Caribe Colombiano*. Colciencias, Fundación Natura and INVEMAR, Santa fe de Bogotá.

Dietler, Michael
2001 Theorizing the Feast, in *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power*, edited by: M. Dietler and B. Hayden: 65-114. Smithsonian Institution Press, Washington and London.

Drennan, Robert D.
1987 Regional demography in Chiefdoms, in *Chiefdoms in the Americas*, edited by: Robert D. Drennan and Carlos A. Uribe, University Press of America, Lanham MD.

1988 Household Location and Compact versus Dispersed Settlement, *in Prehistoric Mesoamerica*, edited by R. R. Wilk and W. Ashmore: 273-294. University of New Mexico Press, Albuquerque.

1992 What is the Archaeology of Chiefdoms About? In *Metaarchaeology:* 53-74. Dandrecht, Netherlands: Kluwer Academic Publishers.

1995 Chiefdoms in Northern South America, *Journal of World Prehistory,* 9 (3): 301-339)

1996 One for All and All for One: Accounting for Variability without Losing Sight of Regularities in the Development of complex Society, in *Emergent Complexity: The*

Evolution of Intermediate Societies. Edited by: Jeanne E. Arnold, International Monographs in Prehistory, Archeological Series 9: 21-34.

2000 *Las sociedades prehispánicas del Alto Magdalena,* ICANH, Bogotá.

2000 Games, Players, Rules and Circumstances, in *Cultural Evolution: Contemporary Viewpoints*, edited by Gary M. Feinman and Linda Manzanilla. Kluwer Academic and Plenum Publishers: 177-196.

2006 Conclusions In *Prehispanic Chiefdoms in the Valle d la Plata*, 5. University of Pittsburgh Memoirs in Latin American Archaeology No.16, edited by: Robert Drennan, University of Pittsburgh, Department of Anthropology, Universidad de Los Andes, Departamento de Antropología, Pittsburgh and Bogotá.

Drennan, Robert D. and Ana María Boada
2006 Demographic Patterns, in *Prehispanic Chiefdoms in the Valle d la Plata, Volume 5.* University of Pittsburgh Memoirs in Latin American Archaeology No.16 edited by Robert Drennan, University of Pittsburgh, Department of Anthropology, Universidad de Los Andes, Departamento de Antropología, Pittsburgh and Bogotá.

Drennan, Robert D. and Christian Peterson
2006 Patterned variation in prehistoric chiefdoms, *PNAS*, the National Academy of Sciences of the USA, 103 (11): 3960-3967.

Drennan, Robert D. and Dale W. Quattrin
2001*Prehispanic Chiefdoms in the Valle de la Plata, Volume 4*, University of Pittsburgh Memoirs in Latin American Archaeology No.11 edited by Robert Drennan, University of Pittsburgh, Department of Anthropology, Universidad de Los Andes, Departamento de Antropología, Pittsburgh and Bogotá.

Dobres, Maria-Anne and John E. Robb
2000 Agency in Archaeology, in *Agency in Archaeology*, edited by: Marcia-Anne Dobres and John Robb. Routledge, London and New York: 3-18.

2005 “Doing Agency: Introductory Remarks on Methodology, *Journal of Archaeological Method and Theory*, 12, No. 3, September 2005: 159-166.

Earle, Timothy
1977 A Reappraisal of Redistribution: Complex Hawaiian Chiefdoms, in *Exchange Systems in Prehistory*, edited by Timothy K. Earle, Academic Press, New York: 213-229.

1991 Property Rights and the Evolution of Chiefdoms, in *Chiefdoms Power, Economy and Ideology*, edited by Timothy K. Earle, Cambridge University Press, Cambridge: 71-99.

1987 Chiefdoms in archaeological and ethnohistorical perspectives, *Annual Review of Anthropology,* 16: 270-308.

1997 *How Chiefs Come to Power: The Political Economy in Prehistory*. Stanford University Press, Stanford, CA.

2001 Economic Support of Chaco Canyon Society. *American Antiquity* 66(1):26-35.

(EBO) Encyclopaedia Britannica Online
2007 Tairona, in *Encyclopaedia Britannica,* Retrieved April 20, 2007.

Ferguson, Brian R. and Neil L. Whitehead
2000 Preface to the Second Printing, in *War in the Tribal Zone*, Edited by: Brian Ferguson and Neil L. Whitehead, School of American Research. Santa Fe, New Mexico.

