The potters' perspectives: A vibrant chronology of ceramic manufacturing practices in the valley of Juigalpa, Chontales, Nicaragua (cal 300 CE - present)
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2 Narratives of place(s) and time(s)

Communities, their particular potting traditions and technical styles develop in a complex network of intersecting itineraries of human practitioners, animals, insects, plants, trees, water sources, soils, geology, and geomorphology. Therefore, this chapter, which aims to contextualize the research area both spatially and chronologically, is divided in two sections.

The first section of this chapter situates the research area, the valley of Juigalpa, which is part of the Mayales River subbasin, located in the modern department of Chontales, central Nicaragua, within its broader national context. Detailed descriptions of the geography and geology of the research area are presented, both in regional and local scopes, which are of relevance for interpreting the macrofabric and compositional analyses that form the building blocks of Chapters 7 and 8. Then, geomorphology and hydrography of the region of interest will be briefly examined, which is necessary to understand landscape perceptions and spatial choices, which are discussed in Chapter 8. Later, the available data on soils in the study area will be reviewed because they are necessary for the stratigraphic interpretations in Chapter 5 and are also related to the discussions involving clay procurement practices in Chapter 7. Also, data on climate and precipitation is included, since they play a role in human choices in the area, as well as in zoological and botanical trajectories. Later, the current flora and fauna will be examined in an attempt to establish a series of human-plant and human-animal interactions despite the differences between modern species and pre-Hispanic ones.

Once spatially situated, the question of time will be addressed. The second section of the chapter provides a detailed overview of the current accepted ceramic chronologies for Pacific, Caribbean, and Central Nicaragua, also incorporating some data from Costa Rica and Honduras. A detailed discussion of the sampling strategies and archaeological contexts where the sherds were retrieved is included, along with the analytical methodologies applied for classification and characterization, the absolute and relative chronological relationships established, and the archaeometric techniques—when applied—as well as interpretations regarding social complexity and networks of interaction between different regions.[7] Even though this book is based on a bottom-up, local to regional approach, data from the Pacific and Caribbean coasts is presented first because chronological discussions regarding central Nicaragua have historically been closely linked to these areas.

Apart from situating this research within places and times, this chapter aims to provide the background required for acknowledging the necessity of revising the ceramic chronology of central Nicaragua, and possibly of all Southern Central America. In particular, this chapter stresses the necessity of leaving behind typological classifications that are principally based on styles and techniques of decoration. Relative chronology through ceramic association is a powerful tool in archaeological practice, but its use can lead to unreliable narratives of the past.[8] As a result, this chapter also serves as an introduction to inform the reader about the current state of affairs that led to the theoretical and methodological choices discussed in Chapters 3, 4, and 6.

7 The reader will notice that the Caribbean and central Nicaragua sections are extremely exhaustive, in contrast to the Pacific portion, which only provides a brief summary. This imbalance exists because few publications are available for the first two regions, whereas most of these datasets are still in unpublished theses and reports. The Pacific watershed, in contrast, has an ample bibliography that is easily available.

8 See Chapter 3 for a thorough discussion of this issue.

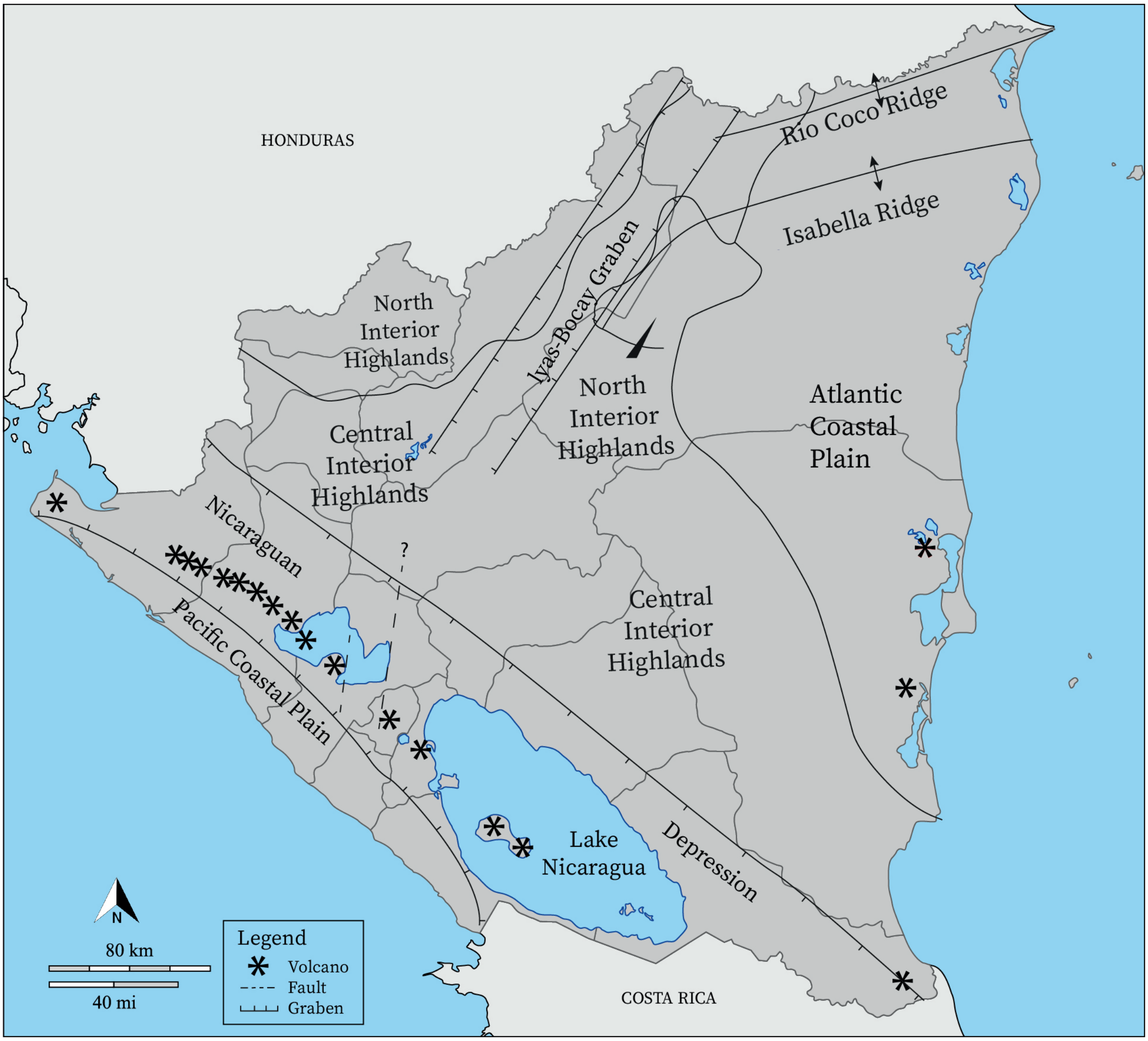

Figure 3: The four physiographic provinces of Nicaragua (redrawn from Arengi & Hodgson 2000, 48).

2.1 NARRATIVES OF PLACE(S)

2.1.1 GEOGRAPHY

Nicaragua (10º 15’ 45’’ north latitude and 79º 30’ 88’’ longitude west) is the largest country in Central America, with an area of 130375.87 km2 and a multi-ethnic population of over six million people. To the north, it shares a 530 km border with the Republic of Honduras, and to the south a 313 km border with the Republic of Costa Rica. The eastern limit of the country is the Caribbean Sea, with a 509 km long coastline; the western edge is the 325 km long Pacific coast (Instituto Nacional de Información de Desarrollo 2012).

Nowadays, the country is administratively divided in 15 different departments, two autonomous regions located in the Caribbean coast, and 153 municipalities (Instituto Nacional de Estadísticas y Censos 2006). However, it can be split in four physiographic provinces **(figure 3)**, which coincide with major geologic units: the slopes of the Pacific Coastal Plain, the Nicaraguan Depression, the

Atlantic Coastal Plain, and the Interior Highlands (McBirney & Williams 1965).

The Pacific province can be subdivided into the narrow coastal plain, a sedimentary basin (Morales *et al.* 1993), and the mountain chains of the Cordillera Pacífica and Cordillera Maribios (Rigat 1992), anti-arcs from the Upper Cretaceous through the Tertiary (Kristinsson & Ruíz Mendieta 2012). The Nicaraguan Depression, a 50 km wide graben, is 35-50 m above sea level and extends for more than 500 km from the Caribbean coast of Costa Rica up to the Gulf of Fonseca (Weyl 1980). It includes the rift trenches of Lakes Xolotlán (or Managua) and Cocibolca (or Nicaragua), together with Quaternary alluvial plains located between the Gulf of Fonseca and Lake Xolotlán, on the eastern shore of Lake Cocibolca (Rigat 1992). The Caribbean coast is a marshy coastal strip that features extensive Quaternary alluviums. The Interior Highlands are divided into the Central Interior Highlands and the North Interior Highlands (Hodgson 1988). The former consists of gently rolling to mountainous volcanic deposits dating to the Tertiary period (McBirney & Williams 1965), whereas the latter is comprised of steep mountainous terrain with Paleozoic and Mesozoic rocks (Hodgson 1988). In addition, the Central Interior Highlands consist of four different mountain chains, including the Cordillera Amerrisque. The valley of Juigalpa, part of the Mayales River subbasin and the focus of this research, is situated west of this mountain chain, within the modern department of Chontales.

The department of Chontales **(figure 4)** is located on the northwest coast of Lake Cocibolca, the largest freshwater lake in Central America (Montenegro-Guillén 2003) that connects the Pacific Ocean with the Caribbean Sea via the San Juan river. From pre-conquest times until the 1900s, this route was the most important for transporting people and goods. However, in the 20th century commerce and economic activity shifted towards the western side of the lakes, stressing the isolation of the eastern part of the country (Incer 1976).

The research area of this book is part of Lake Cocibolca's 40000 km^2 basin and features four main physiographic divisions. First, the elevations, located at the foot of the lower Cordillera; then the plains that emerge from the foot of the Cordillera and extend to Lake Cocibolca; the lakeshore and its islands; and finally the drainage, comprised of all the rivers in the department, which discharge in Lake Cocibolca with the exception of the Canas River (Garayar 1972). One of the main rivers within this basin is the Mayales, which forms a subbasin comprised of its permanent water flows, intersected by numerous *quebradas* and minor streams that irrigate the valley of Juigalpa and have likely played a major role in human-environmental interactions since pre-European times. The focus of this research is on the Mayales river subbasin, particularly the valley located north of the modern city of Juigalpa.

2.1.2 GEOLOGY

In spite of the economic relevance of mineral deposits, Nicaragua lacks a complete and detailed geologic map, and the majority of the surveys have been carried out by mining companies and the National Geologic Service (Arengi & Hodgson 2000). Therefore, these geologic studies primarily provide a tectonic and lithologic overview of quartz veins containing gold, since their main aim was assisting in ore prospecting (Mendoza *et al.* 2006). As a result, this section was written taking into account different authors and surveys that focused exclusively on areas with extraction potential.

Gold is the most relevant mineral resource in Nicaragua (Morales *et al.* 1993), and the country's gold fever started in the mid-1800s with the discovery of two mines: the Bonanza and La Libertad-Santo Domingo (Darce 1993). While the first one is situated in the northeast of the country and consists of a mesothermal vein system, the second one was found 35 km northeast of Juigalpa and is an epithermal system (Arengi & Hodgson 2000). In particular, the La Libertad-Santo Domingo gold deposit is one of the oldest (Morales *et al.* 1993) and most productive mining districts in the whole country (Darce 1993). Located "(...) within a broad discontinuous belt of Tertiary volcanic rocks with several epithermal deposits of gold and silver extending from Guatemala (and Mexico) to Costa Rica" (Darce *et al*. 1991, 87), it covers a 154 km^2 area and consists of a system of epithermal quartz veins in NE-SW direction associated to hydrothermally altered Tertiary volcanic rocks (Darce 1987; 1993; Darce *et al.* 1989).

In the 1940s and 1950s, and pushed by dictator Anastasio Somoza García's economic agenda, Nicaragua became the leading producer of gold within Central America and the Caribbean basin. Even though geologists regard this chapter of mining history with certain nostalgia (Arengi & Hodgson 2000), deforestation, chemical waste,

Figure 4: The modern province of Chontales (redrawn and translated from INIDE 2013, 3).

poor working conditions, low salaries, and an unashamed fiscal legislation favoring foreign revenues better describe Somoza's mining policies. The boom of the golden era of gold mining suffered an abrupt interruption in 1979, when the Sandinista revolution nationalized the industry. Later, in 1994, president Violeta Barrios de Chamorro re-privatized all mining endeavors, following neoliberal recipes established by the International Monetary Fund.

Regional Geology

Essentially, Central America is a recent volcanic cordillera that stretches from Guatemala to Panama and is divided in two sections. Nuclear Central America includes the pre-volcanic terrains of Guatemala, Honduras, El Salvador, and Nicaragua, while the nearly entirely volcanic Isthmus of Central America encompasses Costa Rica and Panama (Dengo 1973; Aubouin *et al.* 1982). The isthmus of Central America separates the Caribbean Sea from the Pacific Ocean, as well as terrestrially bridging North and South America (Marshall 2007). The area lies on the southwesternmost end of the Caribbean plate, but it is influenced by four other tectonic plates: North and South America, Cocos, and Nazca (James 2007). The interaction of these plates began with the breakup of Pangea 250 million years ago (Kristinsson & Ruíz Mendieta 2012). The subduction of the Cocos plate into the Caribbean plate has resulted in an active plate margin and the complex structural pattern of Central America's earth crust (Kristinsson & Ruíz Mendieta 2012). In this context, volcanism has been the dominant geologic process since the Tertiary period, continuing into the present (Schmoll *et al.* 1975), and the volcanic arc that forms the backbone of Central America is a consequence of these activities (Nyström *et al.* 1988).

Nicaragua itself represents the southern part of the Chortis Block, which is limited to the northeast by the Polochi and Motagua faults and by the Hess Escarpment toward the southeast (Kristinsson & Ruíz Mendieta 2012). The country lies on the western edge of the Caribbean plate, bordered by the Cocos and Nazca plates to the north and east and the South American plate to the southeast (Arengi & Hodgson 2000). The country clearly displays the long and complex history of the Cenozoic volcanic province in Central America. With lavas, tuffs, ignimbrites, and volcanic sediments covering almost all of its territory, it has preserved a nearly complete sequence of Late Cretaceous and Tertiary sediment records shaped by volcanic activity and tectonic events (McBirney & Williams 1965). Formations in the region feature relic collapsed volcanic calderas, as well as plateaus with relic conical craters. Ignimbrites with needle shape, massive irregular bodies, pseudo domes and lavas are also found. Hypabyssal rocks feature tabular bodies such as dikes and sills, or massive bodies like stocks (Garayar 1972).

The structural features that have resulted from this complex geological history are divided into three groups, starting with the normal boundary faults of the graben. These feature a northwest-southeast orientation and are possibly associated with the formation of the Nicaraguan Depression, sharing the same orientation. These faults run parallel to the shore of Lake Nicaragua and possibly served as conduits for magmatic emanations. A second fault and fracture pattern with a northeast-southwest orientation transverses the axis of the graben and the main chain of Quaternary volcanoes. Such volcanoes are common near both margins of the graben and within the belt of these volcanoes. Thirdly, there are several fault systems of various ages and orientations that feature broad folding and tilting of rocks adjacent to the depression (McBirney & Williams 1965; Garayar 1972).

Local Geology

As mentioned above, the volcanic activity that has shaped central and southern Nicaragua began during the Cretaceous or Late Jurassic. Volcanism during the Tertiary was concentrated in the Interior Highlands, but evidence suggests that volcanic cones might have existed west of the present coastline since at least part of the Eocene (McBirney & Williams 1965). As a result, there are three volcanic sequences in the region of study: the pre-Matagalpa, Matagalpa, and Coyol (Darce 1987). Additionally, there are five different geological units: the Matagalpa and Coyol groups, undifferentiated volcanic rocks from the Tertiary and the Quaternary, hypabyssal rocks, and Quaternary deposits (Garayar 1972).

The Matagalpa Group (Tomm) is an eroded slope covered by a trellis drainage that was formed from the Late Oligocene to the Middle Miocene **(figure 5)**. Its lithology includes pyroclasts, volcanic sediments, and andesites. In the upper levels of this sequence, welded pink tuff banks of dacitic type are present. The Coyol Group was formed in the Late Miocene through the Late Pliocene, or even the Pleistocene. It was formed by massive bodies and powerful banks of basic volcanic products from Krakatoa-type eruptions and felsitic materials originated by fissural eruptions of *nuée ardente* type, which lie atop the eroded surface of the Matagalpa Group. The lithology of the Coyol group is divided into Lower Coyol (Upper Miocene), which includes agglomerates and andesites (Tmca) as well as tuff and dacitic ignimbrites (Tmcd). The Upper Coyol (Pliocene) features olivine basalt (Tpcb), basaltic agglomerates (Tpca), piroxenic basalts (Tpcb), ignimbrites (Tpci), and basaltic lavas (Tpca). The Tertiary and Quaternary volcanic rocks include undifferentiated lavas and pyroclasts (TQvl). The hypabyssal rocks (Tia. Tii. Tib) date to the Pliocene and consist of isolated bodies, small stocks, sills, or dikes with variable dimensions. The Quaternary deposits are the most recent sediments throughout the region and are comprised of clastic material classified into Alluvial (Qal, rounded materials), Colluvial (Qc, angular materials) or undifferentiated (Q), which are residual dark gray soils associated with the meteorization of basaltic and andesitic fluxes (Garayar 1972; Darce *et al.* 1991; Rigat 1992).

The plateau where the modern city of Juigalpa lies corresponds to the Lower Coyol Group, so basic and intermediate lavas from the Miocene and the Pliocene are common. In contrast, the valley surrounding Juigalpa belongs to the Matagalpa Group, with volcaniclastic rocks from the Oligocene and Miocene and a few outcrops of lavas associated with the Lower Coyol Group (B. Acevedo, pers. comm. 2017).

