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Places to live: a multidisciplinary approach to Modern Maya Houses in Yucatan, Mexico

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PLACES TO LIVE: A MULTIDISCIPLINARY APPROACH TO MODERN MAYA HOUSES IN YUCATAN, MEXICO

A Dissertation
Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Geography and Anthropology

by
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To my husband Terance L. Winemiller,
your support made it possible.
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ABSTRACT

In 1938, Robert C. Wauchope’s *Modern Maya Houses* provided the first detailed description of traditional rural housing for the Maya area. Until today, no research has attempted to test Wauchope’s idea of cultural continuity observed in Maya domestic architecture from the prehistoric past up to the time of his pioneering study. By examining data from three municipios located in the state of Yucatan, I compared contemporary information about residential areas with that published by Wauchope in 1938. I used an integrated approach to data gathering and analysis, that is, a combination of interviews, questionnaires, archaeological survey, and geographic information methods in order to evaluate the various mechanisms involved in the design and use of domestic areas. My goals were to assess how the Maya define, use and conceptualize domestic areas, and to test the validity of Wauchope’s assumption of cultural continuity in Maya housing from the ancient past to modern times. Survey of thirty-one solares and descriptive statistical analysis provided the raw data for comparison and interpretation. Comparison of essential elements found in Yucatec houses revealed variations in each community. These variations along with the circumstances responsible for them, such as socio-economic, technological, or ideological changes were used to build a model of Maya housing.
CHAPTER 1
AN ALTERNATIVE TO THE STUDY OF MAYA HOUSES

Statement of the Problem

Since the arrival of Francisco de Montejo and his forces in 1527, the Maya of Yucatan have experienced major transformations. The transition from prehistoric patterns of organization to a colonial regimen of forced labor, congregation, and evangelization, and a radical decline of population associated with diseases introduced by the Spaniards caused distress in the Maya’s protective social-cultural system. In the 1930s, Wauchope (1934, 1938) suggested that regardless of the impact of European colonization on the Peninsula, Maya domestic architecture indicated cultural continuity from the prehistoric past to modern times. This idea suggests a marked resilience in one cultural trait in the face of dramatic changes in others, such as economics, ideology, and politics. If so, were the Maya household and domestic architecture unchanging in the face of external change, as Wauchope would have us believe? And, what factors would then be responsible for this continuity?

By addressing the physical and social factors involved in the construction of Maya house plots, my study assesses how the Maya define, use and conceptualize their domestic space, and how their perspective of housing is reflected in the Yucatec cultural landscape. Research goals include the description of the layout, material culture, behavior, perception, and praxis (practices) associated with domestic places; recognition of patterns in the data that facilitate comparison at intra-community and
inter-community levels; and development of a model of contemporary Maya domestic areas that could be temporally and spatially tested.

For my research of Maya domestic places in the Yucatan Peninsula, I used two operational hypotheses. In the first hypothesis, I suggest that if house-plots represent the physical remains of the people, their identity and beliefs, then they will reveal the economic, social, and ideological transformations that have stressed Maya rural tradition. Alternatively, if there is an ideological continuity from prehistoric times through the present and the cultural landscape reflects ideology, then this continuity will be manifested not only in ceremonies and religious beliefs, but also in the material culture, landscape construction, and domestic behavior. Thus modern Maya perceptions of space and place reflect ancient perceptions as well.

My initial assumption was that data would support one of two possible scenarios. In the first, Maya traditional housing is an expression of the cultural and ethnic identity of its inhabitants. In this case, the data would reveal persistence of distinct architectural forms, use of perishable materials in the construction, and great awareness of shape and space. Similarities at both levels of analysis would suggest a undiversified perception in Maya housing regardless of the alternatives offered and the impact of modernization. Continuity is evident spatially and historically. A close relationship would be evident between the kind of environment in which the community is located and the type of construction material used to build houses. Therefore, Wauchope’s suggestion of similarities in house design among Maya communities is still valid today for the Northern Yucatan Peninsula.
In the second scenario, data suggest differences in architectural form, construction materials, design and use of space at both intra and inter community scales. Data sets are spatially and historically heterogenous suggesting a lack of continuity. The Maya are choosing not to live in traditional housing by switching to alternatives offered by the introduction of novel construction materials, state housing policies, fashion or external influences. The impact of modernization is evident and is affecting how the Maya define, use, and understand their domestic surroundings. The relationship between construction material and environment is not existent and Wauchope’s proposition does not apply to contemporary Maya housing in the Peninsula. Next, I will discuss the methods I used and difficulties I faced during the fieldwork phase of this work.