Flannery, Kent V.
1972 The Origins of the Village as a Settlement Type in Mesoamerica and the Near East: A Comparative Study, in *Man, Settlement and Urbanism, edited by:* P. Ucko, Ruth Trigham, and George Dimbleby: 1-31. Duckworth, London.

1976 Analysis on the Regional Level: Part 1, in *The Early Mesoamerican Village*, edited by Kent V. Flannery, Studies in Archaeology, Academic Press, New York: 162-180.

2002 The origins of the village revisited: from nuclear to extended households. *American Antiquity,* 67(3), 2002:, 417-433.

Franke, Rebeca
2003 Evaluación de las comunidades epifaunales de las praderas de Thalassia Testudinum en el Parque Nacional Natural Tairona, in *Las praderas de pastos Marinos en Colombia: Estructura y distribución de un ecosistema estratégico,* p 75, edited by: Juan Manual Díaz Merlano, Lina Maria Barrios Suárez and Diana Isabel Gómez-Lopez, Invemar, Serie de Publicaciones Especiales No. 10, Santa Marta, Colombia.

Fried, Morton H.
1967 The Evolution of Political Society: An Essay in Political Anthropology, Random House, New York.

Garzón, Jaime and Alberto Rodríguez-Ramírez
2003a *Monitoreo de arrecifes coralinos, pastos marinos y manglares en la bahía de Chengue: Caribe colombiano (1993-1999),* Invemar, Santa Marta, Colombia.

2003b Diez años de monitoreo de una pradera de Thalassia, in *Las praderas de pastos Marinos en Colombia: Estructura y distribución de un ecosistema estratégico* p 71, edited by: Juan Manual Díaz Merlano, Lina Maria Barrios Suárez and Diana Isabel Gómez-López. Invemar, Serie Publicaciones Especiales No. 10. Santa Marta, Colombia.

Gilbert, Nigel and Klaus G. Trotszsch
2005 *Simulation for the Social Scientist,* Open University Press, New York.

Gilman, Antonio
1981 The Development of Social Stratification in Bronze Age Europe. *Current Anthropology* 22(1):1-24.

1991 Trajectories Toward Social Complexity in the Later Prehistory of the Mediterranean, in *Chiefdoms: Power, Economy, and Ideology*, edited by T. K. Earle: 146-168. Cambridge University Press, Cambridge and New York.

1995 Prehistoric European Chiefdoms: rethinking Germanic societies, in *Foundations of Social Inequality,* edited by: T. D. Price and G. M. Feinman, Plenum Press, New York.: 235-231.

Giraldo, Santiago
2000 De Rioja y otras cosas de los caciques: patrones de intercambio tairona en el siglo XVI. *Arqueología del Área Intermedia*, 2: 47-68.

Groot, Ana Maria
1985 Arqueología y conservación de la localidad precolombina de Buritaca 200 en la Sierra Nevada de Santa Marta*, in Informes Antropológicos*, instituto Colombiano de Antropología, Bogota, 1: 55-102.

Haller, Michael
2004 *The Emergence and Development of Chiefly Societies in the Rio Parita Valley, Panama*, Dissertation, Anthropology PhD. University of Pittsburgh.

Hayden, Brian
1994 Village Approaches to Complex Societies, in *Archeological Views from the Country Side: Village Communities in Early Complex Societies, edited* by: Glenn M. Schwartz and Steven E. Falconer. Smithsonian Institution Press, Washington and London: 198-206.

Hayden, Brian and Aubrey Cannon
1982 The Corporate Group as an Archaeological Unit. *Journal of Anthropological Archaeology*, 1, 132-158.

Helms, Mary W.
1979 *Ancient Panama: chiefs in search of power*, Texas Pan American series, University of Texas Press, Austin.

Herrera de Turbay, Luisa Fernanda
1985 *Agricultura aborigen y cambios de vegetación en la Sierra Nevada de Santa Marta*. Publicación de la Fundación de Investigaciones Arqueológicas Nacionales; no. 27, Fundación de Investigaciones Arqueológicas Nacionales Banco de la República (FIAN), Bogotá.

Hirth, Kenneth
1993 Identifying rank and socioeconomic status in domestic contexts: an example from central Mexico, in *Prehispanic domestic units in western Mesoamerica: studies of the household, compound, and residence*, edited by R. S. S. a. K. G. Hirth, CRC Press, Boca Raton: 121-146.