2.1.3 GEOMORPHOLOGY

The area of study features five different geological and geomorphological units. First, the ancient

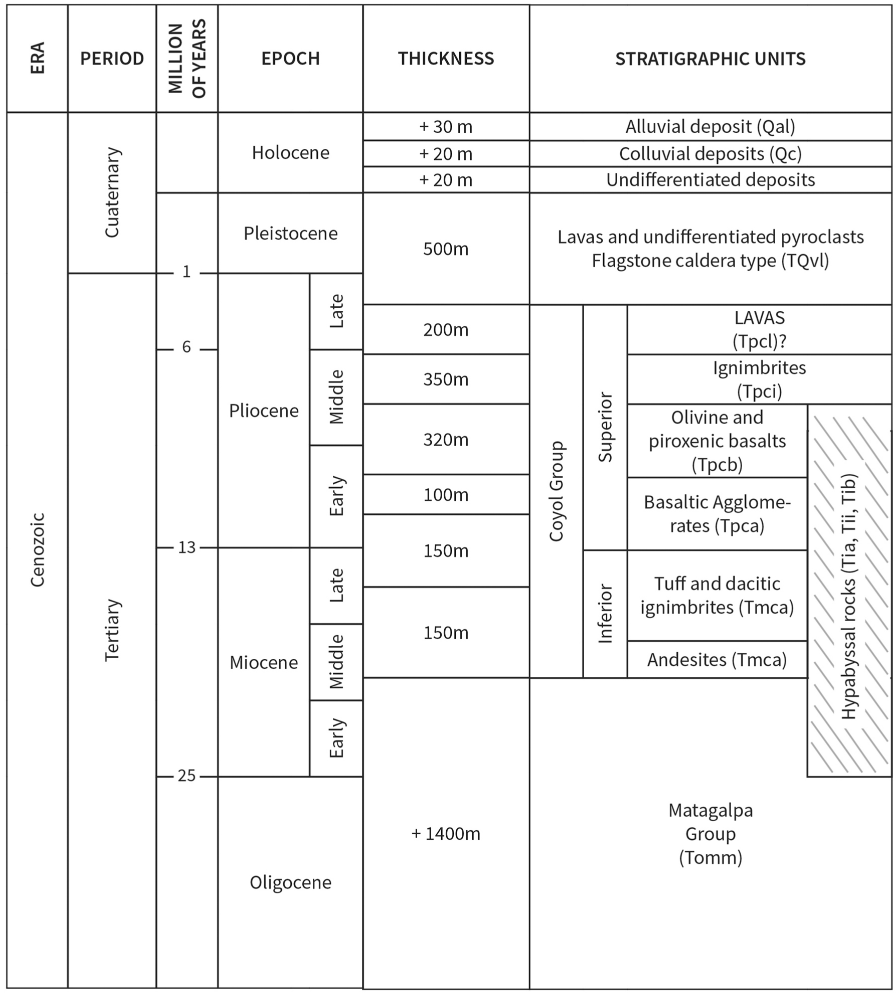

Figure 5: Stratigraphic sequence in the study area (redrawn and translated from Garayar 1972, 16).

slope, formed by Matagalpa Group rocks, consists of isolated hills with a flat top, soft slope, and abrupt end. Second, the rolling hills of Coyol Group and the volcanic rocks from the Tertiary-Quaternary lie atop the surface of the ancient slope. Third, the volcanic plains that are part of the rolling hills feature flat surfaces with soft slopes ending in escarpment that is more than 400 mts high. Hato Grande (Juigalpa) and the Meseta de la Cordillera de Amerrisque (Juigalpa) are good examples of these volcanic plains. Fourth is the lake delta and lakeshore, formed by the deposition of alluvial sediments (Qal) from rivers that discharge in Lake Nicaragua. Due to epeirogenic movements, alluvial plains were formed from divergent rivers, now observable as paleochannels. Fifth are the valleys or erosion plains, present in all four previous units. These valleys feature a dendritic drainage, with profound beds, V sections and steep flanks. As a result, streams tend to be ample and filled with alluvial sediments (Qal, Q), rivers are winding, and plains are extensive with dark clayish soils (vertisoles, locally known as *sonsocuites*). The main valleys in the region are associated with the following rivers: Boaco, Tecolostote, Mayales, Acoyapa, and Oyate (Garayar 1972; Rigat 1992).

When combining geomorphological and topographic features, the research area splits in three different zones (Autoridad Nacional del Agua 2014) **(figure 6)**. First, the high zone, located north of the area, features the Late Tertiary Cordillera Amerrisque (McBirney & Williams 1965), which runs towards

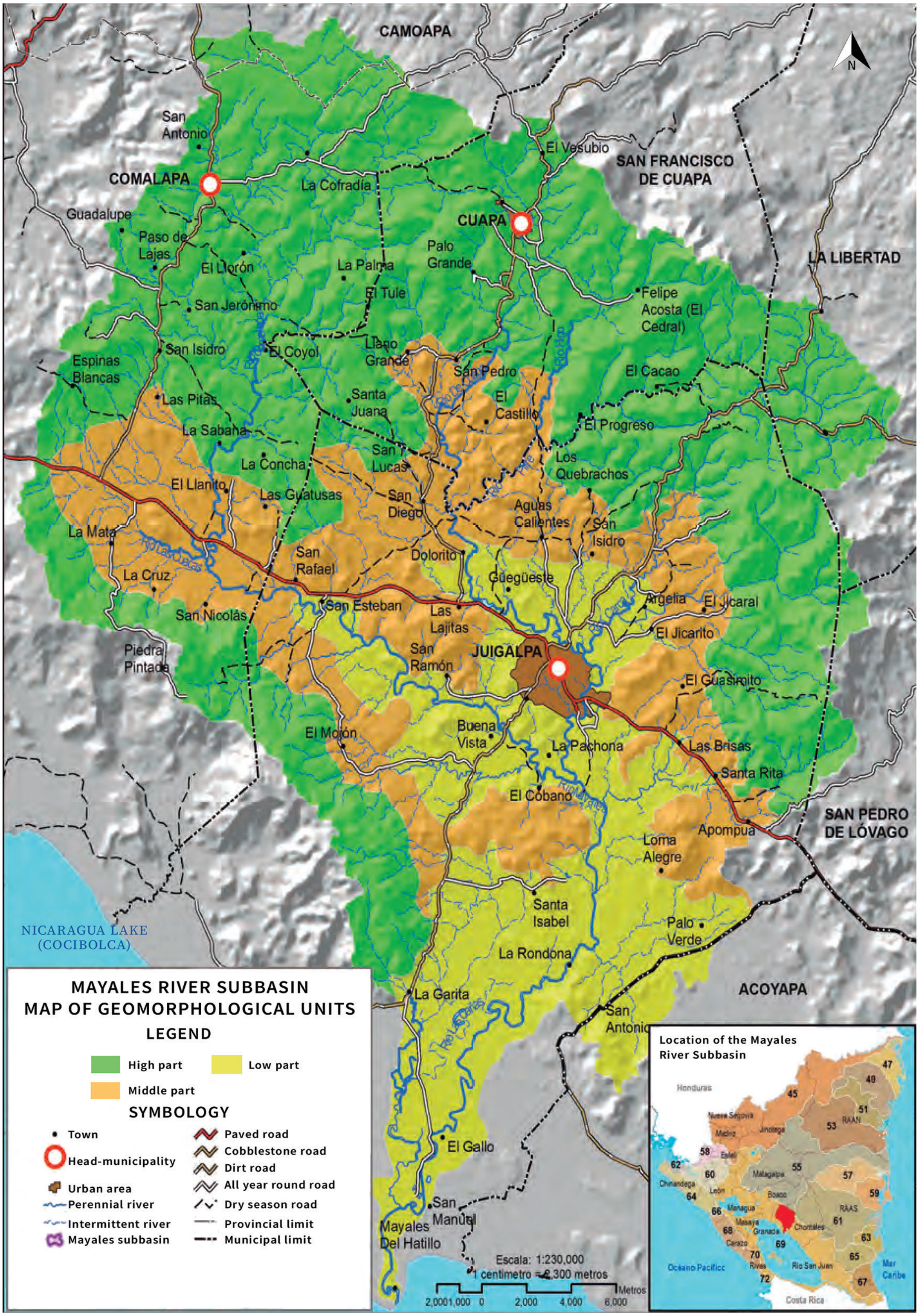

Figure 6: Geomorphological units within the research area (redrawn and translated from Autoridad Nacional del Agua 2014, 29).

Figure 7: Map featuring the Mayales river subbasin (redrawn and translated from Autoridad Nacional del Agua 2014, 24).

the southeast almost parallel to Lake Cocibolca's shore (Taylor 1959; 1963). The mountainous abrupt relief includes elevations up to 800 m.a.s.l. (Obando 1997) and is the cradle for the local rivers (Autoridad Nacional del Agua 2014). The middle zone is characterized by soft slopes, where the middle of the main river courses are located. Finally, the extensive alluvial terraces are located in the inferior course and the Mayales river delta, forming the lowest zone of the subbasin, which has low flat relief (Autoridad Nacional del Agua 2014). The research area is located in the middle zone, which also features some elevations such as the hills of Aguas Calientes, Cerro de la Cruz, and Güegüestepe, for example.

Hydrography

The Mayales river subbasin, with a 1051.72 km2 drainage area, is part of Basin no. 69, which encompasses the San Juan river and the two major lakes of Nicaragua **(figure 7)**. The main river course runs for 83.3 km from its source on the El Parlamento hill (661 m.a.s.l.) until its mouth, at Lake

Cocibolca (Autoridad Nacional del Agua 2014). The river is born in the mountains, crosses the plains and then flows into the lake with a northeast-southwest orientation, perpendicular to the lake depression (Rigat 1992). The subbasin has very good drainage and is divided into six different microbasins: Mayales, Los Cuchumbos, Cuisalá, Apompuá, Las Delicias, and the Lower Mayales. The research area of this project is part of the first microbasin, the Mayales, with a 412.9 square km area and a 42.96 km course (Autoridad Nacional del Agua 2014). The marked seasonal rainfall patterns produce significant variations in river water levels (Taylor 1959; 1963; Rigat 1992), which affects the numerous seasonal streams that cover the area, such as La Garnacha, Aguas Calientes, and Las Ánimas.

Soils

Taylor (1959) identified eight different groups of soils in the research area, whose variation is explained by different climates, parent materials, and topographies. The black tropical soils (grumosols) include the tropical black clays and tropical black clay-loams. These soils are extremely plastic during the rainy season and crack deeply during the dry season. They are usually found on deposits of Quaternary alluvium and on flat areas of Tertiary basic volcanics and sediments. Brown latosols occur both on abundant basic volcanic rocks and on acidic schists. Dark latosols happen mainly on basalt, while yellow latosols are found on almost all types of tertiary volcanic rocks. Lithosols are young, shallow, and stony soils that occur on moderate to very steep slopes. Regosols derive from volcanic ash and consist of immature soils formed on soft rocks or rapidly decomposed deposits. Young alluvial soils are immature and feature successive layers of alluvial deposits. Hydromorphic soils are flooded for long parts of the year, so their main characteristics depend on the duration of this flooding, as well as the groundwater composition.

In contrast, Rigat (1992) defines six pedologic units: brown forest soil, tropical clayish red soil (latosol), unconsolidated clayish rockish soil (lithosol), dark gray-black clayish soil (vertisol), alluvial soil, and hydromorphic soil. Discrepancies with Taylor (1959; 1963) might be due to their different research areas; while Taylor covered the entire department of Chontales, Rigat only focused on the area subject to his archaeological surveys (Gorin & Rigat 1988). Also, it could be the result of different pedological views; while Rigat focused on the links between human populations and their environment, Taylor's classification was strictly geological (A. Geurds, pers. comm. 2019). However, since Rigat does not quote any references in this section, Taylor's definitions will be used.

Van Dijk (2017) conducted an ethnopedological study of local soil knowledge within the research area. According to his study, the local taxonomic system consists of four different levels mainly based on texture and color, in combination with function and land-use variables (van Dijk 2017, 40). The main nine soil types proposed by van Dijk (third level in his taxonomic system) were successfully juxtaposed with seven of Taylor's scientific nomenclatures (van Dijk 2017, 41), creating a comparative baseline between the two classification systems. In this book, both scientific and local names will be applied; however, during excavations, local names were given priority.

Climate and Precipitation

The climate of the research area corresponds to the tropical savanna type, or the AW according to the Köppen classification (Rigat 1992), with an average annual temperature of 25 to 30 °C for the whole region and 26.3 °C in Juigalpa (Garayar 1972). In local classifications, Nicaragua is divided into three climatic zones: hot (0 to 500 m.a.s.l.), temperate (500 to 1000 m.a.s.l.) and cold (1000 to 2107 m.a.s.l.) (MARENA & INFOR 2002); the region under examination belongs to the second zone. The Mayales river subbasin enjoys an average annual precipitation of 1398 mm, with September as the month with the highest rainfall throughout the year (Autoridad Nacional del Agua 2014). Winds flow from the northeast, east, and south (MARENA 2016). There are two different seasons (Taylor 1959): a rainy one from May through December and a dry one from December until April (Garayar 1972). However, the climatic changes due to intense deforestation have resulted in higher temperatures and dryness in general (Rigat 1992), as well as a longer dry season of up to six months.

Flora and Fauna

Nicaragua is split into five different vegetation zones based on climatic conditions: lowland evergreen rain forest, lower montane rain forest, seasonal evergreen rain forest, semi-evergreen rain forest, and deciduous forest. Apart from that, there are azonal communities, as well as pine forest and savanna. This region of study falls within the semi-evergreen rain forest (Taylor 1963).

Taking into account the geology, topography, climate, soils, and vegetation, the country was split into four different ecological regions. Region I corresponds to the Pacific coast, Region II to the north-central part, Region III with the central Bocay area, and Region IV with the Caribbean coast (MARENA & INFOR 2002). Flora in the region of study (II) is mainly characterized by fabaceous species, represented by shrubs and herbs (MARENA 2016). In general, vegetation fluctuates seasonally and consists of tropical savannas, *jicaral* woods and *zacate jaragua* (grasses) (Garayar 1972). For complete species lists, see Taylor (1963), and the reports by MARENA-INAFOR (2002) and MARENA (2016).

Faunal species are generally divided into terrestrial and aquatic. The first group includes vertebrates such as mammals, amphibians, reptiles, and birds, as well as invertebrates. Rabbits, deer, foxes, porcupines, monkeys, shrews, armadillos, iguanas, snakes, turtles, and several birds are just some of the contemporary native species in this area. The second group live in flooded areas, estuaries, lagoons, rivers, and the Lake. It includes *Parachromis managuensis* (*guapotes*), *Prochilodus lineatus* (*sabalos*), and *Centropomus* sp. (*robalos*), among others. For complete species lists, see the reports by MARENA-INAFOR (2002) and MARENA (2016).

2.2 NARRATIVES OF THE PAST AND PAST NARRATIVES

The question of time and early human presence in Nicaragua has sparked fascination in both national and foreign amateurs, scholars, and politicians, especially in the case of the Acahualinca footprints, which presumably dated to 3000 BCE (Flint 1884; Crawford 1891; Bryan 1973; Schmincke *et al.* 2009). Also, the dubious association of megafauna with jasper flakes at El Bosque, Pueblo Nuevo, Estelí resulted in a visit of several international scholars in the beginning of the 1970s, orchestrated by the government of dictator Anastasio Somoza Debayle (R. Cooke, pers. comm. 2016). However, the confirmed presence of humans in the country starts in the Caribbean watershed (Veloz Maggiolo 1991; Matilló Vila 1993; Balladares Navarro *et al.* 2014b; Byers *et al.* 2014; Roksandic 2014; Roksandic *et al.* 2018).

In Nicaragua, narratives regarding time are mainly centered around the chronology of the Pacific coast (Zambrana Fernández 2015). Hence, it is pertinent to ask ourselves why it is that certain places dominate time narratives. Why does the history of one section of the country define the rest? And why is that portion of the territory so relevant? The answer to that question was partially implied in Chapter 1 and goes back to the impressions painted by early *cronistas* and travelers,[9] in combination with later pioneers and collectors in the 19th century (Steinbrenner 2010, 16-20) through the more formal archaeological attempts of the early 20th century. The narratives stressing connections with "higher" cultures crystallized in 1943, a turning point in the archaeology of Central and North America, when Paul Kirchhoff (1943) included western Nicaragua as part of Mesoamerica, specifically as its southeasternmost border. This proposal dominated the agenda of formal archaeological research in the country for at least five decades and continues to steer many of the current debates. However, new perspectives have argued for the necessity of a paradigm shift (Joyce 2020).

The history of archaeological efforts in Nicaragua since the first ethnohistorical accounts, as well as those provided by travelers and explorers, have been thoroughly examined by numerous authors, such as Healy (1980), Salgado González (1996), Palomar Puebla & Gassiot Ballbè (1999), Tous Mata (2002), Niemel (2003), Werner (2009), Steinbrenner (2011), and Dennett (2016), just to name a few. Gorin (1990; 1992; 2010), van Broekhoven (2002), and van Broekhoven & Geurds (2012) also delved into these topics, with a specific focus on Chontales. In a very broad sense, the authors divide this history into several different periods: early Spanish accounts, which include primary and secondary sources; pioneers and collectors of the 19th century; the first classifications, chronology-building endeavours, and synthesis during the first half of the 20th century; modern systematic archaeology from 1959 through the 1990s; and finally the latest, more bottom-up approaches from the 1990s into the 21st century (Gorin 1990; 2010; Steinbrenner 2010).

9 For examples of these works, see Mártir de Angleria (1944); López de Gómara (1975); Fernández de Oviedo y Valdés (1853); Espinoza (1892); Bobadilla (1998); Benzoni (1962); and López de Velasco (1894).