**Research Design**

model of contemporary domestic areas, and relate societal change to the built environment.

Previous research on housing emphasized single perspectives to both data gathering and analysis. Geographers and architects focused on both synchronic and diachronic changes observed in building design and use of domestic space from several areas. Data on the behavior and social relationships of those residing in domestic complexes are rarely found in these studies. Contrastingly, cultural anthropology has provided an extensive corpus of data on those cross-cultural patterns of behavior and social interrelations observed to exist among people who inhabit domestic areas. Nevertheless, most of the ethnographic data is synchronic in nature, and lacking information on the physical context (landscape, buildings, and artifacts) in which human behavior takes place.

Archaeological research on housing focuses on the changes observed in material remains, and their diachronic relevance to the study of culture. Houses are a vital source of information on the nature of settlement patterns particular to prehistoric and historic societies. To overcome the lack of informants, patterns observed on the location, distribution, and chronology of archaeological artifacts are often the source of behavioral inferences. In the last of twenty years, the emergence of ethnoarchaeology, a subdiscipline of archaeology focusing on aspects of contemporary sociocultural behavior from an archaeological perspective, has contributed to the study of houses by incorporating observable data regarding the design and use of artifacts and space. Kramer (1979) suggests that ethnoarchaeologists attempt to systematically define
relationships between behavior and material culture not often explored by ethnologists, and ascertain how certain features of observable behavior might be reflected in the remains archaeologists discover.

My research differs from previous studies on housing by using a multi disciplinary approach to data gathering and analysis to incorporate the theoretical diversity found in previous studies. Following Rathje’s (2001) integrated approach, my research design combines field methods and analytical tools including participant observation, interviews, genealogical data, surveying, artifactual inventory, landscape assessment, aerial photograph interpretation, and geographic information systems. Combination of data sources facilitates an understanding of the behavioral patterns and changes impacting the people who reside in traditional Maya houses and how those changes reflect on the built environment, artifactual inventory, and use of space.

My research focused on a sample of 31 contemporary Maya house-plots (solares) located in the rural landscape of Northern Yucatan. Data on the physical and social composition of the household, distribution of material culture, perceptions and behaviors associated with the domestic environment are used to render a substantive perspective about how the Maya define, use, and understand their domestic surroundings.

To realize the various project goals mentioned above, I carried out a field study program, divided into three operations:

Operation 1. Sample definition (December 2001). Community and ejido maps (ejidos are community-owned land), aerial photographs and statistical information
purchased from the regional office of the National Institute of Geography and Statistics (INEGI) in Merida, Yucatan were used to select communities, define boundaries, and characterize the environment. Community selection was based largely on attributes such as long tradition of Maya settlement, bilingual population, and presence of vernacular architecture. Other criteria such as *milpa* (slash and burn) agricultural subsistence base and a population totaling less than 500 individuals were overlooked in the interest of developing a more diverse sample for the purpose of comparison. Due to budgetary and time constrains, I limited research to the *municipios* (counties) of Chicxulub Pueblo, Tinum, and Dzitas located in the modern state of Yucatan, Mexico (see figure 1.1).

![Figure 1.1. Map of Yucatan showing location of municipios sampled by Wauchope (1938), and revisited by the author in 2002.](image_url)
Not only did Wauchope visit communities in these municipios in 1938, but I was already familiar with these areas and knew the inhabitants from previous anthropological research. The next step was to visit the county cabecera municipal (head of county) and participate in town meetings. Conversations with friends, community members, as well as a dialogue with comisario municipal authorities helped to define a final sample that included two towns (Chicxulub Pueblo and Piste) and two comisariados ejidales (San Felipe Nuevo and Yaxche).1

I used a 12-frame set of aerial photos for the community of Piste to estimate the number of house-lots with traditional houses. The sequence of vertical photographs was taken in March 20, 1994. By observing shadow length and orientation, I determined that the flight most likely occurred between 11:00 A.M. and 1:00 P.M. The photo scale, 1:4000, is recorded on each frame. Photo frames have a 60 percent overlap and individual photographs cover approximately 1.84 square kilometers. I scanned the photographs and then using non-ground control points, I georeferenced individual frames in Geomedia Professional 5.1 and exported out each registered image as a geotiff. Geotiffs were merged into a controlled mosaic2 using ENVI 3.4. The mosaic image was then exported from ENVI into Geomedia and reinserted as a separate layer (see figure 1.2). To identify traditional houses, I used shape, size, and distribution patterns as recognition elements. I also acquired two digital orthophotos that cover the area of Piste and Yaxche. Both orthophotos were assembled from 1:75000 aerial photos dating to February 1998. INEGI orthorectified the original photos using geodesic control points and a digital elevation model.3 I also integrated the orthophotos as a
layer into the GIS environment and used it to vectorize the main highways.