McKinnon, Susan
2000 The Tanimbarese Tavu: The ideology of Growth and the Material Configurations of Houses and Hierarchy in an Indonesian Society, in *Beyond Kinship: Social and material reproduction in house societies, edited by:* Rosemary A. Joyce and Susan D. Gillespie. University of Pennsylvania Press, Philadelphia.

Isbell, William H.
2000 What we should be studying: the "imagined community "and the "natural community", in *The Archaeology of Communities: A New World Perspective,* edited by: Marcello A. Canuto and Jason Yaeger, Routledge, London and New York: 243-266.

Knerr Béatrice,
1998 Impacts of Labour Migration on the Sustainability of Agricultural Development in Arid Regions, in *Population and Environment in Arid Regions*, edited by: J. Clarke and D. Noin, Unesco and The Parthenon Publishing Group,19:211-246.

Kolb, Charles C.
1985 Demographic Estimates in Archaeology: Contributions from Ethnoarchaeology on Mesoamerican Peasants, *Current Anthropology*, 26 (5): 581- 599.

Kirch, Patrick V.
1984 *The Evolution of the Polynesian Chiefdoms*, Cambridge University Press, Cambridge.

Lachniet MS and Vazquez-Selem L.
2005. Last glacial maximum equilibrium line altitudes in the circum-Caribbean (Mexico, Guatemala,Costa Rica, Colombia, and Venezuela). *Quaternary International*138139: 129144.

Langebaek, Carl H.
1987 La Cronología de la región arqueológica Tairona vista desde Papare, Municipio de Cienaga. *Boletin de Arqueología* 2:83-101.

1991 Highland Center Foothill Periphery in 16th Century Eastern Colombia, *Research in Economic Anthropology* 13:325-339.

1996 Patterns of Human Mobility and Elite Finances in 16th Century Northern Colombia and Western Venezuela, in *Chieftains, Power and Trade: Regional Interaction in the Intermediate Area of the Americas,* edited by: Carl H. Langebaek and Felipe Cardenas Arroyo, Departamento de Antropología, Universidad de los Andes, Bogotá, Colombia:154-174.

2005 *The Prehispanic Population of the Santa Marta Bays: A contribution to the study of the development of the northern Colombia Tairona chiefdoms.* University of Pittsburgh Latin American Archaeology Reports No. 4, Universidad de los Andes, Bogotá, University of Pittsburgh, Pittsburgh.

Langebaek, Carl; Andrea Cuellar and Alejandro Dever
1998 Medio Ambiente y Poblamiento en la Guajira: Investigaciones Arqueológicas en el Ranchería Medio, Estudios Antropológicos No. 1, Universidad de los Andes, Bogota, Colombia.

Langebaek, Carl and Alejandro Dever
2000 *Arqueología en el Bajo Magdalena: un estudio de los primeros agricultores del Caribe colombiano,* Informes Arqueológicos del Instituto Colombiano de Antropología e Historia No. 1, ICANH, Bogotá, Colombia.

2002 Estudio regional en las bahías del Parque Tairona: arqueología, medio ambiente y desarrollo de sociedades prehispánicas, *Boletín de Arqueología*, 17(1): 3-16.

Leonard, Robert D.
1989 Resource specialization, population growth, and agricultural production in the American Southwest, *American Antiquity*, 54(3): 491-403.

Liot, Catherine
2000 Les salines préhispaniques du bassin de Sayula (Occident du Mexique): Miliue et techniques, Monographs in American Archaeology 6. Series Editor: Eric Taldoire. BAR International Series 849.

Lister, Florence C. and Robert H. Lister
1989 Andalusian Ceramics in Spain and New Spain A Cultural Register from the Third Century B.C. to 1700, *American Antiquity*, 4 (54): 877-878.

Lleras, Roberto
1985 Excavaciones de salvamento en la Sierra Nevada, in *Informes Antropológicos*: 1, Instituto Colombiano de Antropología (ICAN), Bogota: 103-131.

Malagón, Dimas; Carlos Pulido Roa; Rubén Darío Llinás, Clara Chamorro and Jimmy Fernández
1995 *Suelos de Colombia: origen, evolución, clasificación, distribución y uso,* Instituto Geográfico Agustín Codazzi: Subdirección de Agrología, Santa fe de Bogotá.

Martin, Colin J. M.
1979 Spanish Armada Pottery, the International Journal of Nautical Archaeology and Underwater Exploration, 8 (4): 279-302.