The efforts centered around ceramic chronology building have been numerous (see below), but in a way they have all followed compartmentalized geo-cultural borders inherited from the discourses described above. Ceramic chronologies in Pacific, Central, and Caribbean Nicaragua reflect dated ideas that consider decoration and morphological styles to be infallible chronological markers. Also, they were specifically designed to assess the level of influences from more "relevant" cultural areas as measured by the presence, absence, and frequency of certain types and styles. Interregional comparisons are reduced to comparative charts that lack real discussions of manufacturing techniques and foodways.

These theoretical biases were translated into methodological ones; the fundamental flaw of ceramic analyses, classifications, and chronological placement in the country lies in the almost absolute negligence towards the "utilitarian" wares,[10] which usually comprise more than 50% of the sample (McCafferty & Steinbrenner 2005a). The focus placed on decorated sherds as the building blocks for chronological narratives is disconnected from the study of social transformations. Chronologies in the country are histories of expanding and declining types and modes of decoration, which do not necessarily reflect the richness and complexity of human experience. The lifeways of ancient Nicaraguans are obscured by a stubborn myopic concentration on the "nice" pots, and no true paradigm shift can take place within this frame of discourse.

2.2.1 CERAMIC CHRONOLOGY OF PACIFIC NICARAGUA

Western or Pacific Nicaragua includes two different geographic and geological provinces: the slopes of the Pacific coastal plain and the Nicaraguan Depression (McBirney & Williams 1965; Schmoll *et al.* 1975). Since early colonial times, this section of the country was selected for the majority of Spanish settlement, so its modern population is mostly comprised of *mestizos*. This area is nowadays home to at least half of the population of the country, in spite of occupying only 15% of the national territory (Instituto Nacional de Información de Desarrollo 2012). Therefore, it is not surprising that this section has received more archaeological attention than the rest of the country combined. Attempts to characterize and chronologically organize the ceramics of the Greater Nicoya area, and consequently of Pacific Nicaragua, started with Lothrop (1926), who was followed by numerous efforts (Norweb 1961, 1962; Coe & Baudez 1961; Baudez & Coe 1962; Baudez & Hogarth 1970; Lange 1971b; Wyckoff 1971; Healy 1974, 1980; Sweeney 1975; Lange *et al.* 1976, 1992; Haberland 1978, 1986; Wyss 1983; Creamer 1983; Day 1984; Hoopes 1987; Abel-Vidor *et al.* 1990; Knowlton 1992; Niemel 2003). The latest attempts to homogenize data were conducted by Vázquez Leiva *et al*. (1994), McCafferty & Steinbrenner (2005), Steinbrenner, (2010), and Dennett (2016). In these efforts, there has always been more data available for Costa Rica, including far more absolute dates, than Nicaragua.

As a result, the current accepted chronology is based on the integration of stratigraphic excavations and radiocarbon dates combined with type-variety and modal analytical methodologies (Healy 1980).[11] The type-variety classification incorporates detailed technological attributes, including thorough paste descriptions, finishing and surface treatment choices, as well as insights into firing techniques and vessel morphometric styles. In practice, iconography and vessel forms have been the markers of origin, identity, and chronology in Pacific Nicaragua (Dennett 2016). Recently, provenance data by means of chemical characterization through Neutron Activation Analyisis (NAA) (Lange & Bishop 1988; Bishop *et al.* 1992; Bishop & Lange 2013; Dennett 2016) and X-RD (McCafferty *et al.* 2007) as well as mineralogical approaches (Dennett *et al.* 2011; Dennett 2016; Platz 2017) have also been integrated. Technological studies regarding fashioning techniques have been conducted in Costa Rica (see Herrera Villalobos 2001 as a good example) but remain scarce in the Nicaraguan

10 Steinbrenner's work (Steinbrenner 2010; 2011) focuses mainly on polychromes but also delves into monochrome ceramics, including utilitarian sherds, trying to establish connections with the decorated ones. His preliminary results point to a shared manufacturing tradition that produced both "utilitarian" and polychrome pots. However, it is unclear how these patterns relate to X-RD results on ceramics from Santa Isabel, which indicate that "(...) the trace minerals found in the monochrome pottery were not found in the polychromes examined" (McCafferty *et al.* 2007, 14).

11 The preceding ceramic sequence included four different periods: Zoned Bichrome (300 BCE - 200 CE), Early Polychrome (200 - 800 CE), Middle Polychrome (800 - 1175 CE) and Late Polychrome (1175 CE - conquest) (Coe & Baudez 1961; Baudez & Coe 1962; Baudez 1967).

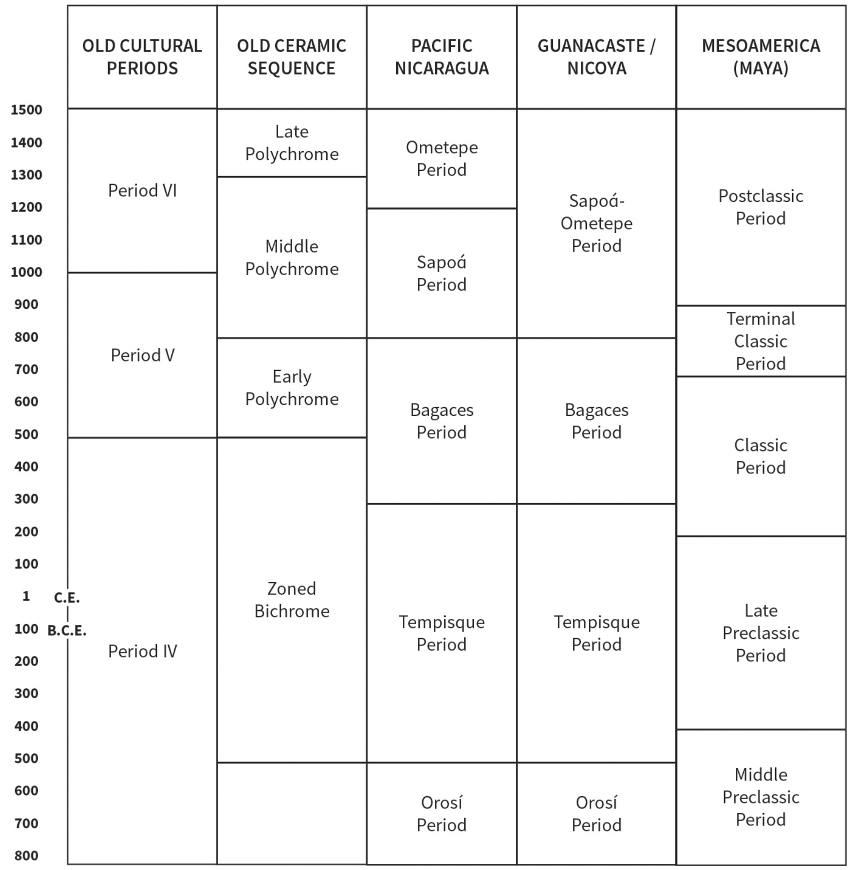

Figure 8: Chronology of Pacific Nicaragua (redrawn from Dennett 2016, 64).

portion of the Greater Nicoya (exceptions are the contributions already mentioned above by Lange, Bishop, and Dennett). The collective efforts made by numerous researchers over more than five decades has resulted in a ceramic sequence comprised of five different phases, based on numerous absolute dates and ceramics, spanning from 2000 BCE until 1550 CE and incorporating predominantly ceramic data, complemented by insights on subsistence strategies, settlement patterns, social organization, contacts with other regions, and stonework traditions (Vázquez Leiva *et al.* 1994). Since available literature is ample and easily accessible, in contrast to the Caribbean and Central portions of the country, the chronology will be briefly summarized **(figure 8)** based on the last published synthesis (Vázquez Leiva *et al.* 1994), incorporating the latest research developments from the Nicaraguan section of the Greater Nicoya (McCafferty & Steinbrenner 2005a; Steinbrenner 2010; Dennett 2016).

Orosí (2000 - 500 BCE)

Ceramics feature decoration with broad incised lines, as well as shell impressions. Red slip, either covering the entire surface of the vessel or restricted to the rims, is also common. The most ubiquitous shapes are *tecomates*, cylindrical vessels, bowls, and globular pots. Lithic technologies include a bifacial flake industry, as well as grinding stones (*metates*). Communities seem to have lived in small hamlets around lagoons, on islands, and in flood areas. Their economy was mixed, including agriculture, hunting, silviculture and the exploitation of lake resources. No evidence of long-distance trade has been recovered (Vázquez Leiva *et al.* 1994).

Diagnostic ceramic types: Bocana Incised Bichrome (Bocana, Toya, Palmar, and Diria varieties), Santiago Appliqué, Schettel Incised, Tronadora Incised, Tonjibe Beige, Tigra Incised Punctuated, Zetillal Shell Stamped, Tajo Incised-Gouged (Vázquez Leiva *et al.* 1994).

Tempisque (500 BCE - 300 CE)

Ceramic vessels go through a transformation in their morphological styles; the period is characterized by the appearance of bottles, *cajetes*, and effigy vessels, both anthropomorphic and zoomorphic. Lithic technologies include flaking industries in local siliceous rocks, polished axes (celts), *metates*, *manos*, hammers and jadeite ornaments. Communities show a certain amount of social differentiation and were located on highly fertile soils and in coastal environments. Agriculture, fishing, hunting, and agroforestry were the main subsistence practices. For this period, there is ample evidence of long-distance exchange of ceramics from the north (Usulután) and central valleys of Costa Rica, as well as of jadeite (Vázquez Leiva *et al.* 1994). The end of this period coincides with the collapse of Mombacho Volcano, which obliterated any evidence for previous settlements on the shore of Lake Cocibolca (Dennett 2016).

Diagnostic ceramic types: Bocana Incised Bichrome (Bocana, Toya, Palmar, and Diria varieties), Rosales Zoned Engraved (Rosales and Claro varieties), Popoyuapa Zoned Striated, Apompua Modelled, Las Palmas Red on Beige, Mojica Impressed (Mojica and Laguna varieties), Monte Cristo Beige, and Beige Brothers (Vázquez Leiva *et al.* 1994).

Bagaces (300 - 800 CE)

Ceramics show a tendency towards less varied, more repetitive morphological patterns, as well as a transition from the zoning of incised and painted designs to polychromy. The Costa Rican sector features linear motifs, both painted and incised; decorative techniques include negative painting, multiple brush, and burnished surfaces. Cylindrical and pear-like shapes are also present. Lithic industries include the appearance of flaked obsidian and other rocks, as well as an increase in the number of *metates*, *manos*, and celts (Vázquez Leiva *et al.* 1994).

This period is characterized by transformations and regional differentiation, with clear variations between northwestern Costa Rica and southwestern Nicaragua in spite of shared traditions. There is an increase in the number of sites, but centralization is lacking in the southern sector. Subsistence practices included agriculture, hunting, fishing, and collection of wild species. Long distance trade also increases, evincing contacts with Caribbean and central Costa Rica, Guatemala and Honduras (obsidian), El Salvador and Honduras (ceramics), and the Maya area (jadeite, slate, and mirror frames) (Vázquez Leiva *et al.* 1994). At the transition between Bagaces and the next period, Sapoá, Dennett (2016) proposes a shift towards more centralized control of ceramic production, distribution, and consumption, evinced by increased standardization, the adoption of new tools, and a decrease in competition.

Diagnostic ceramic types: Guinea Incised (Guinea, Gutiérrez and Resistent varieties), Charco Black on Red (Charco and Puerto varieties), Zelaya Painted (Bicrome and Tricrome varieties), Tola Tricome (López and Tola varieties), Mojica Impressed (Mojica, Corrico, and Arrastrado varieties), Espinoza Red Band, Marbella with Punctuated Zoned Impressions, Las Palmas Red on Beige, Chávez White on Red (Chávez and Punta varieties), León Punctuated, Potosí Appliqué (Caiman, Santos, and Potosí varieties), Velasco Black Bands, Carrillo Polychrome, Galo Polychrome (Jaguar, Lagarto, and Figura varieties) (Vázquez Leiva *et al.* 1994).

Sapoá (800 - 1350 CE)

The beginning of this period was traditionally marked by the arrival of Chorotega speakers (Mangue) to southwestern Nicaragua and northwest Costa Rica. Ceramics feature the popularization of polychrome decoration applied on white slips in the Rivas Isthmus and on orange slips in the Costa Rican section (Vázquez Leiva *et al.* 1994). However, Steinbrenner (2011) considers that "(...) most of the Sapoá Period polychrome types previously identified in Pacific Nicaragua—including those usually treated as markers of different immigrant Mesoamerican groups—are more alike than unalike, and are best understood as the products of a common potting tradition with a probable Central American origin" (Steinbrenner 2011, 1). Therefore, the exogenous origin of the producers of these polychromes is now under debate.

According to Niemel and others (Niemel *et al.* 1998), major settlement pattern transformations took place in south Pacific Nicaragua between 900 and 1000 CE. For example, we see the emergence of the construction of mounds, involving the use of stone slabs and organized around plazas. Several production centers were active during this period in both sectors. Communities show a complex social organization, with subsistence practices including a mix of agriculture, fishing, hunting and collection. Long distance trade included relationships with

Honduras, as evinced through presence of imported ceramics, metallurgy, and marble vessels; with Guatemala, as shown by obsidian finds; and elsewhere in Mesoamerica, expressed through iconographic traits identified in local ceramics. From a technical point of view, Mesoamerican influence is evinced by the application of finer surface treatments, including more advanced smoothing techniques and better distributed slips (Niemel *et al.* 1998). Obsidian frequencies are higher in the north than in the south, but both sections experienced an increase in the production of prismatic blades and flakes (Valerio Lobo & Salgado González 2000). The rest of the lithic industries show continuity with previous periods, with the presence of *metates* (both carved and uncarved), nutcrackers (recycled *metates*), unworked flakes, projectile points, grinders, polishers, axes (both flaked and polished) (Vázquez Leiva *et al.* 1994). Also, worked bone artifacts are present, particularly ornaments, needles, flutes, sharp splinters, and points. Shell artifacts are also present, usually used as ornaments (Vázquez Leiva *et al.* 1994).

Diagnostic ceramic types: Mora Polychrome (Mora, Guapote, Mono, Guabal, Cinta, and Chircot varieties), Papagayo Polychrome (Papagayo, Culebra, Mandador, Serpiente, Fonseca, Pica, Alfredo, Cervantes, Césares, and Manta varieties), Birmania Polychrome, Cabuyal Polychrome, Palmira Polychrome, Sacasa Striated, Guillén Black on Light Brown, Santa Marta Polychrome, Altiplano Polychrome, Belén Incised (Palmares, Belén, and Ayotes varieties), Asientillo Polychrome, Pataky Polychrome (Leyenda, Mayer, and Pataky varieties), Jicote polychrome (Pataky, Jicote, Tempisque, Máscara, Lazo, Madeira, Felino, Luna, Lunita, Bramadero, and Cara varieties), Grandad polychrome, Jiménez Polychrome, Piches Red, Danta Beige, and Tres Esquinas Beige (Vázquez Leiva *et al.* 1994).

Diagnostic types of Late Sapoá - transition to Ometepe: Vallejo Polychrome (Vallejo, Lazo, Cara, and Mombacho varieties), Madeira Polychrome, and Bramadero Polychrome (McCafferty & Steinbrenner 2005a).

Ometepe (1350 - 1550 CE)

This period is marked by the supposed arrival of the Nicarao groups, who were Nahuatl speakers, and the Subtiabas (but see McCafferty & Steinbrenner 2005a and Steinbrenner 2010). Communities, which show increased hierarchization, continue living in the same sites, and continuity is also visible in their subsistence practices. Ceramics evince consistency with the types that appear at the end of the Sapoá period, such as Vallejo Polychrome and its varieties. New types are also present in the assemblages, such as Luna Polychrome and Murillo Appliqué. Lithic industries feature more diversity. Obsidian frequencies reach new highs, especially in the Lake Xolotlán basin, and bifaces produced with local raw materials are on the increase in this period. Stone sculpture also originates within this period (Vázquez Leiva *et al.* 1994).

Diagnostic ceramic types: Castillo Engraved, Banda Polychrome, Luna Polychrome (Luna and Menco varieties), Cuello Appliqué, Murillo Appliqué, Lago Negro Modelled, Ometepe Red Slip, Patastule Red Bands, Carlitos Polychrome, Miragua Comun, Coronado Red, Oluma White and Red (Vázquez Leiva *et al.* 1994).

The chronology summarized above requires critical assessment. For the Nicaraguan section, more radiocarbon dates are necessary in order to elucidate the actual temporal placement of the sites and therefore of the ceramics retrieved from them. Also, as noted by McCafferty & Steinbrenner (2005), traditional views of Greater Nicoya equated ceramic types with cultural groups. Therefore, the appearance of certain types was thought to signify the arrival of different communities. However, a lack of solid material connections with the supposed migrant groups, together with local continuity and a refinement of the chronology, have questioned these assumptions (McCafferty & Steinbrenner 2005a). Methodologically speaking, this bias towards migrations has resulted in a virtual absence of inter-type continuity approaches, as previously noted by Steinbrenner (2011). As a consequence, types have been conceived as autonomous units that serve as ethnic markers. For example, Papagayo Polychrome and Sacasa Striated have traditionally been ascribed as Chorotega diagnostics, while Vallejo Polychrome would be a Nicarao product. However, a modal approach focused on looking at the connections between the types, at their similarities rather than their differences, proposes that they were products of shared potting traditions (Steinbrenner 2010; 2011).[12]

12 The conceptual modes taken into account included vessel form, appendage and decorative modes, wall thickness and height, mouth diameter, etc. (Steinbrenner 2010; 2011).

Ceramic analysis in Greater Nicoya is far from integrating true technological variables. Even though Dennett's (2016) work and partially Steinbrenner's (2010) do delve into technological choices, the first study is limited to clay procurement and clay preparation practices, while the second focuses on formal aspects that can be byproducts of technological choices. Therefore, these modes are not examined from a true technological perspective. For example, Steinbrenner (2010; 2011) is convinced that average wall thicknesses of different types are "unconscious" or "unintentional" attributes. However, direct relationships can be established between wall thickness and choices related to fashioning techniques, including coil size and the type of force applied to the pre-form (pressure or percussion). Therefore, these conceptual modes, or formal attributes, can be directly linked to socially learnt practices and are not necessarily random results. From a practice theory perspective, some modes are unintended consequences of situated, learnt bodily gestures in different steps of the manufacturing chain. Modes related to wall thickness, for example, may also be related to certain properties desired for the end product in connection to consumption practices.