Operation 2. Data collection (January to March 2002).

Once permission was granted by the community members, I gathered ethnographic data by surveying the adults in the household using a combination of questionnaires (see Appendix C), participant observation⁴, and Mayan conversations during in-depth interviews in non-formal settings (see figure 1.3). The comisario ejidal helped me by translating Mayan conversations and also during the mapping process. Interviews were recorded and later transcribed. In-depth interviews provided qualitative data necessary to determine the rules governing decisions about the layout and use of

Figure 1.2. View of geographic information system showing aerial photo mosaic for the town of Piste, Yucatan.
domestic space. Informants were asked to describe their characterization of every space and to self-report space-specific daily activities within the lot and also off the lot. Each house-lot was extensively examined. I used standardized forms to obtain data on the general environment such as house location and orientation, construction and building materials, floor dimensions, height of structures, construction materials, thickness of walls and floor, amount and function of structures (see Appendix C). Data on the physical attributes of the house plan helped to make inferences about the degree of standardization in design. In order to ensure the accuracy of the house-lot data, I videotaped and digitally photographed each dwelling to facilitate data description and analysis. In some instances, research observations were vital to ascertain whether or not informants are doing what they say they are doing.

Figure 1.3. Partial view of the interview context: solar 1, Chicxulub Pueblo.
House plots were mapped using the tape and compass method (see figure 1.4). I used AutoCAD 2000 software to draw floor plans, house arrangements, and use of space. Locational data were collected for every structure, the lot, and the town layout using a Trimble Geoexplorer III global positioning system device. Positional data was recorded in Universal Transverse Mercator (UTM) coordinates. Although, one of the project goals was to surface collect artifacts in every house-lot, this task proved to be time consuming and rather uncomfortable for the lot residents. In order to avoid any conflict that would jeopardize the research, I used detailed video recordings and photographs to accomplish a similar purpose.

*Operation 3: Data analysis (April 2002 to September 2003)*

The next step was to input all the project data into Borland Visual dBase 5.7 and finally into relational databases created using Windows Access 2000. I applied...
differential corrections to locational data sets using base station data from both English Turn, Louisiana, and Edgemont Key, Florida. Then, I plotted locational data in a geographic information system created with Intergraph Geomedia Professional software (see figure 1.5).

Figure 1.5. Geographic information system (GIS) data layers using Intergraph Geomedia. Left, Chicxulub Pueblo street pattern. Right, location of solares surveyed in 2002.

*Ejido* and community maps were scanned, digitized, and used as base-maps for thematic analysis and in the instances where the sample was sufficient for further statistical analysis. Video data was digitally formatted and rendered into .MPG files using Microsystems Dazzle digital video creator 8.0 software. I analyzed video data to inventory the number and location of artifacts/furniture per structure. Data helped to identify household utilization of the domestic environment.

Data were analyzed at two levels: intra-community and inter-community. At the intra-community level, I incorporated information from the house-lots and compared
their morphology and chronology. A GIS was used to query and display quantitative and qualitative data within the house-lot environment. Relational databases were displayed into a vector version of the house-lot map and into raster images such as aerial photos to compare house-lots at the community level. The location and relationship of objects in space also known, as topology is one of the characteristics of a GIS. As a relative measurement, it can be complemented by statistically analyzing locational data (De Mers 1997). My original proposal was to apply spatial statistic to the data recovered. However, my sample size was less than 30 percent, restricting my analysis to the use of descriptive statistics to identify patterns in my data. Finally, I used inter-community analysis to compare data from all communities and to build a community level model.