Mason, John Alden and Donald Horton
1931 *Archaeology of Santa Marta, Colombia: The Tairona culture,* Marshall Field Archaeological Expedition to Colombia, 1922-23, Chicago.

May, Robert
1977 Thresholds and breakpoints in ecosystems with a multiplicity of stable states, *Nature*, 269, 471-477.

Mayr, Juan
1998 *The Sierra Nevada de Santa Marta,* edited by: Juan Mayr, Mayr and Cabal Ltda, Santa Fe de Boota, Colombia.

Masuda, Yoshio, Izumi Shimada and Craig Morris
1985 *Andean ecology and civilization: an interdisciplinary perspective on Andean ecological complementarity,* papers from Wenner-Gren Foundation for Anthropological Research symposium no. 91, University of Tokyo Press, Tokyo.

McGuire, Randall H.
1983 Breaking Down Cultural Complexity: Inequality and Heterogeneity, in *Advances in Archaeological Method and Theory*, 6: 91-142.

McKillop, Heather
2002 *Salt: White Gold of the Ancient May*a, University Press of Florida, Gainesville.

2005 Finds in Belize document Late Classic Maya salt making and canoe transport, *PNAS*, April 12, 2005, 15 (102): 5630-5634.

Miller, John H. and Scott E. Page
2007 Complex Adaptive System: An Introduction to Computational Models of Social Life, Princeton University Press, Princeton and Oxford.

Murdy, Carson N.
1986 Cangaru: Una economía marítima prehistórica en la isla de Salamanca (Departamiento del Magdalena), in *Informes Antropológicos,* Instituto Colombiano de Antropología, Bogota, 2: 3-38.

Murra, John
1972 El Control Vertical de un máximo de pisos ecológicos en la economía de las sociedades andinas, in *Visita de la Provincia de León de Huánuco (1562)*, edited by: I.Ortiz de Zúñiga and J. V. Murra, Documentos para la historia y etnología de Huánuco y la selva central, tomo 1. Universidad Nacional Hermilio Valdizán, Facultad de Letras y Educación, Huánuco, Peru: 381-406.

1995 Did tribute and markets prevail in the Andes before the European invasion? In *Ethnicity, Markets and Migration in the Andes*, edited by: B. Larson, O. Harris and E. Tandeter, Duke University, Durham.: 57-72.

Naroll, Raoul
1961 *Two Solutions to Galton's Problem,.* In Readings in Cross- Cultural Methodology, edited by Frank Moore, New Haven: HRAF Press:221-245.

Netting, Robert McC

1990 Population, Permanent agriculture, and Polities: Unpacking the Evolutionary Portmanteau, in *The Evolution of Political Systems: sociopolitics in small- scale sedentary societies*, edited by S. Upham. School of American Research advanced seminar series. Cambridge University Press, Cambridge and New York: 21-61.

1993 Smallholders, householders: farm families and the ecology of intensive, sustainable agriculture. Stanford University Press, Stanford, California.

Nishida, Alberto K, Nivaldo Nordi and Rómulo RN Alves

2006 The lunar-tide cycle viewed by crustacean and mollusk gatherers in the State of Paraíba, Northeast Brazil and their influence in collection attitudes, *Journal of Ethnobiology and Ethnomedicine*, 2(1): 1-12.

Oberem, Udo.

1981. El acceso a recursos naturales de diferentes ecologías en la Sierra Ecuatoriana (siglo XVI), in *Contribuciones a la etnohistoria ecuatoriana,* edited by: Moreno S. Oberem, U, Instituto Otavaleño de Antropología, Otavalo: 45-71.

Organización Wiwa Yugumainum Bunkwanarrwa Tayrona, Organización Indígena Kankuama, Organización Gonawindua Tayrona and Confederación Indígena Tayrona

1999 Declaración Conjunta de las Cuatro Organizaciones Indígenas de la Sierra Nevada de Santa Marta para la Interlocución con el Estado y la Sociedad Nacional, electronic document retrieved October 2005, www.lasc.ie/declaracioncongiunta.pdf, Valledupar, Colombia.

Oyuela-Caycedo, Augusto

1986a Excavación de un basurero en Ciudad Perdida, Sierra Nevada de Santa Marta. *Boletin de Arqueología* 1(1):28-33.

1986b Contribución a al periodización cultural en el litoral del Parque Tairona, *Boletin de Arqueología* 1(1): 8-24.