2.2.2 CERAMIC CHRONOLOGY OF CARIBBEAN NICARAGUA

The Caribbean (Atlantic coast) region of Nicaragua comprises 60366 sq km (INETER 2000), almost 50% of the national territory (Programa de Naciones Unidas Para el Desarrollo 2005). Geologically, it was formed by a magmatic sedimentary succession comprised of Miocene to Upper Quaternary (Holocene) deposits atop an earlier Tertiary substrate (Kristinsson & Ruíz Mendieta 2012). Geomorphologically, the Caribbean coast of Nicaragua is an extensive plain that features some elevations up to 1650 m.a.s.l. (MARENA 2000b), but is mainly a flat terrain crossed by rich hydrological networks (for example Río Grande de Matagalpa, as well as the Escondido and Prinzapolka rivers). The climate is characterized as tropical humid, with high precipitation and a stable temperature of 27 °C. It features an environment of tropical wet forests, wetlands, marshes, mangroves, and swamps (MARENA 2000a).[13] Administratively, it is divided into two autonomous regions: Región Autónoma de la Costa Caribe Sur (RACCS) and Región Autónoma de la Costa Caribe Norte (RACCN). In the past, the former was known as Región Autónoma del Atlántico Sur (RAAS) and the latter as Región Autónoma del Atlántico Norte (RAAN). Nowadays, these two regions are home to very diverse groups: indigenous, such as the Miskito, Mayagna, and Rama; the Afro-descendent Garifuna and Creole communities; and the *mestizo* community, who are the majority (Williamson Cuthbert & Fonseca Duarte 2007).

Before the 1970s, knowledge regarding the pre-Hispanic Caribbean population in Nicaragua was limited to ethnohistoric accounts by travelers (Squier 1891; Hodgson 1990; Roach 1991; Romero Vargas 1995; Íncer Barquero 2003; von Houwald & Castro Frenzel 2003), which characterized the population as small groups with high mobility who mainly subsisted through hunting, fishing, and gathering practices but also developed incipient agriculture. However, in the 1970s, two major research events transformed our understanding of this region. First, Jorge Espinosa, together with foreign colleagues, conducted an archaeological survey that resulted in the identification of 15 different shell middens at Monkey Point (RACCS) (Matilló Vila 1993), as well as excavations at the Angie shell midden (Veloz Maggiolo 1991; Matilló Vila 1993). The absence of ceramics in this context led to the hypothesis that it was at least 7600 years old (Magnus 1974).[14] Radiocarbon dating of the deposit established its age as 7065 ±734 (71-194) BP and 6915 ±235 (71-203) BP (Veloz Maggiolo 1991, 38). Human remains of a 25-40 year-old female (Roksandic 2014; Roksandic *et al.* 2018) were found directly atop a radiocarbon-dated context (Gaitán Solano & Balladares Navarro 2012; Balladares Navarro *et al.* 2014a; Byers *et al.* 2014). A brief description of the materials retrieved account for the presence of ceramics within only the upper 30 cm of the shell midden, which were followed by deposits containing hearths, floor levels, lithic artifacts, sea and freshwater shells,

13 Unfortunately, extensive agriculture has damaged these ecosystems (MARENA 2000a).

14 Recent excavations led by archaeologists from BICU-CIDCA and the CADI (UNAN-Managua) yielded radiocarbon dates confirming that the site of Angie is more than 6000 years old (Balladares Navarro *et al.* 2014b; Byers *et al.* 2014). Since all samples were taken from around 3.5 m in depth, and the estimated total depth of the midden is 7 m, the currently accepted hypothesis proposes that the antiquity of the midden will probably surpass Espinosa's projections (Balladares Navarro *et al.* 2014b).

shark and other fish remains (bones and teeth), as well as mammal remains (Veloz Maggiolo 1991). More recent excavations confirmed the presence of ceramics within the first three stratigraphic levels, up to 64 cm below the surface (Byers *et al.* 2014). These sherds were monochrome, but one incised sample was collected, identified as the type Lower Lagoon Fine Lined Incised (800 - 1200 CE according to Magnus' chronology) (Byers *et al.* 2014). Lithic industries, which were not based on flaking techniques, included choppers, suggesting large woodwork, which could indicate the production of canoes used for transport and fishing. Hammers and *manos* indicate seed processing (Veloz Maggiolo 1991). Even though full results were not published, the hypothesis generated by this preliminary research insisted that the Caribbean coast of Nicaragua was populated in a much denser manner than previously stipulated; that its original dwellers came from the south; and that this territory served as a link to the Greater Antilles (Matilló Vila 1993).[15]

Following these lines of thought, Richard Magnus (Magnus 1974; 1978; 1980a; 1993) started his research plan between the north end of Pearl Lagoon and the south end of the Bluefields Bay. In his opinion, ethnohistorical accounts were inaccurate because they described communities already transformed by the European invasion, such as the Miskito, who were riverine people and then adapted to the sea coast after the arrival of the invaders (Magnus 1974; 1993). For that reason, his study included survey and excavations (mainly but not exclusively of shell middens), as well as a cultural chronology based on a ceramic sequence constructed using "(...) a combination of frequency and similiary seriation of ceramic modes, synchronization, and radiocarbon dating" (Magnus 1974, I). His analytical methodology included types and modes, as well as the definition of traditions and their complexes. Results obtained through these combined methodologies resulted in a chronological proposal spanning from 400 BCE until 1400 CE and comprised of two different ceramic traditions **(figure 9)**.

The first ceramic tradition, Siteioid, includes a single ceramic complex, while the second, Smalloid, encompasses three different ceramic complexes (Magnus 1974; 1980a). All coastal sites excavated by Magnus consisted of temporary hunting and

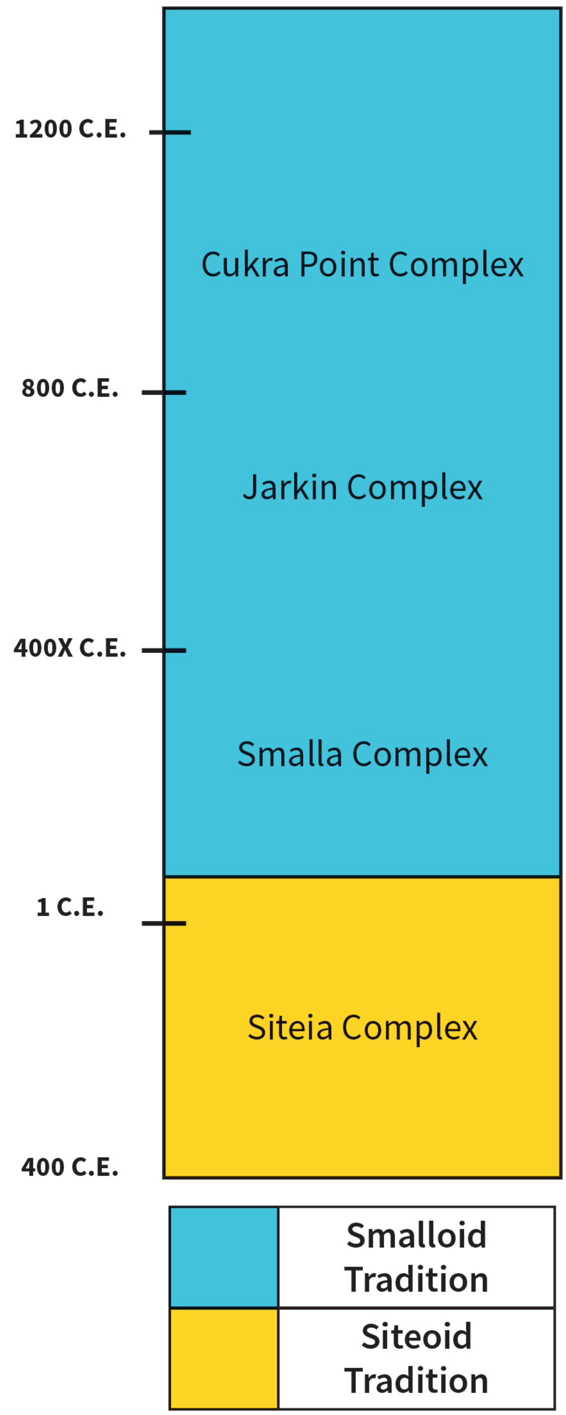

Figure 9: Chronology of Caribbean Nicaragua according to Magnus (redrawn from Magnus 1974, 204).

15 This connection to the Caribbean islands was previously proposed by Cruxent and Rouse (1969).

fishing stations used by inland-based agriculturally oriented riverine groups, who visited the coast to complement their diet. In his opinion, the coast was not significantly populated until after the conquest, suggesting a continuity in ancient subsistence practices that was disrupted by the conquest and the modern tendency towards permanent villages along the coast (Magnus 1978).

Siteioid Tradition (400 BCE - 1 CE)

The earliest and only complex within this tradition, Siteia, was defined through the excavation of three archaeological sites: Cox, Cayasso, and Siteia, all located along the southern Miskito coast, between the north end of Pearl Lagoon and the south end of Bluefields Bay. These sites were comprised of one or several shell middens and belonged to the site category of ceramic highland lagoon, according to Magnus's classification.

Archaeological excavations yielded 5100 ceramic fragments, which were classified into 11 different types. One of these types, Pearl Lagoon Polychrome (red and black on white), was characterized by its polychromy; however, the majority of the sherds were monochrome, thick, red slipped and without any further decorations. Paste recipes were homogeneous, and grain sizes were all fine or very fine with sand or white grit temper, which resulted in compact sherds. Smoothing was performed by hand or with the help of a pebble; incised decorations were present. Surface treatment involved polishing with a pebble and slipping in predominantly red tones but also in black, while decoration consisted of different painting techniques. This included rectilinear wide bands in red and black and white circles in negative paint with black dots in the center. Additionally, Magnus (1974) characterized a "sun" motif, comprised of a circle with perpendicular lines around the circumference. Firing possibly took place in an open oxidizing atmosphere, with good control over temperature and duration.

Other objects associated with this complex are stone celts and unmodified but used flint chips measuring 3x3x4 cm, interpreted as animal skinning tools. *Metate* and *mano* (ovoid cross- section) fragments were also present and assumed to have been employed for maize processing. Additionally, 2-3 cm rhyolite stone balls were presumably used as fishing weights. A bone projectile point was found, along with bone fragments from mammals, reptiles, and fish.

Magnus found possible similarities between his polychromes and those found at Caño del Oso in southern Venezuela, so he attributed a South American origin to the tradition, which was possibly brought to Nicaragua by small groups of people who either moved all the way North or made regular short trips to the area. Apart from that, the presence of a single Zoned Bichrome sherd suggested to Magnus a minimal contact with the Greater Nicoya and/or Western Lake Nicaragua.

Two radiocarbon dates were obtained to date this tradition. The earliest sample dated to 25 BCE (I-7100) and consisted of a charcoal fragment, which was found at the Siteia site, Cut 1 (100-120 cm deep) among the shells forming the midden and in association to painted ceramics. The second sample, a shell fragment associated to painted ceramics, dated to 80 CE (I-7450).

Smalloid Tradition (1 - 1400 CE)

The Smalloid tradition was defined through the excavation of ten different archaeological sites, which resulted in the definition of three diachronic complexes, characterized by the absence of polychrome and the presence of monochrome undecorated types, as well as incised ceramic modes such as groups of short, parallel lines that were either widely spaced over the surface of the vessel or close to each other, forming textile-patterning as well as punctuation, in combination with a lack of modelling techniques.[16]

Smalla Complex (1 - 400 CE)

The Smalla Complex was excavated at a single archaeological site, Smalla, located at the north of Pearl Lagoon. The site was comprised of one shell midden and belonged to the site category of ceramic highland lagoon, according to Magnus' classification.

16 Martínez Somarriba (1977) excavated Tacanites and Laureles, in Nueva Guinea, the geographical transition between the Caribbean coast and the Central Interior Highlands. Together with his supervisor (Magnus), he aimed to explore cultural boundaries between these two regions. As part of his results, Martínez Somarriba created the Nueva Guinea complex, which he placed within the Smalloid Tradition (Martínez Somarriba 1977; Magnus 1980a). Since his description of the ceramic analysis is not thorough, a re-evaluation of the materials was conducted by Miranda Tapia (2014), who proposed that the ceramics from Tacanites and Laureles actually should be placed within the Siteia Complex (Miranda Tapia 2014, 66). Since this debate exceeds the limits of this section's aims, the Nueva Guinea Complex was left out of the summary of Magnus' chronological proposal.

Abundant materials were recovered, such as zooarchaeological remains (turtle, peccary, manatee, and fish, flint flakes), and ceramics. The 2050 sherds were classified into 17 different types, of which five were also present in the Siteia Tradition. Paste recipes were homogeneous, featuring only white grit tempering (in contrast to the previous presence of both white grit and sand) and a more varied spectrum regarding grain size (fine, medium, and coarse) when compared with the previous tradition. However, the majority of the types show a tendency towards fine pastes, which implies a certain continuation in preferences related to clay procurement and/or preparation practices. Finishing included smoothing, but not many details were provided by Magnus to enable technological interpretations. Decorations were characterized by the combination of incisions on thick bands and punctuation, as well as incised lines with punctuation. Red slip with punctuation was also present, as well as non-slipped undecorated monochrome ceramics. No appendages were identified in this assemblage. As in the previous complex, firing possibly took place in an open oxidizing atmosphere, with good control over temperature and duration; however, firing technique involved lower temperatures and/or a shorter duration. Some fragments featured smoked internal surfaces. Other objects associated to this complex were a large number of unworked but used 2x3x1 cm flint chips, as well as *mano* (cross-ovoid section) and *metate* fragments. Additionally, zooarchaeological remains, such as bone fragments of white-lipped peccary, brocket deer, hickatee turtle, manatee, and various fishes (jack, snook, coppermouth, etc.), were found.

Magnus did not identify connections between the types defined for this complex and other regions; only some vague similarities were observed with the Dinarte phase of Ometepe. However, Magnus established links between the unclassified polychrome pottery (black and white on red) he excavated and the Central Interior Highlands of Nicaragua. As a result, the author proposed that "(...) during the Smalla complex times, the Miskito Coast inhabitants were very isolated and very uninvolved in extensive trade with other zones. Possibly other peoples passed through the zone but apparently had little influence on the local culture" (Magnus 1974, 212). Since the bone and shell was too badly eroded, no radiocarbon dates were obtained for this complex. Synchronization was not possible due to the lack of imported artifacts. Consequently, its chronological placement was established through similiary and frequency seriation of modes within the Smalloid Tradition.

Jarkin Complex (400 - 800 CE)

The Jarkin Complex was excavated from four different archaeological sites. Three of them, Jarkin, Finca Jarkin, and Jarkin Cana, were located in the Cukra Hill vicinity and belong to the site category of ceramic riverine sites, according to Magnus's classification. The fourth site, a shell midden known as Long Mangrove, was classified as a ceramic lowland-lagoon site and was situated south of Brown Bank. A total of 5700 sherds were classified into ten different types, none of them present in any of the previous complexes.

Paste recipes show a clear discontinuity with preceding clay procurement and/or preparation practices, with more than half of the types featuring a tendency towards medium grain sizes and the presence of two coarse types, a grain size completely absent in the previous complex. Tempering also shows transformations towards more heterogeneity, featuring five types with sand (mostly quartz), four sites with white grit, and one with sand (quartz) combined with shells. Coarse ceramics were sand tempered, while medium fine ceramics had either sand or white grit, with the exception of one case (Chavarria B) with sand and shell. Fine ceramics only contained white grit temper. Very little data is provided for finishing, but surface treatment involved polishing with a pebble and slipping. Most ceramics were undecorated and monochrome, usually unslipped. However, decoration techniques show several innovations, such as appliqué decorations (bands and zoomorphic) and supports (zoomorphic and small conical). Incised modes continue in this complex but show more complexity, such as intricate textile patterns created with incised lines and punctuations. A tendency towards flattened rim tops is also developed during this complex. A metric analysis of Magnus' drawings indicates a reduction of vessel wall thickness. Firing techniques seem to be twofold. Some types show evidence of continuity with the preceding complexes, with open oxidizing atmospheres with good control over firing temperature and duration. In contrast, other types evinced the introduction of a new technique, firing in controlled closed atmospheres, which could imply the use of a kiln. Objects found in association with these ceramics were unmodified but used 2x3x1 cm flint chips, as well as *metates* and *manos* (ovoid cross-section), also found in miniature. According to Magnus, the smaller ground stone artifacts were employed for grinding chillies or other condiments. No zooarchaeological remains were recovered in any of the sites within this complex.

One of the ceramic types, Heizen Incised Line and Punctuate, showed stylistical continuation with two types from the former Smalla complex, allowing for intra-zone comparisons. Also, Heizen featured similarities with the Dinarte materials from Ometepe; however, this phase is earlier than the Caribbean materials, so relationships are tenuous. Even though Magnus tried to draw comparisons to other complexes from southern Central America, Belize, and northern South America, he concluded that the relative isolation of the Miskito coast during the Jarkin complex times was similar to the previous complexes. Sporadic contact with surrounding regions cannot be excluded, but cultural innovations seem to emerge locally.

One radiocarbon date was obtained for this complex, which yielded a date of 490 CE. The sample consisted of large lumps of charcoal, which were found at the Jarkin Cana site, Cut 4 (75-100 cm deep). This represents the first radiocarbon date for earthen mounds in Caribbean Nicaragua.

Cukra Point Complex (800 - 1200 CE)

The Cukra Point Complex was excavated at five different archaeological sites comprised of shell mounds throughout Bluefields Bay. Four sites (Cukra Point, Pilly Point, Paraiso, and Thomas Finca) were classified as ceramic highland lagoon sites, while Mullin Creek belongs to the ceramic lowland lagoon site category. A total of 7250 sherds were classified into 23 different types, with only two types (Lower Lagoon Fine Line Incised and Lower Lagoon Medium Line Incised) previously defined for the Siteia tradition and complex.

Paste recipes are extremely homogeneous, only featuring white grit temper, like the Smalla Complex. Grain size is predominantly medium-fine, followed in frequency by fine, very fine, coarse and medium types. This variability is shared with the other complexes within the Smalloid Tradition and contrasts with the Siteoid Tradition. The only finishing technique reported was smoothing with a pebble, while surface treatment involved slipping in red and white. Incised decoration techniques and styles reach their most complex forms, with more systematic patterns for placing groups of lines and dashes, creating definite textile patterns. Also, there is a varied range of appliqué ornamentation that seems to relate to the Jarking Complex, now featuring snakes and other animals, as well as banding. The number of vessel supports increases when compared to the previous complex and includes conical, geometric, cylindrical, zoomorphic, and anthropomorphic shapes, some of which feature incised lines and appliqué dots. Additionally, the tendency towards flat top rims is stressed. Two types featured smoked surfaces, on interior (Eugene Plain Black Interior) and exterior (Allen Plain Black Exterior) surfaces. As in the Siteioid and Smalla Traditions, firing possibly took place in an open oxidizing atmosphere, with good control over firing temperature and duration.

The objects found in association with the ceramics consisted of 2x3x2 cm average size unworked but used flint chips; *metate* and *mano* (ovoid cross-section) fragments, both in average and miniature sizes; stone balls; and stone celts. Additionally, zooarchaeological remains, such as mammals, reptiles, and fish, were found.

Magnus identified some possible stylistical relationships between the Cukra Point Complex and other regions, but connections were drawn mostly with the Jarkin Complex, suggesting continuity of the local tradition. Therefore, he concludes that, as in the previous complexes, the research area remained relatively isolated and developed its own cultural traits locally. Some minimal trade might have occurred with Northern South America, but those links are very tentative. Sporadic trade with the Greater Nicoya or Western Lake Nicaragua was evinced by the presence of a single polychrome jaguar vessel support.

One radiocarbon date was obtained to date this complex, which yielded 1185 CE. The sample consisted of shell fragments, which were found at Cukra Point, Cut 6 (40-60 cm deep). This date represents the most recent for prehistoric occupation of the research area.

Magnus' work is exemplary because even though it is limited to the theoretical (ecological-cultural approach), methodological (typology, modal analysis, seriation), technical (dating, macro and microbotanical sampling, for example) and natural (the 1972 earthquake) constraints of his time, he excelled in describing his complete sampling strategies, from site selection criteria for excavations, through digging techniques, as well as his analytical choices in the laboratory. However, his research has several limitations. To begin with, he argued that none of the surveyed sites were multi-component (Magnus 1974) but rather were occupied for around 50 years

(Magnus 1978). Therefore, cultural stratigraphy was not suitable for answering his cultural chronology question (Magnus 1974, 186). In his opinion, "(...) statistical studies of frequencies from level to level inside a single site did not yield meaningful results" (Magnus 1974, 185). However, stratigraphic analysis goes beyond temporal placements, as it aids in broader interpretations about the excavated contexts (Harris 1991). Problematic as well regarding sampling are his excavations of earthen mounded sites, such as Jarkin, where test pits were only placed directly on structures, retrieving materials used as filling, without collecting comparative off-mound excavation data.

In regards to his analytical choices, his definition of types was mainly based on modes related to the outer appearance of sherds, such as surface color, luster, and surface decoration. Also, he included some technological variables, like hardness and temper, as well as wall thickness, as metric characteristics. Nevertheless, paste descriptions were not exhaustive and did not include archaeometric techniques, and modal analysis of rims and morphostyles was only partially undertaken. Moreover, even though some "plain" ceramic types were unique to each of the complexes, he chose not to include them because he considered that their defining modes were sensitive to local variables such as fuel and raw material availability (Magnus 1974, 188). Even though these factors play fundamental roles that affect both internal and outer appearance of ceramics, as well as technological choices, they do not necessarily impact all steps of the manufacturing process, nor the pots' morphometric styles.

Additionally, the limited number of radiocarbon dates (n=4) was solely obtained to confirm the results of his seriations. Only three of the four complexes were dated, and only one of them has two dates (Siteia), while the rest rely on a single radiocarbon date. The Smalla Complex, which lacks absolute dating, was placed in the chronology solely based on seriation criteria, which has its own issues. Magnus applied a reductionist evolutionary principle in constructing his similiary seriation, which went from simple to complex and from absence to presence. As a result, for example, he organized the incised modes considering that the ones featured in the Siteia Complex were less developed than in the Cukra Hill Complex. Also, the occurence of certain modes, like appendages or supports, was arranged from none to few to higher frequencies. The assumption that everything tends to go from simple to complex, and from none to lots, implies a teleological, evolutionary notion of culture. Finally, there is one detail in Magnus' work that escapes my understanding. Since the author included synchronization as part of his analytical methodology, throughout his work he compared the modes present in the ceramics he excavated with those from other assemblages. Therefore, references to ceramics from Belize, Honduras, Costa Rica, Panama, Colombia, and Venezuela are abundant in his text. However, he made absolutely no comparisons with the insular Caribbean. This is particularly striking considering that his dissertation supervisor at Yale University was professor Irving Rouse, who was foundational in the design and application of modal analysis in the Americas with his own doctoral work in Haiti (Rouse 1941) and then throughout his career in both the Lesser and Greater Antilles. The reason behind this omission could be Rouse's animosity towards Steward's Circum-Caribbean postulate. Also, Rouse did not consider materials from Caribbean Nicaragua to be similar enough to the Antillean ones to allow comparisons, and Magnus was more inclined towards local developments rather than assertions of long-distance movement (A. Geurds, pers. comm. 2019).

After Magnus concluded his seminal work in Caribbean Nicaragua, the country went through a complex political phase, which included the Sandinista revolution, the dismantlement of Somoza's regime, civil war, and attempts to establish a revolutionary government. Perhaps due to this, research in the area was scarce until 1998, when the Universidad Nacional Autónoma de Nicaragua (UNAN-Managua) and Universitat Autónoma de Barcelona started a collaborative research project focused on the localization and re-evaluation of archaeological localities in the RACCS, specifically between the northern half of the Bluefields Bay and Kakabila Point. This project aimed to re-define Magnus' existing chronology from a different standpoint. Apart from taking into account material culture, as in any traditional chronology building effort, they decided to propose a chronological sequence showing the changes in ceramic and lithic production alongside environmental exploitation strategies (Gassiot Ballbè & Palomar Puebla 2006).

This international multidisciplinary research program involved explicit survey and excavation methodologies, with multiple publications and theses ranging from ceramics (Latino Muñoz & Palomar Puebla 2005; Gassiot Ballbè & Palomar Puebla 2006; Vásquez Moreno 2016), lithics (Gutierrez Torres 2007; Clemente Conte *et al.* 2008), malacology

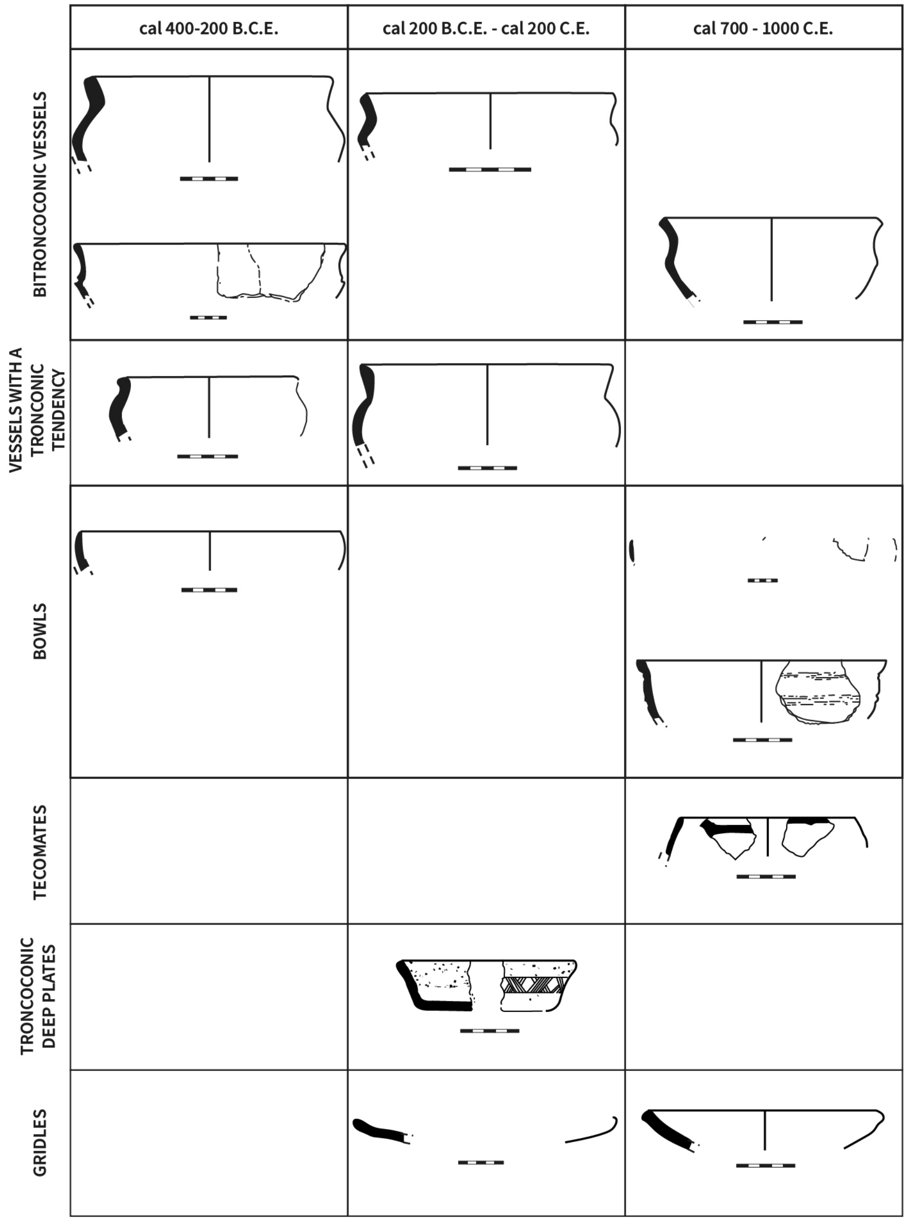

Figure 10: Chronology of Caribbean Nicaragua according to Gassiot Ballbé and Palomar Puebla (redrawn from Gassiot Ballbè & Palomar Puebla 2006, 237).

(Gassiot-Ballbè 2005; Gassiot-Ballbè & Clemente Conte 2015), and zooarchaeology (Lara Kraudy 2004; Zorro Luján 2010; Delsol *et al.* 2015), to social complexity (Clemente Conte & Gassiot Ballbè 2005), radiocarbon dating (Clemente Conte & Gassiot Ballbè 2005; Gassiot Ballbè & Palomar Puebla 2006), shell mounds (Clemente Conte *et al.* 2009, 2013), spatial analysis (Martínez Cervantes 2004; Clemente Conte *et al.* 2012) and heritage-related topics (Palomar Puebla & Gassiot Ballbè 1999), as well as public outreach (Gassiot Ballbè *et al.* 2003; Gassiot Ballbè & Estévez Escalera 2004).

Among its many contributions, the project identified and recorded 80 shell middens, 50 of them previously unpublished; two lithic workshops with no associated mounds; one surface ceramic site; and the mounded site of Cascal de Flor de Pino (Gassiot Ballbè & Estévez Escalera 2004). Excavations in 26 different locations and almost 30 new radiocarbon dates led to the proposal of a history of 3300 years of occupation divided in four periods (Gassiot Ballbè & Palomar Puebla 2006; Clemente Conte *et al.* 2013) **(figure 10)**, with some differences when compared to the previous chronological synthesis outlined by Magnus (1974; 1976; 1978). The ceramic portion of the chronology was based on morphological and decorative modes (Gassiot Ballbè & Palomar Puebla 2006).

Period I (cal 1500 - 900/800 BCE)

The oldest known phase for the area was encountered during the excavation of two marshy lowland shell middens, Long Mangrove and Coconut Beach, which are located at the shore of Pearl Lagoon (Gassiot Ballbè & Palomar Puebla 2006; Clemente Conte *et al.* 2013). The shell middens did not feature differentiated layers and were comprised of a single species, *Polymesoda solida*, which suggests the exclusive consumption of these estuarine clams. Vertebrate fauna, ceramics, and lithics were completely absent. This lack of earthenware can be interpreted either as a functional bias or as a threshold for human presence in the area. Both sites were interpreted as processing stations near collection loci, and the meat obtained would have then been transported inland. One radiocarbon date was retrieved from each of these sites.

Period II (cal 800/700 BCE - 400/500 CE)

The second phase was defined through the excavation of three sites related to Pearl Lagoon: Siteiata, Brown Bank, and the seven shell middens that compose the Karoline site (Gassiot Ballbè & Palomar Puebla 2006; Clemente Conte *et al.* 2013). The inland mounded site of Cascal de Flor de Pino (CFP) also aided in the characterization of the period (Gassiot Ballbè & Estévez Escalera 2004; Clemente Conte *et al.* 2013). This phase was defined through ten different radiocarbon dates retrieved at Karoline and CFP, and, according to the researchers, it shows relationships between coastal and inland sites, mainly by means of a shared ceramic tradition.

In Karoline, the shell middens featured well-differentiated stratigraphic packages, formed by *Donax sp.* clam species deposits, as well as a high amount of vertebrate fauna, such as icthyofauna, birds, quelonids, and small mammals (Gassiot Ballbè & Palomar Puebla 2006). In contrast, the Siteiata and Brown Bank shell middens consisted of unstratified *Polymesoda solida* (Clemente Conte *et al.* 2013). The three sites shared two characteristics. First, the middens were clustered in groups of mounds up to 2 m high, which were linked to domestic sites of small independent communities. Second, lithics included *metates* and abundant ceramic fragments were found. In contrast, CFP is an inland site, which was constructed between cal 800/550 BCE and abandoned in cal 400/440 CE. Located on the top of the Cascal hill, its architectural features are spread throughout at least 6 ha (Gassiot Ballbè & Estévez Escalera 2004). The site is comprised of three aligned platforms in south-north direction, more than 3 m high, which were built on a previously leveled terrain. East of these platforms, which featured staired accesses, a 2 ha plaza was surrounded by 18 mounds or platforms of lower sizes. Mounds were built from a combination of basalt blocks and sediment, and one of the lower mounds surrounding the plaza is associated with a spiral petroglyph. The sites of Las Limas and Bella Vista are located within a 5 km radius of CFP (Clemente Conte & Gassiot Ballbè 2004). The first yielded a man-made cluster of 75 columnar basalt monoliths between 1 and 3 m long. Bella Vista features mounds, an anthropomorphic petroglyph, and several monoliths similar to those found at Las Limas. One of these monuments was found in a vertical position, extending 80 cm above ground surface.

It is unclear if the characteristics of the ceramics described in the main publication regarding chronology (Gassiot Ballbè & Palomar Puebla 2006) include the materials from CFP. However, the authors distinguish two different moments. The first occurs between cal 400 and 200 BCE and is marked by the presence of bitroncoconic vessels with marked careens and bowls (Gassiot Ballbè & Palomar Puebla 2006). A small percentage of the ceramics were decorated, featuring fingernail impressions and incised parallel lines. Additionally, Magnus' Pearl Lagoon Polychrome, with its diagnostic red paint on white slip, was found in this context. The second moment, which spanned from cal 200 BCE until cal 200 CE, evinced continuity and discontinuity when compared to the previous moment. On the one hand, it exhibited continuity of vessel shapes and a general scarcity of decoration, specifically the absence of textile-like incised decoration that is common in more recent sites, as well as the presence of polychromes. Discontinuities, on the other hand, included a tendency towards smoothing the careens in vessels shaped as double truncated cones, the appearance of deep plates and griddles in the shape of truncated cones, a higher presence of incisions in more complex forms, appliqués of small conical mammal-like and figurative elements, and impressions on careens. Pastes are very compact and gray, similar to Usulután pastes from northeast Nicaragua, but the quartz temper is coarser in the Caribbean (Gassiot Ballbè & Palomar Puebla 2006).

For CFP, more data regarding ceramic technology is available thanks to Vásquez Moreno's (2016) thesis. According to the author, pastes usually included quartz, iron oxide, and pumice. The main fashioning technique was modelling (65%), followed by coiling (35%). The majority of the surface treatments consisted of smoothing and a combination of smoothing and later slipping of surfaces. Most samples were undecorated (88%), but principal decoration techniques included impressions (with nail and wood), incisions, and red and black paint, as well as appliqué. In general, firing was undertaken in open hearths (88%), and only 12% of the sherds were fired in closed kilns. Vessel shapes included *ollas* (50%), bowls (27%), griddles (11%), and the less common liquid containers.

Period III (cal 500 - 800 CE)

This period is characterized by the absence of coastal sites. Instead, sites were built inland, and they consisted of earthen mounds built as house foundations. At CFP, for example, new structures were built atop older foundations. An unspecified change in pottery styles (Clemente Conte *et al.* 2013) coincides with the levels of burning and abandonment at CFP. No further data is provided for this period.

Period IV (cal 800 - 1500 CE)

During this period, shell middens, located mainly around Bluefields Bay, were comprised of a unique taxon—*Polymesoda solida*—deposited in a single stratum. The particularity of these shell mounds is in their low and extensive shapes, which makes them hard to recognize in the landscape. Except for Rocky Point at Pearl Lagoon, which yielded high densities of both terrestrial and aquatic fauna, the rest of the middens did not feature any vertebrate fauna. The period was defined based on three absolute dates, including one reported by Magnus at Cukra Point.