1987a Implicaciones de las secuencias locales y regionales en los aspectos culturales de los Tairona, in *Chiefdoms in the Americas*, edited by: R. D. Drennan and C. A. Uribe, University Press of America, Landhan: 202-213.

1987b Gaira: una introducción a la ecología y arqueología del litoral de la Sierra Nevada de Santa Marta, *Boletín del Museo del Oro,* 19: 35-55.

1990 Las redes de caminos prehispánicos en la Sierra Nevada de Santa marta, in *Ingenierías Prehispánicas*, edited by Santiago Mora, Instituto Colombiano de Antropología (ICAN), Bogota: 47-72.

1998 Ideology, Temples, and Priests, in *Recent advances in the archaeology of the northern Andes: in memory of Gerardo Reichel-Dolmatoff*, edited by: A. Oyuela-Caycedo and J. S. Raymond: 39-53, Monograph 39, The Institute of Archaeology, University of California, Los Angeles, California.

2002 El surgimiento de la rutinización religiosa: La conformación de la elite sacerdotal Tairona Kogui, *Revista del Área Intermedia 4*:12-45.

Piperno, Dolores and Deborah M. Pearsall

1998 The Origins of Agriculture in the Lowland Neotropics, Academic Press, London.

Polanyi, Karl
1957 The economy as instituted process, in *Trade and market in the early empires,* edited by K. Polanyi, and H. Pearson, Free Press, New York: 243-270.

Polissar, PJ, M.B. Abbot, A.P Wolfe, M. Bezada, V. Rull, and R.S. Bradley
2006 Solar modulation of Little Ice Age: climate in the tropical Andes, *PNAS*, The National Academy of Sciences of the USA, June 13, 103 (24): 8937-8942.

Potter, M. James
2000 Ritual, Power, and Social Differentiation in Small-Scale Societies, in *Hierarchies in action: Cui bono?,* edited by M. W. Diehl, Center for Archaeological Investigations Southern Illinois University Carbondale, Carbondale: 295-315.

Redmond, Elsa M.
1994 *Tribal and chiefly warfare in South America,* Memoirs of the Museum of Anthropology, University of Michigan 28, Museum of Anthropology University of Michigan, Ann Arbor.

Reichel-Dolmatoff, Gerardo
1951 Datos históricos culturales sobre las tribus de la Antigua Gobernación de SantaMarta, Imprenta del Banco de la República, Bogota.

1953 Contactos y cambios culturales en la Sierra Nevada de Santa Marta, *Revista Colombiana de Antropología*, 1: 15-122.

1954a Investigaciones arqueológicas en la Sierra nevada de Santa Marta, partes 1 y 2, *Revista Colombiana de Antropología*, 2:145-206.

1954b A Preliminary Study of Space and Time perspective in Northern Colombia, *American Antiquity*, 19, No. 4 April: 353-366.

1965 Colombia: Ancient Peoples and Places, Thames and Hudson, London.

1978 Colombia Indígena. Periodo Prehispánico, in Manual de Historia de Colombia. Tomo I, Biblioteca Colombiana de Cultura, Bogotá.

1985 *Los Kogui: Una tribu de la Sierra Nevada de Santa Marta, Colombia,* 1 and 2, Procultura S.A., Presidencia de la Republica, Inderena, Fondo de Cultura Económica, Nueva Biblioteca de Colombiana de Cultura, Bogota.

1986 Arqueología de Colombia: Un texto introductorio, Segunda Expedición Botánica, Bogotá.

Reichel-Dolmatoff, Gerardo and Alicia Dusán de Reichel-Dolmatoff.
1955. Investigaciones Arqueológicas en la Sierra Nevada de Santa Marta: Parte cuarta, *Revista Colombiano de Antropología* 4: 189-245.

Reimer PJ, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer.
2004 *Radiocarbon*, 46: 1029-1058.

Renfrew, Colin
1986 Introduction: Peer Polity Interaction and Socio-Political Change, in *Peer Polity Interaction and Socio-Political Change*, edited by: C. r. a. J. F. Cherry, Cambridge University Press, Cambridge:1-18.

Rowlands, Michael, and Kristian Kristiansen
1998 Introduction*, in Social Transformations in Archaeology: Global and Local Perspectives*, edited by Kristian Kristiansen and Michael Rowlands, Routledge, London: 1-26.

Rosa, Nicolás de la.
1974 (1833) *Floresta de la Santa Iglesia Catedral de la Ciudad de Santa Marta*, Biblioteca Banco Popular, Talleres Gráficos Banco Popular, Bogotá.