The ceramics feature characteristics different from the previous periods, specifically regarding surface treatment and decoration. Incised decoration, which corresponds to Magnus' Cukra Point Complex, becomes highly frequent and is mainly comprised of straight lines, sometimes combined with points. Textile-like incisions are characteristic of this period, as well as the application of incised cords. Polychromy disappears, and slipped surfaces are scarce and monochrome. Additionally, there is an increase in the diversity of shapes, marked by the appearance of *tecomates* and the development of necked vessels. Small, conical mammal-like elements are present, as well as supports.

The attempt to construct a chronology through a multidisciplinary approach to material culture might have resulted in negligence towards the ceramics. Except for Vásquez Moreno's Masters thesis (2016), no ceramic data was published. Archaeometric techniques were completely absent, and in spite of the incorporation of Magnus' radiocarbon dates, a discussion that compared and contrasted Magnus's (1974) chronology with the new results is lacking. As a consequence, the result is an unconvincing proposal that applies similar criteria to those used by Magnus (morphological and decorative modes), but employed with less detail and without truly merging the new data with the old. Unfortunately, the data available for the RACCN is very scarce (exceptions are González Hodgson & Taylor Rigby 2012; González Hodgson *et al.* 2009). Ceramic descriptions, mainly focused on surface treatment and decoration, show similarities with the assemblages retrieved at CFP and Karoline.

During the last decade, archaeological research in the RACCS has been led by the Bluefields Indian and Caribbean University (BICU-CIDCA) and the Centro Arqueológico de Documentación e Investigación (CADI, UNAN-Managua). Surface survey succeeded in recording an additional 63 archaeological and historical sites (Byers *et al.* 2014), but ceramic chronological issues or analysis were not addressed in the publication of the results, and references to ceramics are only focused on decorative modes.

2.2.3 ARCHAEOLOGY AND CERAMIC CHRONOLOGY OF CENTRAL NICARAGUA

The first ethnohistorical accounts of Chontales (Fernández de Oviedo y Valdés 1853) referred to the population living east of Lake Cocibolca at the time of the arrival of the Spanish as *chondales*, which is derived from a Nahuatl word for foreigner (*chontali*). These "strangers", labeled as such by the Nicaraos and the Chorotegas, settled in the Pacific coast, also spoke differently, or "wrongly" (van Broekhoven 2002). In spite of this, Fernández de Oviedo described their markets, economic development, and traditions as similar to those of the groups living west of the Lake (Fernández de Oviedo y Valdés 1853). In the 19th century, many travelers and explorers visited the Central Interior Highlands, mainly reporting archaeological remains such as tombs and stone sculpture (Friedrichsthal 1841; Fröbel & Froebel 1859; Boyle 1866; Pim & Seeman 1869; Belt 1874; Habel 1880; Flint 1882; Crawford 1895). Sequeira (1942) conducted non-scientific excavation of burials in the late 1930s. In 1967, the Museo Arqueológico Gregorio Aguilar Barea (MAGAB) was founded in Juigalpa by members of the *Clan Intelectual de Chontales* to provide adequate storage for artifacts collected by local schoolteacher Gregorio Aguilar Barea and his students, as well as donations from local landowners. Nowadays, the museum stores more than one hundred columnar stone sculptures and many complete ceramic and lithic artifacts, as well as thousands of fragments of objects, alongside a collection of taxidermy and more recent historical artifacts.

Scientific archaeological research in Central Nicaragua started with the work of Richard Magnus, who in 1975 launched a research program that aimed to establish the cultural history of both the Chontales and Zelaya departments.[17] In order to fulfill his goals, he excavated 11 different sites using arbitrary metric levels and conducted a modal analysis of the ceramic fragments. Unfortunately, he never concluded his work, and the publication of preliminary results is quite limited (Magnus 1976; 1980b; Cooke 1977; Martínez Somarriba 1977). Moreover, his interpretations were based on relative chronology in relationship to Greater Nicoya types, since no absolute dating of his contexts was undertaken. Therefore, we are left with a very fragmentary dataset and some impressionistic accounts of fieldwork and labwork. Nonetheless, these preliminary ideas are relevant to take into account considering Magnus' previous extensive studies in the Caribbean coast of the country, which provided him with a different perspective than the researchers who came to Chontales after him. In fact, the author was aware of his alternative view, and he warned other researchers about a "Mesoamerican bias", which in his opinion affected all of our interpretations regarding pre-conquest Nicaragua, even the Pacific coast (van Broekhoven 2002).

Brief descriptions of six of the archaeological sites excavated by Magnus are provided by Martínez Somarriba (1977): Lovigüisca, Cerna, Gutiérrez, Copelito, Morales, and Barillas. Excavations at Lovigüisca, a colonial site with the remains of a church, yielded few prehistoric ceramic fragments. Decorated sherds were minimal, in spite of the excavation of 12 2x2 m pits. In contrast, Cerna, located at merely 1 km away, featured one stone mound measuring 20x5 m and 0.5 m height and yielded numerous ceramic fragments from five 2x2 m pits.[18] Many of these sherds were identified as Greater Nicoya ceramics, whereas the few local decorated samples showed cross-hatched incisions. Through ceramic associations to Pacific Nicaragua, Magnus proposed a chronology for the site between 1200 and 1300 CE. The Los Gutiérrez site is located 1.5 km west of Acoyapa, and here Magnus reported 30 mounds of about 2.5 m height and 15 m diameter. He excavated three structures by means of four pits of 2x2 m. He retrieved ceramics, including incised decorations (some with an "8" motif), finer incised decoration around the rims, and random cross-hatched incised lines. Apart from ceramics, he also collected abundant lithic materials, including axes and flint fragments. According to Magnus, this site should also be placed between 1200 and 1300 CE. At Copelito, a site 11 km north of Juigalpa, Magnus recorded 30 mounds of 15 m diameter and up to 2 m height and remarked on the presence of many large rocks on the surface.[19] He excavated one mound with two pits of 2x2m and documented various types of incised ceramics, as well as ceramics decorated with the incised "8" motif. Following his modal approach, he grouped this site together with Los Gutiérrez, between 1200 and 1300

17 The Zelaya department was transformed into the Región Autónoma del Atlántico Norte and Región Autonóma del Atlántico Sur in 1987, which are now the RACCN and RACCS.

18 According to van Broekhoven (2002, 91), this main mound measured 16x8 m and is located on top of a hill that overlooks Acoyapa.

19 In Gorin's later description (Gorin 1990), the site contains 40 mounds.

CE.[20] At Morales, located 1 km east of Copelito, Magnus reported 15 stone mounds, of around 1 m in height and 5 m in diameter. He excavated one mound almost in its entirety, placing six pits of 2x2 m. He found very few fragments of ceramics, most of which were undecorated. At Barillas, 8 km west of Juigalpa, Magnus observed 15 stone mounds of around 5 m in diameter and up to 2.5 m in height. Six 2x2 m pits were placed, three of which were at the center of mounds, yielding very few ceramic fragments. The remaining three excavation units were placed next to mounds. In contrast to the former, these latter three pits provided a substantial ceramic assemblage. The undecorated ceramics resembled those at Lovigüisca, and the presence of a colonial sherd generated doubts about the site's chronology, but its occupation was still placed between 1200 and 1300 CE.[21]

Sabana Grande, located 2.5 km northeast of Juigalpa, was reported with 15 mounds. Magnus excavated two 2x2m pits on one mound; one of the excavation units reached a 1.65 m depth (Espinoza Pérez & Rigat 1994), which is remarkable given that the average depth in the area is 50 cm. In these excavations, Magnus found walls, a stone floor and the remains of a hearth. A combined techno-functional and morphological analysis of the 10816 chipped and ground stone remains found in these excavations was conducted by Andrea Gerstle as part of her Masters thesis research (Gerstle 1976). A radiocarbon date of 730 ±85 CE (I-9098) was retrieved from these excavations (Gerstle 1976).

Even though excavation techniques followed a stratigraphic approach and systematic methodology, the selection of contexts was based on criteria that privileged the amount of ceramic fragments retrieved rather than the construction of a comparable dataset. For example, Magnus contrasted materials from on- and off-mound excavations without providing a detailed stratigraphic model for his units. Therefore, the chronological applications and the potential to generalize based on his preliminary results are very limited. His ceramic analysis concentrated exclusively on decorative styles and did not incorporate decoration techniques as an analytical variable.[22]

Magnus' preliminary ceramic analysis allowed him to identify two different complexes: Copelito and Cerna. Copelito complex was characterized by the combined presence of ceramics and lithics found in excavations. He identified four different monochrome incised types: incised cross-hatched lines, irregular incised lines, the textile motif, and the "8" motif. Also, he classified one type with perforations all over the vessel surface. He identified the painted fragments as probable imports from Pacific Nicaragua, particularly from Rivas-Ometepe, based on the presence of types Mombacho Incised Polychrome, Luna and Papagayo Polychrome. Monochrome zoomorphic adornos depicting turtles and birds were also part of the ceramic assemblage, as well as spindle whorls (*malacates*), and cylindrical seals. Lithic industries included *manos*, *metates*, flint flakes, arrow points, and axes. The Cerna complex, on the other hand, was also characterized by ceramic and lithic fragments but differed from the previous one, especially in its incised types. In particular, this complex featured one monochrome type with parallel lines and another with triangles around the neck. Additionally, the perforated fragments were dissimilar to those from Copelito, since the perforations were narrower and more closely placed.[23] Magnus also reported zoomorphic appliqués and decorations, as well as geometric ornamental patterns. Polychromes in this complex were very poorly preserved, featuring zoomorphic and anthropomorphic supports. These, together with fragments of Las Marías Polychrome, led him to postulate a connection to the Pacific coast. Lithic industries were similar to those of the Copelito complex, but the Cerna complex also featured jade beads and obsidian flakes (Magnus 1980b).

Preliminary conclusions drawn by Magnus indicate that all sites, except for Lovigüisca, which is colonial, yielded ceramics from Greater Nicoya, interpreted as the result of trade. For the site with the most frequency of imported materials, Cerna, Martínez Somarriba proposed a function as a trader's post (Martínez Somarriba 1977, 8). The other sites could not be considered as such because the amount of local ceramics was always higher than the imported ones (van Broekhoven 2002). For Magnus, this representation of imported sherds in the Chontales ceramic assemblages

20 The site was later dated by Gorin (Gorin 1990) to the Monotá phase (1200 - 1550 CE).

21 The site was later dated by Gorin (Gorin 1990, 192) to the Cuapa phase (1400 - 1600 CE).

22 See Chapter 3, section 3.3.1 for an extensive discussion of this approach.

23 As we will discuss later in this chapter, Gorin recognized three different types of colanders: Rodeo colador (Mayales I phase, 500 BCE - 200 CE), Jinocuao colador (Cuisalá phase, 400 - 800 CE), and Combo colador (Monotá phase, 1200 - 1550 CE) (Gorin 1990).

evinced strong commercial ties to the Greater Nicoya, but he found no conclusive evidence of an active and frequent interaction. Consequently, he concluded that cultural development in Central Nicaragua was largely independent of the Pacific watershed (Martínez Somarriba 1977). Interestingly, in his excavations, Magnus did not find any correlation between the Caribbean and Chontales from an archaeological point of view (van Broekhoven 2002).[24] This accordingly led to a search for the location that, due to its different ecological characteristics, could serve as a cultural frontier between the Caribbean and the central area. For that reason, Martínez Somarriba conducted his research in the department of Nueva Guinea, in the low Yolaina cordillera (400 m.a.s.l.), 100 km west of the Caribbean watershed, where the plains of the Caribbean Sea meet the Central Interior Highlands (Martínez Somarriba 1977). Following an ecological-cultural approach, Magnus then considered the Central Interior Highlands as the border between the Caribbean and Chontales, as well as between Nahuatl and Ulua speakers (van Broekhoven 2002).

To enrich his interpretations, Magnus not only based his work on ceramics but also compared his results with other types of material culture. Therefore, he also looked at stone sculpture, which has been a topic of debate in central Nicaraguan archaeology. In 1970, Baudez stated, following Gregorio Aguilar Barea's insights, that the Chontales sculpture had ties to Greater Nicoya because it was found in contexts associated to polychrome ceramics dated from 800 to 1550 CE. Thus, according to Baudez (1970), the region should be considered as a zone of Mesoamerican tradition, part of the Greater Nicoya cultural subarea.[25] However, Richardson (1942) had previously proposed that the stone sculpture had no ties to Mesoamerica but was more connected to Costa Rica and Panama. The study conducted by Thieck (1971) also concluded that the Greater Nicoya sculpture from Zapatera belonged to a different style than that of Chontales. Magnus not only agreed that both the proportions and style of the rock art were different, but also asserted that local incised ceramics were dissimilar to those from the Pacific watershed. For that reason, he proposed that future research in Chontales should focus on studying the development of local ceramic styles (van Broekhoven 2002).

In 1983, Frederick Lange, Payson Sheets and Aníbal Martínez Somarriba visited the MAGAB and five different archaeological sites in Chontales: Las Lajitas, Cerro de la Vaca, Río Apompuá, La Vainilla, and Agua Buena (later identified as Aguas Buenas). Brief descriptions of these sites were included in a later publication (Lange *et al.* 1992, 48-50), which included location, size, number of mounds, state of conservation, previous research conducted at the site, time periods represented, and lithic and ceramic summaries. The chronology of the sites was established by ceramic associations with Greater Nicoya types, the only "diagnostic" given that no typology was previously established. As a result, the authors were able to place La Vainilla within the Early and Middle Polychrome periods of Greater Nicoya, while Las Lajitas and Cerro de la Vaca were ascribed to the Late Polychrome period. Río Apompuá and Agua Buena were not dated through ceramic associations; for the former, they did not collect ceramics, while the latter did not yield any diagnostic types. Overlooking Magnus' suggestion concerning the utility of concentrating on local ceramic industries before making further assumptions, the authors did not mention or describe local ceramics. The lithic industries received more attention, and two clear differences with Pacific Nicaragua were acknowledged: first, the lack of obsidian, and second, the abundance of fine porphyry. Additionally, they reported the use of andesite, basalt, chert, and chalcedony, as well as the presence of bifacial technology at Cerro de la Vaca and Aguas Buenas (Lange *et al.* 1992). Finally, the authors proposed Aguas Buenas as a ceremonial center based on its large number of mounds (>200) and the presence of petroglyphs.

The main goals of the project coordinated by Lange and Sheets consisted of "(...) exploring similarities and differences in the Nicaraguan sites from their southern Mesoamerican and northern Intermediate Area perspectives" (Lange *et al.* 1992, XVIII), with a main focus on answering the question of classifying Pacific Nicaragua as part of Mesoamerica, the Intermediate Area, or a transitional area.

24 In the same book, van Broekhoven mentions that Magnus did find a link between the Caribbean Siteia complex and the Zoned Bichrome (300 BCE - 300 CE). This led him to propose that during the Late Formative period, the whole country was one homogenous cultural area (van Broekhoven 2002). In a way, this idea of a homogenous tradition during the Formative contradicts Magnus' ecological approach.

25 These observations were based on a very brief visit Baudez paid to Juigalpa in the late 1960s and not on a thorough analysis of the stone sculptures (A. Geurds, pers. comm. 2019).

Consequently, their principal objective when visiting sites outside of the Greater Nicoya, such as central Nicaragua, was to evaluate the presence or absence of imported materials from that subarea in order to establish the connections that may have existed between them. Their work in Chontales is a good example of the dominant narratives in Nicaraguan archaeology at the time, where Greater Nicoya ceramics were used to date sites in other regions of the country through ceramic associations, with little focus placed on local traditions and architectural practices, settlement patterns, subsistence strategies, and rock art.

The paragraphs above describe the state of affairs of central Nicaraguan archaeology by the time two French doctoral students from the University of Paris I-Pántheon Sorbonne, Franck Gorin and Dominique Rigat, decided to start their Proyecto Arqueológico Chontales in 1984, under the guidance of their advisor, Claude Baudez. The main aims of their project were to establish a chronology of human occupation of the study region; to define the cultural identity of the pre-conquest populations living between Lake Cocibolca and the Cordillera Chontaleña; and to outline the variable position of the border between the Mesoamerican and South American influence zones through time (Gorin & Rigat 1987). In order to fulfill these goals, Gorin focused on ceramics, while Rigat concentrated his efforts on the lithic industries. The objectives of the project, together with the analytical methodologies that will be discussed below, echo several problematic theoretical assumptions. First is the assertion that through the study of pottery and lithic traditions, it is possible to directly discuss ethnicity. Second is the view of Chontales as a peripheral region in relationship to cultural macroareas. Instead of applying a local-to regional-to macroregional approach, meaning a thorough study of local developments followed by regional, macro and inter regional assessments, the authors chose the inverted approach, using biased macroregional and regional perspectives to interpret local developments.

Intensive fieldwork seasons were conducted between 1984 and 1987, in which five different survey zones covering 42 sq km were explored. Survey methodology combined systematic and unsystematic techniques (Gorin 1990). Alluvial valleys, the mountains of the Cordillera Chontaleña, and the lakeshore were included to encompass the different ecological components of the microregion (Gorin & Rigat 1988; Gorin 1990). However, survey zones were mainly designed along the major rivers (Cuisalá for Zone I, Cuapa for Zone II, and Acoyapa for Zone V, for example) and the lakeshore for Zone V, so a bias towards freshwater sources should be taken into account when examining these authors' datasets and interpretations. This bias was later confirmed to be problematic by Hasegawa (1998), who found additional sites both on the top and the slopes of elevations. In total, Gorin and Rigat identified 103 archaeological sites throughout four zones, since Zone V did not yield any archaeological evidence. After the survey was completed, the team excavated four sites. While El Cóbano (I 14-15) and El Tamarindo (II 12) were tested in 1985,[26] La Pachona (I 43) and San Jacinto (II 26) were excavated in 1986 (Gorin & Rigat 1987). Three types of contexts were included in their research: refuse areas (SS3 at I 14-15, SS1 at I 43, SS1 and SS2 at II 26), areas between mounds (SS1 at II 12, El Tamarindo), and mounds themselves (SS1 and SS2 at I 14-15, SS2 at II 12). Therefore, on- and off-mound contexts were compared.

The assemblage analyzed consisted of more than 100000 fragments of ceramics and more than 70000 pieces of lithics. For ceramics, Gorin selected a methodological approach combining typological and modal classifications with petrographic techniques. He characterized 44 ceramic types and 11 modes. He conducted an exhaustive descriptive study, which remains the only reference dataset for Chontales including thin section petrography, an overview of decoration techniques and vessel morphologies. The ceramic analysis was reinforced by nine radiocarbon dates, of which four were considered for his proposal. He also incorporated detailed stratigraphic analysis, both to explain his choices for taking into account or discarding dates and to show the exact distribution of the types and modes.

Since the authors considered that lithic industries go through transformations over longer periods of time, they decided to build the chronology of the region based on ceramics (Gorin & Rigat 1988; Gorin 1990; Rigat 1992). However, Rigat's lithic analysis was integrated in the chronological proposal (Gorin & Rigat 1987; 1988; Gorin 1990; 1992; Rigat 1992; Rigat & Gorin 1993), as well as other types of objects such as ornaments, *malacates*, and cylindrical seals.

26 El Tamarindo, due to its limited sample size, was not considered for his chronological proposal (Gorin 1990).

Greater Nicoya	Date	Central Nicaragua	Date	Type site
Ometepe	1350-1550 C.E.	Cuapa	1400-1600 C.E.	San Jacinto, Barillas
Sapoá	800-1350 C.E.	Monotá	1200-1500 C.E.	La Pachona
		Potrero	800-1200 C.E.	El Tamarindo
Bagaces	300-800 C.E.	Cuisalá	400-800 C.E.	El Cóbano
Tempisque	500 B.C.E.- 300 C.E.	Mayales II	200 B.C.E.-400 C.E.	La Pachona
		Mayales I	500-200 B.C.E.	La Pachona
Orosí	2000-500 B.C.E.			

Figure 11: Chronology of central Nicaragua as of 2018 (redrawn from Geurds 2013, 148).

Their chronological proposal, based on the presence/absence of types and modes, is comprised of six different phases **(figure 11)**, Mayales I (500 BCE - 200 CE), Mayales II (200 - 400 CE), Cuisalá (400 - 800 CE), and Potrero (800 - 1200 CE), as well as the partially overlapping Monotá (1200 - 1550 CE) and Cuapa (1400 - 1600 CE) (Gorin 1990). Since a detailed account of the phases can be found in the author's publications (Gorin & Rigat 1987; 1988; Gorin 1990; 1992; Rigat 1992; Rigat & Gorin 1993; Espinoza Pérez & Rigat 1994), only a very cursory summary will be provided, complemented by **table 1**.

Mayales I (500 BCE - 200 CE)

Decorated fragments were abundant, varied, and well preserved. Mayales I is the earliest phase in the chronology of Chontales, contemporaneous with the Dinarte phase at Ometepe Island (Haberland 1986).

Sites: La Pachona (I 43), probably Los Andes (excavated by Gregorio Aguilar Barea, materials stored at the MAGAB), and a site near Juigalpa (agricultural school).

Absolute dating: No radiocarbon date available. Chronology determined based on ceramic associations through the presence of type Bocana Incised, dated to 500 BCE within Greater Nicoya and appearing before the types that mark the end of this phase, such as Schettel Incised, Usulután Negative y Rosales Esgrafiado.

Settlement data: No conclusive data, only three sites documented for this phase, apparently population was very low, settled in dispersed locations.

Burials: Signaled by piles of rocks on the surface, burials were located underneath a flat long stone covering urns containing interments (Los Andes).

Relationships with other regions: In Gorin's (1990) opinion, Chontales was not part of Greater Nicoya during this phase, but it had connections with both the Pacific and northeast Caribbean watersheds. During Mayales I, Chontales developed independently but was an intermediary between Greater Nicoya and the Caribbean coast.

Mayales II (200 BCE - 400 CE)

The types identified for Mayales I continue in this phase, but new ones, both local and imported, also appear. Gorin noticed an increase in the import of Usulután Negative and of Greater Nicoya ceramics in general when compared with Mayales I. Additionally, the author mentions the presence of imported types of unknown provenance.

Sites: La Pachona (I 43).

Absolute dating: Two radiocarbon samples dated, considered contaminated, so no absolute date available for this phase.

Settlement data: No conclusive data available. La Pachona was less relevant during this phase than during its latest phase of occupation (Monotá). Low population density spread over dispersed sites.

Burials: No data available.

Lithics: Preference for jasper, chalcedony, and basalt, in decreasing order of importance. Lithic assemblage is comprised of flakes, cores, scrapers,

Chronology	Lab code	Absolute date	Site	Types (decreasing importance)	Comments
500 BCE - 200 CE		N/A	LP	Jobo rouge excisé Bocana zoned incised, Tumbé variety Matanga polychrome Chaguitillo polychrome Rodeo colador Bálsamo á bord souligné Usulután négatif Yaboa Polychrome excisé	Types also present in Mayales II, so Gorin applies presence/absence criteria. Another difference is densities: 1061 sherds in level 9, >4000 in level 8.
200 - 400 CE	GIF-7230 GIF-7229	1190 ±135 CE (SS1, L8) 865 ± 145 CE (SS1, L6)	LP	Jícaro polychrome Coyolito rouge gravé Guarumo incisé et ponctué Schettel incised Bonifacio excisé et gravé Azabache brun-sur-beige Níspero rouge-sur-blanc Rosale gravé en zones, varieté Rosales Charco noir-sur-rouge, varieté Charco Capulín blanc-sur-brun	
400 - 800 CE	GIF-6895 GIF-6896 GIF-7226 GIF-6893	935 ± 140 CE (SS1, L5) 685 ± 150 CE (SS2, L7) 770 ± 145 CE (SS2, L11) 470 ± 135 CE (SS2, L2/3)	El Cóbano El Tamarindo	Zamora incisé Tambor noir et rouge Atalaya rouge-sur-blanc Subasa polychrome Arrayán noir excisé Jinocuao colador Orégano polychrome Carrillo polychrome Chavez blanc-sur-rouge, varieté Chavez Tripode Africa	Gorin marks a hiatus in the sequence, because the Mayales II types are not present at El Cóbano. Lower levels are mixed with the next phase.
800 - 1200 CE	GIF-6894 GIF-7227	810 ± 145 CE (SS1, L2) N/A (SS3, L2)	El Cóbano	Potosí appliqué Castillo gravé Papagayo polychrome, varietés Incisée y Culebra Ometepe rouge incisé Sacasa strié	Continuity of the folllowing types: Zamora incisé, Tambor noir et rouge, Jinocuao colador, and Subasa Polychrome
1200 - 1550 CE	GIF-7228	1485 ± 140 CE (SS1, L1)	El Cóbano LP	Vallejo polychrome, varietés Lazo, Mombacho, Vallejo Patastule a bandes rouges Madeira polychrome Combo colador Carlitos polychrome Pataky polychrome Bramadero polychrome Granada polychrome Luna polychrome	Sacasa strié, Ometepe Incised appear on the previous phase but reach their maximum frequency during Monota. Same happens with Papagayo, but for this type new varieties also appear, such as Papagayo, Mandador, Manta, Alfredo, Pica, Cervantes, Fonseca, and Casares. Types are present in all levels, so a subdivision of the phase was not possible.
1400 - 1600 CE		N/A	San Jacinto	Miragua común Coronado rouge Olumarouge et blanc	

Table 1: Ceramic sequence for Central Nicaragua based on Gorin (1990).

arrow points, axes, mortars, *metates* and *manos* (both of mortars and *metates*). The presence of grinding stones suggested maize agriculture to Gorin and Rigat (1988).

Relationships with other regions: Chontales continued to be independent from Greater Nicoya, but exchange between the two regions intensified. Commercial relationships diversified in general, including the formation of contacts with northeast Costa Rica (jade) and possibly El Salvador.

Cuisalá (400 - 800 CE)

Materials are scarce and poorly preserved. There is a hiatus between the Mayales II and Cuisalá phases, meaning that no context showed a combination of materials from these phases. Therefore, the transition between these two periods is unclear. Even though there is continuity in decoration techniques already present during the previous phase, such as incisions and modelling, Cuisalá features much less variability. Painted ceramics become more elaborate during this

phase but appear in lower frequencies. Imported ceramics are rare, and undecorated and red slipped modes show continuity with the previous phases.
Sites: El Tamarindo (II 12) and El Cóbano (I 12-15), Aguas Buenas (possibly).
Absolute dating: Four radiocarbon dates, one interpreted as contaminated.
Settlement data: El Tamarindo is a 1.6 ha site with 10 to 16 mounds, subcircular shape, 6-30 m diameter, height <1 m. No spatial arrangement is observed; however, one larger mound had two apparent plazas next to it. Communities were small, with six to 12 low habitational platforms, and showed low complexity. Population rates from the previous phase were maintained.
Burials: No data available.
Lithics: Preference (in decreasing order) for chalcedony, jasper, and obsidian. Flake, ground stone, and bifacial industries featured scrapers, hammers, arrow points, axes, *metates* (one decorated, resembling the Guanacaste phase in Costa Rica) and *manos*.
Relationships with other regions: Imported materials from Greater Nicoya and the Caribbean were found. Gorin proposes that Chontales continued its autonomous development during this phase, and relationships with Greater Nicoya seem less relevant during Cuisalá than in preceding phases.

Potrero (800 - 1200 CE)
Materials are abundant and varied but poorly preserved. There is overall continuity between the Cuisalá and Potrero phases, but a rupture was identified in the ceramics. For the first time, imported ceramics comprise 30% of the decorated samples. This is the only phase where a stone sculpture was found in archaeological context.
Sites: El Cóbano, II 15 and possibly I 17, II 12, II 14, II 32, as well as Aguas Buenas.
Absolute dating: Two radiocarbon dates, of which one is contaminated.
Settlement data: El Cóbano features a 1.4 ha site with ten confirmed circular mounds (plus a probable one), placed along an alluvial terrace. Diameters range between 12 and 25 m, with a maximum height of 1.5 m. An empty space between the mounds and the Cuisalá river was interpreted by Gorin as a possible plaza. A fragment of sculpture associated with lithics and ceramics was found at the site, which Rigat understood as a workshop. Settlements experience an increase in size in relationship to the previous phases, with six to 40 habitational platforms adapted to the topography and with an irregular spatial arrangement.
Burials: No available data.
Lithics: Preference for chalcedony, jasper, and basalt (order shows decreasing importance). Similar industries as in the previous phase, with a strong flake industry with a tendency towards retouched microdenticular microflakes. In general, lithic production was abundant and varied during this phase.
Relationships with other regions: An increase in the ceramic types imported from Greater Nicoya and decrease in local decorated types, together with the appearance of *malacates,* suggest to Gorin that the commercial ties with the Pacific coast are so strong by this phase that Chontales should be considered a peripheral area within the Greater Nicoya sphere, with independent local industries.

Monotá (1200 - 1550 CE)
Materials are abundant, varied, and well preserved. The majority of the archaeological artifacts stored at the MAGAB belong to this phase. Undecorated and red slipped local modes do not show transformations from the earliest phase. Aside from two local decorated types, all other decorated ceramic fragments are typical for Greater Nicoya. Gorin does not discard the possibility of a local production of Greater Nicoyan style ceramics. A local ceramic type, Ometepe Red Incised, appears during this phase and is exported in low quantities to the island of Ometepe. The *malacates* are hemispherical in shape.
Sites: 12-13 sites, including La Pachona (I 43), Copelito, and possibly El Tamarindo (II 12).
Absolute dating: A single radiocarbon sample.
Settlement data: La Pachona is a 4 ha site, oriented NE-SW with 27 confirmed mounds plus nine possible additional structures. Mounds are located on slopes, and their shapes are elliptical or ovular; their diameters range between 8 and 40 m. No formal arrangement could be recognized, but there is a significantly large empty space at the center of the site, which could have served as a plaza. In general, sites feature less than 40 low circular mounds (1 m in maximum height, diameter between 8 and 20 m), their surfaces measure approximately 3 ha, and they do not show specific spatial organizations. A larger oval platform-mound (45x15 m) was also found at La Pachona. In contrast to the previous phase, there are more sites, and the surfaces they cover are larger on average.
Burials: 13 interments were excavated at La Pachona and classified into two types. The first type

is represented by only one burial, which is secondary and direct. The second type includes the other twelve burials, which are secondary, indirect, and in urns. A ceramic necklace and a fragment of a gold pendant were found among the artifacts associated to the burials. These mortuary practices are considered by Gorin to be similar to those on Ometepe Island and south of Lake Managua (Nicaraos). Funerary urns were either ovoid or globular and were sometimes covered with pots or plates placed upside down as lids. Cranial deformation was identified, following the same style as that described by Wyss (1983) at San Cristóbal, a site at the shore of Lake Xolotlán.
Lithics: Preference for chalcedony, jasper, and basalt (order shows decreasing importance). Lithic production was abundant and varied; it included flake, bifacial, and ground stone industries, featuring artifacts such as scrapers, arrow points, *metates*, *morteros*, *manos*, and an increased number of axes, which suggest agricultural practices (Gorin & Rigat 1988). Again, decorated *metates* resemble those of Costa Rica, specifically their contemporaries in Bahía Culebra (Pacific coast).
Relationships with other regions: To Gorin, the higher frequency of Greater Nicoya types in the decorated ceramics, as well as the presence of *malacates* and ceramic beads, indicated a Mesoamerican influence. The ceramic ear ornaments suggest connections to El Salvador, while the earrings and *tumbaga* show links to Costa Rica and/or Panama.[27] For Gorin, the Monotá phase evinced a total incorporation of Chontales into Greater Nicoya, with a possible presence of Nahuatl-speaking Nicarao groups. According to Gorin, these Nicarao settlers mixed with the local population, which continued their traditional ways of ceramic manufacture (undecorated and red slipped modes) but formed an elite that encouraged the import of luxurious and/or ritual objects from Greater Nicoya. Nahuatl toponyms throughout Chontales are additional evidence to Gorin of this occupation.[28]

27 *Tumbaga* refers to an alloy of gold and copper.

28 Even though van Broekhoven (2002) agrees with Gorin regarding the existence of Nicarao colonies in Chontales prior to the 15th century, she disagrees with his conclusions about toponyms. For van Broekhoven, transformations of toponyms go hand in hand with sociopolitical developments and should be regarded as such instead of direct evidence for the presence of certain groups.

Cuapa (1400 - 1600 CE)
Last pre-conquest occupation in Chontales. Features decorated and undecorated materials completely different from all previous phases. Also, sherds from the overlapping Monotá phase are rarely found in Cuapa contexts, so exchange between these groups was minimal. The main characteristic of the ceramics in the Cuapa phase is that they are homogeneous and share a very low-quality paste, used for both decorated and undecorated vessels. The poor quality is the result of low temperature firing, which also diminished the quality of conservation. Therefore, the ceramics thresh when put in water. A single colonial sherd was found in a Cuapa context at Barillas.
Sites: Ten sites, including San jacinto (II 26), La Candelaria (I 35), Aguas Buenas, Barillas, El Carmen and Las Lajitas.
Absolute dating: Not available.
Settlement data: In comparison with the previous phases, sites during the Cuapa phase are larger in size (47-300 mounds, up to 6.5 ha) and show clear spatial arrangements, including plazas and aligned platforms. Stone mounds are circular, between 3 and 28 m diameter, with a maximum height of 2m.
Burials: No data available.
Lithics: Preference for chalcedony, jasper, opal, and obsidian (order shows decreasing importance). Lithic production does not seem very developed, but the tendency towards a flake industry is consistent with previous phases. Denticulated flakes, hammers, arrow points, *manos* and *metates* characterize this phase. Also, Rigat (1992) identified what he considered to be a chronological marker for Cuapa: the Cuapa scraper, a multifunctional tool shaped like an orange segment.
Relationships with other regions: The radical differences found in the ceramics, together with the minimum presence of Greater Nicoya types, led Gorin to propose the arrival of a completely different group, one that re-occupied previously abandoned Monotá sites and started new settlements in a progressive manner. These immigrants were well-organized and numerous; for Rigat & Gorin (1993), they probably took advantage of the consequences of the Spanish conquest, which left the Nicaraos of Chontales in crisis after their relationships with the Pacific watershed were severed. The Cuapa phase practitioners were the Chondales described by Oviedo: the foreigners, in the eyes of the Nicaraos. Even though Gorin proposed that the newcomers might have been Matagalpa speakers, part of the Macro-Chibchan language

family, later work conducted by Espinoza Pérez *et al.* (1994) found no connections between this group's material assemblages in the North Interior Highlands with the Cuapa materials from Chontales.

Gorin and Rigat's research methodology had four main problems. First, the chronology of the region was based on only three excavated sites, while the other 100 were left aside. Of course, it would have been impossible for any project to fund the excavation of such large number of sites. However, different excavation techniques, such as shovel testing or coring, would have allowed for the collection of stratigraphically controlled materials. Another option, taking into account the frequent low material densities in some sites, would have been 1x1 m test pits, which are also successful when the objective lies in obtaining reliable stratigraphic columns for building chronological assessments.

Second, even though Gorin applied an adequate analytical approach, it was unsuitable for his dataset. This resulted in a sampling strategy that was not representative of the local ceramic manufacturing traditions. Gorin's efforts in applying type-variety and modal analysis on decorative techniques limited him to a biased 15% of the ceramic assemblage, leaving aside what he named Common Ceramic and Red Slipped modes, which constituted 85% of his collection. Even though the author noted fundamental differences between undecorated ceramics from Chontales in comparison with Rivas-Ometepe and asserted that those variations might be related to differential storage practices and foodways between the two regions, he chose to build the Chontales chronology using decorated materials because they showed more variation through time (Gorin 1990). In this sense, he argued that no relevant transformations were observed in these two local modes throughout his sequence, and he explains this by assuming that potting practices were totally performed by women, who were the protagonists in the relationships between the *chontaleños* and foreign groups (Gorin 1990). Marriage alliances, in Gorin's opinion, explain the discontinuities in imported ceramics and the continuity in local traditions. Leaving aside the gender bias and fully concentrating on his sampling choices, perhaps the variations in these local modes were not found because for Gorin, they resided in decorative styles and techniques only. Perhaps, looking at other variables, such as clay procurement and preparation practices, vessel morphometrical characteristics, and manufacturing techniques, would shed light on this issue.[29] Gorin did incorporate vessel morphological characteristics and measurements. However, the ranges he established for his seven different types of shapes is too broad, grouping together, for example, diameters between 10 and 46 cm, 4 and 34 cm, 10 and 50 cm. He also omitted other relevant variables such as wall thickness.