Sahlins, Marshal
1958 *Social Stratification in Polynesia*, University of Washington Press, Seattle.

Saitta, Dean
1994 Agency, Class and Archaeological Interpretation, *Journal of Anthropological Archaeology,* 13: 201-227.

Sanders, William, Jeffrey R. Parsons and Robert S. Santley
1979 *The Basin of Mexico: Ecological Process in the Evolution of a Civilization*, Academic Press, New York.

Santley, Robert S.
1993 Late Formative Period Society at Loma Torremote: A Consideration of the Redistribution versus the Great Provider Models as a Basis for the Emergence of Complexity in the Basin of Mexico, in *Prehispanic Domestic Units in Western Mesoamerica: Studies of the Household, Compound, and Residence*, edited by: Robert S. Santley and Kenneth G. Hirth, CRC Press Inc: 37-63.

Sawyer, Keith R
2005 *Social Emergence: Societies as Complex Systems*, Cambridge University Press, Cambridge.

Scarborough, Vernon L
1988 A Water Storage Adaptation in the American Southwest, *Journal of Anthropological Research*, 4(1): 21-40.

Schiffer, Michael B
1985 Is there a "Pompeii Premise" in archaeology? *Journal of Anthropological Research* 41: 18-41.

Service, Elman Rogers
1962 *Primitive social organization: an evolutionary perspective*, Random House, New York.

1975 *Origins of the state and civilization: the process of cultural evolution*, 1st edition, Norton, New York.

Smith-Vaniz, W., L.S. Kaufman and J. Glowacki
1995 Species-specific patterns of hyperostosis in marine teleost fishes, *Marine Biology*, 121 (2): 573-589.

Smith, Michael
1987 Household Possessions and Wealth in Agrarian States: Implications for Archaeology. *Journal of Anthropological Archaeology* 6: 297-335.

Spencer, Charles S.
1998 Investigating the Development of Venezuelan Chiefdoms, in *Chiefdoms and Chieftaincy in the Americas*, edited by Elsa M. Redmond, University Press of Florida: 104-137.

Skinner, William G.
1997 Family Systems and Demographic Processes, in *Anthropological Geography: Toward a New Synthesis,* edited by: David I. Kertzer and Tom Fricke, The University of Chicago Press, Chicago and London: 53-95.

Tirado, Ernesto
1937 Cómo se pacificaba a los indios, *Boletín de Historia y Antigüedades,* Bogotá, 34:739-743.

Trigger, Bruce G.
1974 The Archaeology of Government, *World Archaeology*, 6: 95-106.

Tovar, Hermes
1988 *No hay caciques ni señores*, Sendai, Barcelona.

1993 *Relaciones y Visitas a los Andes, s. XVI: Tomo II Región del Caribe,* Colección de Historia de la Biblioteca Nacional, Instituto Colombiano de Cultura Hispánica.

1997 *La estación del miedo o la desolación dispersa: el Caribe colombiano en el siglo XVI*, Editorial Arie, Santa Fe de Bogotá.

Uribe, Carlos A.
1992 *Sierra Nevada de Santa marta y las Tierras Adyacentes,* Geografía Humana de Colombia: Nordeste Indígena, Tomo 2, Instituto Colombiano de Cultura Hispánica, Santa Fe de Bogota.

White, M J.
1985 Digging out big-men?, *Archaeology of Oceania*, 20: 49-57.

Wills, Wirt H.
1991 Organizational Strategies and the Emergence of Prehistoric Villages in the American Southwest, in *Bands and States,* edited by Susan A. Gregg, Center for Archaeological Investigations, Occasional Paper No. 9, Board of Trustees, Southern Illinois University.

Wynn, Jack
1975 *Buritaca Ceramic Chronology: A Seriation from the Tairona Area, Colombia*, Dissertation Anthropology PhD, Missouri University.

Yaeger, Jason
2000 Communities in the Classic Maya countryside: strategies of affiliation in western Belize, in *The Archaeology of Communities: A New World Perspective,* edited by: Marcello A. Canuto and Jason Yaeger, Routledge, London and New York: 123-142.

Yaeger, Jason and Marcello A. Canuto
2000 Introducing an archaeology of communities, in *The Archaeology of Communities: a New World Perspective,* edited by: Marcello A. Canuto and Jason Yaeger, Routledge, London and New York: 1-15.