Third, Gorin's interpretative models, an issue directly connected to his sample strategy and theoretical views, equate ceramics with ethnic groups (van Broekhoven 2002; Geurds *et al.* 2008). This question concerning the relationship between material culture and identity is an ongoing debate (Shennan 1989; Jones 1997; Stark 1998; Mayor 2010), and extensive studies have addressed this issue from a ceramic perspective.[30] Although ethnoarchaeologists have pointed out the stability in pottery shaping techniques, which is directly connected to the transmission of technical knowledge within a community (Gosselain 2000; Gosselain & Livingstone Smith 2005; Wendrich 2013; Roux 2016), decoration techniques, and especially decoration styles, are more variable. This variability is not only diachronic but also synchronic, and its mechanisms of change are much less tied to social groups than shaping techniques. Therefore, changes in decorative styles should not be interpreted as evidence of occupation, influence, or conquest by other groups; more nuanced interpretative models in which different communities of practitioners network, interact, share, and transfer technical knowledge is more in tune with what is observed in the ethnoarchaeological record. Conflict, violence, imposition, conquest, and relationships of power are not necessarily absent, but they cannot be seen as the only explanations. Also, human mobility plays a relevant role in technical transfer, and it does not always mean the conquest of new territories. Boundaries in pre-conquest times were not directly comparable to our Western notion of frontiers, and ceramic decorative styles definitely should not be used as markers for either territorial or ethnolinguistic divisions.

The final issue in Gorin's proposal relates to his dating techniques. Even though he tried to combine absolute dating with relative dating, radiocarbon dates were in fact used to confirm ceramic associations rather than

29 Even though Gorin incorporated thin section petrography into his analytical approach, he only sampled Greater Nicoyan types, preventing the study of local raw material procurement and processing strategies.

30 See Chapter 3 for a more extensive discussion.

to create a baseline for them. Consequently, two of the confirmed dates (SS2 at I 14-15 and SS2 at II12) were taken from excavations on mounds to match ceramic typology and radiocarbon results. Therefore, they date the construction and/or use of the structure, and their stratigraphy does not necessarily represent the best model for chronological interpretations. Discrepancies shown by the confirmed dates of SS1 I 14-15, for example, were not taken into account. In that context, level 2 dated older than level 7; however, this was not interpreted as a possible contamination. The only off-mound excavation considered was the El Tamarindo date (SS2). However, ceramics from this site were not included in the aforementioned analysis. The rest of the dated off-mound samples (SS3 at I 14-15 and SSI at I 43) were interpreted as contaminations. As a result, we are left with six different phases, of which only one (Cuisalá) has three reliable absolute dates. In spite of this, the error margin of two of these dates (>±130 years), all retrieved from mound excavations, could actually place them in Potrero. Therefore, the most solid date for Cuisalá is the one associated to the ceramics from El Tamarindo that were not analyzed. Mayales I and II, as well as the Cuapa phase, have no radiocarbon dates to prove their chronological ascription, while Potrero and Monotá are based on a single date each. Therefore, the proposed sequence is mostly based on the Greater Nicoya sequence, so Gorin's microregional approach is obscured by ceramic associations as the main chronology building tool.

In spite of the issues explained above, when re-reading Gorin's research today, it is possible to interpret relevant technological aspects of the ceramics he excavated. Regarding clay procurement practices, the author undertook thin section petrography. He concluded that all the samples analyzed were comprised of montmorillonite, a type of clay that is abundantly found in vertisols, which are present in the study area. Moreover, inclusions consisted of basic to intermediate volcanic rocks (andesites and basalts), which are also common within the research area. As far as clay preparation, Gorin considered that all inclusions were naturally occurring in the clay outcrops, so they varied according to the extraction locus and not due to tempering practices. Even though his mineralogical study only included his "diagnostic" minority groups, which do not fully represent local technical traditions, it remains the only study of this kind of archaeological ceramics within Chontales.

In 1998, Etsu Hasegawa carried out two weeks of fieldwork in an attempt to start the Proyecto Arqueológico Chontales II. The project had three main goals. First, he aimed to complete the archaeological site map that was initiated by Gorin and Rigat. Second, he intended to conduct excavations at mounded sites to elucidate their dating, function, and cultural relationships. His last objective consisted of analyzing settlement patterns in order to interpret the social structure of pre-conquest societies in Chontales based on their level of complexity, the presence or absence of social classes, and labor specialization (Hasegawa 1998). However, due to "misunderstandings" with the local population, Hasegawa was limited to fulfilling only his first goal. He confirmed four sites previously reported by Gorin (1990) and recorded eight previously unknown sites: Las Lajitas II,[31] Rincón de las Ánimas I, Rincón de las Ánimas II, El Jicaral, Cerro Cuape, sites 1603-1 and 1603-2 situated on Cerro de la Cruz, and San Antonio. Brief descriptions of these sites can be found in an unpublished report (Hasegawa 1998).

Even though Hasegawa's incursion in Central Nicaragua was extremely brief, he was able to detect that Gorin's survey methodology was biased towards permanent freshwater sources, neglecting the tops and slopes of the numerous elevations found throughout the area. In contrast, during his short unsystematic survey, he succeeded in characterizing general differences between the sites located by the riverbanks identified by Gorin (1990), which were permanent habitational settlements, and the sites on the tops and slopes of elevated geomorphological features. This second group was characterized by the presence of a lower number of mounds, which are bigger in size and constructed only with rocks, without the addition of sediment in their filling. Also, the rocks employed for construction are generally of a larger size than those used in the riverbank sites. Surface materials, such as ceramics and lithics, were absent. Since access to freshwater is complicated and there were no surface materials to indicate daily practices, Hasegawa concluded that these sites, which he placed in the Cuapa phase, were not habitational. In contrast, he interpreted them as

31 This site is locally known as El Salto, so Geurds recorded it using the local name (Geurds 2009, 14).

sanctuaries on the top of hills, whose relationship to their contemporaneous riverbank sites should be studied.

In spite of the fact that Hasegawa exclusively used ceramic associations to date his sites—in the cases that featured surface ceramics—his suggestions for future research in Chontales are lucid. To begin with, he recommended a systematic survey beyond the riverbanks to complete our gaps concerning the Amerrisque mountains and the Caribbean watershed. Second, he pointed out the necessity of conducting horizontal excavations of mounds in order to clarify their architectonic style, characteristics, and functions. In particular, he argued in favor of studying the ceramics, lithics, zooarchaeological, and archaeobotanical remains associated to them. Moreover, he proposed to date the sites located on elevations through absolute methods and warned about the need for an intensive and long term project to counteract growing conservation issues (Hasegawa 1998).

In the beginning of the 21st century, Geurds (Leiden University)[32] started an extensive, long-term research program in the area around Juigalpa. In his first fieldwork season, which took place in 2007, he carried out a partial coverage, non-systematic survey in a 105 km^2 area of the Mayales river subbasin, from the city of Juigalpa until Lake Cocibolca. Survey sections around the mouth of the river were avoided due to presumed recent meandering and massive alluvial deposits (A. Geurds, pers. comm. 2019). The main aim of this study was to broaden the dataset on archaeological sites in the area, but also included recording and protecting culture heritage in Chontales, especially in the area around Juigalpa (Geurds *et al.* 2008). In total, 37 archaeological sites were recorded, most of them previously unknown. Brief descriptions of the sites can be found in an unpublished report (Geurds *et al.* 2008). The contribution of this study goes beyond the new available data on pre-conquest settlement choices in the research area. In his brief report, Geurds is the first author to acknowledge the monumentality of certain architectural features in Chontales (Geurds *et al.* 2008, 34). Moreover, even though he recognizes that the work carried out by Gorin (1990) and Rigat (1992) represents the basic available data on ceramics and lithics, he claims that their systematization of the ceramic data in favor of chronological agendas has blinded research from studying the characteristics of ancient communities, their social complexity, and domestic practices. Consequently, he suggests that future excavations should go beyond stratigraphic test pits aimed to establish a chronology and move towards horizontal excavations aimed at clarifying domestic contexts (Geurds *et al.* 2008). Therefore, he proposes a bottom-up approach to study the various settlements and households, the structure and evolution of public spaces, the agricultural systems, the settlement patterns in connection to the local geography, the regional contact infrastructure, and finally the position of Chontales within an interregional context, characterizing its relationships with both the Pacific and Caribbean watersheds. Additionally, he warned about the progressive destruction of archaeological heritage in the area and stressed the need of a protection program.

The second season, carried out in 2009, focused on stone sculpture. The main goals consisted of documenting and characterizing this type of art, as well as an opportunistic survey to record sites with sculptures. Additionally, the project aimed to elucidate macroregional interactions with the Caribbean coast. As a result, the survey area consisted of a triangular zone from the northwest of Juigalpa to the border between Chontales and the RACCS, which included sections between Juigalpa, Cuapa, and Acoyapa. The towns of La Libertad and Santo Domingo (both in Chontales), as well as El Ayote (RACCS), were also incorporated. In total, Geurds recorded nine mounded sites (El Salto, San Jacinto, Babilonia, Aguas Buenas, Las Lajitas, El Despoblado, and Los Andes in Chontales; apart from El Gavilán and Palmira Dos in RACCS), two rock art sites (La Mica petroglyphs in Chontales and La Lagartera in RACCS), as well as a columnar basalt quarry (El Pedregal, in Chontales).[33] Detailed mapping of San Jacinto, the site used by Gorin to define the Cuapa complex, yielded two more mounds than previously recorded, producing a total of 199 structures. Regarding the spatial arrangement of the site, Geurds observed the presence of an extensive plaza (80x60 m), interpreted as a public place. Mapping of Aguas Buenas (Gorin 1990; Lange *et al.* 1992) yielded 513 mounds in total, including both public and residential mounds. This number of mounds surpasses

32 The first season was carried out in collaboration with Laura van Broekhoven and Jorge Zambrana.

33 In this report, Geurds referred to the site El Gavilán as Nawawasito (Geurds 2009, 26); however, later on he renamed it El Gavilán for clarity, as Nawawasito is also the name of the *comarca* in which the site is located.

any other archaeological site known in Nicaragua, but the contemporaneity of the residential mounds with the rest of the complex should be tested (Geurds 2009).[34] El Salto, interpreted by Geurds as a ceremonial center, consists of 19 mounds, including nine circular in the typical Chontales style and ten rectangular platforms. All mounds were built following a line along the northeastern slope of the elevation where the site is located. Various fragments of monoliths were recorded in different sectors of the site. The corresponding residential area of the site is known as Las Lajitas, a site built on a terrace next to the Mayales river, comprised of 58 mounds arranged in a semicircle with circles of rocks located in the periphery. The site of El Gavilán is defined by 42 structures, which combine two quadrangular platforms with 39 circular mounds (some of them very large, up to 30 m of diameter and 4 m height) and one ovular structure. Geurds and his team found 43 fragments of sculptures in the Chontales style directly associated to the quadrangular platforms. For the authors, these structures should be considered non residential architecture; the site could also have served as a peregrination center (Geurds 2009; 2020). Results from this fieldwork season suggest that the characterization of the Chontales style for stone sculpture requires a redefinition, taking into account that its distribution extends beyond the department of Chontales and is also found in the RACCS (Geurds 2009). Also, the author began asking questions about social complexity, attempting to connect public architecture, residential mounds, spatial arrangements, and stone sculpture with site hierarchies. Geurds proposes two different hierarchical levels, with Aguas Buenas, San Jacinto, and El Gavilán at the top. Smaller sites, with low quantities of residential mounds and high densities of public architecture, would comprise the second level of the hierarchy. However, Geurds proposes to move beyond traditional site typologies because in his view, ancient Central Nicaraguan groups followed alternative material expressions, which stressed stone sculpture in contrast to monumental architecture (Geurds 2009).

One of the greatest issues in Chontales-style sculpture is the lack of contextualized finds. With a corpus of approximately 200 statues nowadays located all over the world (Geurds 2011a), architectural and chronological contexts are not available for their study. Therefore, their meaning and function is still unknown. Consequently, the site of El Gavilán was selected for the 2010 and 2011 fieldwork seasons based on its *in situ* statuary. El Gavilán is a mounded site located on a low sloping hilltop immediately north of the intersection between the Siquia river and its tributary, the Nawawas river (Geurds in press). The site is thus part of the Escondido river basin, which is born in the Central Cordillera and flows into the Caribbean sea. Administratively, it is situated within the RACCS and within El Ayote municipal district.

The main goals of this season included topographic mapping of the site, as well as the excavation of 26 stratigraphic shovel tests and one test pit to differentiate habitational and public spaces. Also, the project aimed to establish both absolute and relative chronologies for the site (Geurds 2011a).[35] Apart from that, 3D scanning of all the monoliths found in context was carried out, together with a geophysical survey aimed at identifying raw material outcrops (extrusive volcanic rocks). Finally, a macroscopic analysis of the statues stored at the MAGAB was conducted to create a comparative dataset between El Gavilán and the Chontales statues (Geurds 2011a). Three radiocarbon dates were retrieved from the site (**table 2**).

The site featured 42 mounds, divided in two main categories. The first one consists of 36 low circular earthen mounds, measuring 11 m in diameter and less than 50 cm height. The remaining six structures measure 25 m diameter and up to 2 m height. Construction practices included the use of boulders of up to 50 cm in diameter. Structures 1 and 2, which belong to this second group of mounds, are perfect squares and have steps on their four sides,

34 Mound recording and excavations within the southern sector (what Geurds refers to as the residential mounded area) and the core of Aguas Buenas point to different chronological phases. The southern part, the Lázaro Villegas site (Arteaga 2017), seems to be later than the first construction event of the geometric patterned mound configuration located to the north. However, since this public area was subsequently modified (Auziņa 2018), relationships with this southern site, as well as with Alberto Obando (located 500 m to the west of Aguas Buenas) and the mounded sites within the lots of Sebastián Ríos and Juan Suárez, should be studied. See Chapters 5 and 8 for a thorough discussion of Aguas Buenas, and **Appendix 7** for the site description.

35 Excavations were undertaken on-mound to confirm or discard their function as habitational places (Geurds 2011a, 7).

Sample	Material	Age in BP	Calibrated age
Beta-294642	charcoal	2050 ±30	65 ±85 BCE
Beta-294641	charcoal	1360 ±30	705 ±55 CE
Beat-294640	charcoal	1350 ±30	710 ±70 CE

Table 2: Radiocarbon dates from El Gavilán site (modified from Geurds 2011a, 9).

two very uncommon architectural characteristics for Nicaragua (Geurds in press). Results from these excavations attest that the mounds were built in one single event.

A total of 58 carved and uncarved sculpture specimens were recorded at the site, which feature four different rock types as raw materials. In particular, columnar basalts, ignimbrites, andesites and carbonate rocks were used. The quarries for these raw materials, except for the latter, are found 1.5 to 2 km away from El Gavilán, although these materials were available immediately next to the site. Uncarved megaliths were probably employed as columns. Statues measure up to 5 m in height, with a restricted circumference (<50 cm). Representations are usually anthropomorphic, achieved with techniques such as low relief and incision carving (Geurds 2011a). The sculptures were found in association to Structures 1 and 2, some of them even at the center of the former.

The excavations yielded ceramic and lithic fragments in very low quantities (Geurds 2011a). Ceramics were made with local clays, rich in iron oxide; their state of preservation was poor, and fragments measured less than 5 cm. Decorations such as striations and linear thumb impressions along the rims were observed (Geurds 2011a). Moreover, pieces of burnt clay were found, some of them with log imprints (Geurds 2011b), suggesting the presence of wattle-and-daub walls (Geurds 2011a). The low quantities of ceramic materials should not be interpreted as evidence for temporary campsites because at least a semi-permanent settlement is necessary for maintaining such walls.

In a recent publication, Geurds (2020) proposed to see El Gavilán as a public commemorative regional center, where groups from both up and down river would gather. In particular, the combination of monumental architecture and stone sculpture expresses leadership and communal identity through "(...) the public display of adorned human figures in life-sized stones" instead of emphasizing the exchange of exotics, such as in other regions (Geurds in press). These practices of remembrance created forms of shared identities that were communicated throughout the region.

Following this interest in monumentality and alternative ways of interpreting it, from 2012 until 2014, Geurds shifted his view towards Aguas Buenas and started a research program that involved four different phases of study. First, the site was mapped in detail, using the combination of a differential GPS and a total station, in order to create a digital elevation model of the site's unique design (Geurds & Terpstra 2017; Auziņa 2018). Second, selected man-made mounds were excavated to establish both relative and absolute chronologies, as well as the mounds' functionality in relationship to their morphology and location within the site (Geurds 2012; 2013a; 2014). Additionally, intensive surface survey of the site to define its boundaries (Geurds 2014) and non-systematic collection of diagnostic materials was undertaken (Geurds 2012; 2013a), and petroglyphs within the site were documented (Vlaskamp 2012; Vlaskamp *et al.* 2014; Arteaga 2017). Finally, surface survey focused on preliminary mapping of Aguas Buenas "satellite" sites was conducted in Piedras Grandes I,[36] Copelito I and II, Santa Rita, and Barillas (Geurds 2014). Excavation of four mounds (M1 in 2012, M300 in 2013, M34 and M36 in 2014) was conducted using the quadrant method to expose the profiles of the structures for stratigraphic analysis, preceded by the trench excavation of one mound (M135 in 2011).

The urgent necessity to understand the role of Aguas Buenas, mound construction and use practices, as well as the need to re-define the ceramic chronology of the area, drove Geurds to start a larger scale project in 2014, which continues through the present and is the baseline for this research.

36 Piedras Grandes II was also included in the survey, but high dense vegetation prevented its exploration.