This dissertation explores the nature of the built environment of rural Yucatan by examining how the Maya define, use and conceptualize their domestic space, and the role it plays in shaping a cultural region. In chapter 2, I introduce anthropological and geographical concepts that were useful for designing my research and analyzing the data. Several lines of research, the scales of study, and data sources essential for the study of households are also submitted. Chapter 3, presents a description of both the physical and cultural landscapes for the state of Yucatan providing a context for a review of previous studies of Maya housing in the area discussed in chapter 4. An account of milpa agriculture as is practiced by the Maya of Northern Yucatan is also included. Chapter 5 presents general observations about the nature of the built environment of rural Yucatan and the role it plays in shaping a cultural region. County and solar (house-lot) data are used to characterize rural houses as well as the material
culture associated with them. In chapter 6, a comparison of the principal elements of Yucatec houses is used to introduce a community model of Maya housing. This model integrates those factors involved in house construction and serves as a basis to evaluate Wauchope’s idea of cultural continuity, to assess the role of “traditional” architecture in mestizo identity and for place and landscape conceptualization.

Appendix A provides a detailed description of every solar surveyed along with a map of each lot. Appendix B contains additional photographs for each house-lot investigated. Finally, questionnaire forms used during the fieldwork portion of my research are presented in Appendix C.

End Notes

1. The Government of Yucatan under article 9 of the Ley Organica de los Municipios del Estado de Yucatan (2002), provides the following settlement categorization:
   a) City, a population center with more than 15,000 inhabitants, availability of public services, hospitals, police, paved streets, municipal offices, market and meat processing facilities, hotels, jail, cemetery, education centers ranging from kinder garden to college, banks, industrial and retailing facilities.
   b) Villa, a population center with more than 8,000 inhabitants, availability of public services, hospitals, police, paved streets, municipal offices, market and meat processing facilities, hotels, jail, cemetery, and education centers ranging from kinder garden to high school.
   c) Town, a population center with more than 3,000 inhabitants, some public services, municipal offices, jail, cemetery, and education centers ranging from kinder garden to elementary school.
   d) Rancheria, a population center with more than 400 inhabitants, an office for the municipal authority, and elementary school.

2. For Avery and Berlin (1992), an air photo mosaic is “an assemblage of two or more overlapping aerial photographs that form a composite view for the total area covered by the individual photographs.” A controlled mosaic is assembled by cutting and putting together the central portions of individual vertical photos to minimize radial displacement. It also needs to be geo-referenced to avoid distortions.

3. Orthophotos Metadata:
   1.F16c65A, scale 1:75,000, February 1998, datum ITRF92, ellipsoid GRS 80; dimensions: 5925 columns, 7024 rows. UTM zone 16; NW corner coordinates 326280
east, 2295420 north; SE corner coordinates 338130 east, 2281372 north; pixel size is 2 meters. Format: raw binary data, 1 byte per pixel
2. F16c65B, scale 1:75,000, February 1998, datum ITRF92, ellipsoid GRS 80; dimensions: 5925 columns, 7024 rows. UTM zone 16; NW corner coordinates 337860 east, 2295310 north; SE corner coordinates 349710 east, 2281262 north; pixel size is 2 meters. Format: raw binary data, 1 byte per pixel.

4. For Zelditch (1962) participant observation includes not one but three methods: a) description of incidents or participant observation; b) learning institutionalized norms and values through informant interviewing; c) documentation of frequency data by sampling of enumeration.
CHAPTER 2

AN INTEGRATED PERSPECTIVE TO THE ORGANIZATION OF DOMESTIC AREAS

For the past 50 years, the study of houses and households has become a major topic in several disciplines such as architecture, geography, anthropology, archaeology, and ethnoarchaeology. Each specialty provides a different perspective for research. The study of residential areas allows us to identify those facts related to the spatial organization of human groups. Methodological and theoretical diversity prompted an increase of research focused on the domestic realm that resulted in a myriad of definitions for domestic group, household, house, residential unit, domestic lot, and activity area. Terms such as household, place, habitus, and landscape, used by researchers in different disciplines, carry different meanings. Revision and standardization is necessary if we are to benefit from an interdisciplinary approach to the study of houses. In this chapter, I introduce both anthropological and geographical concepts commonly used in the study of housing and their practical application to my research.

Anthropology of Households: Morphology, Function, and Material Culture

Wilk et al. (1984: 1-2) suggest that the concept of household conveys multiple meanings. As a cultural construction, household often is confused with family. The two terms are regarded as dependent and interchangeable. However, both concepts should be separated in order to use the household as the unit of observation for cross-cultural comparisons. Scholars frequently make no distinction between the form of households and their functions (Wilk et al. 1984: 1-2). However, an analysis of households should
clearly distinguish between morphology and function. In morphological studies, terms such as lineage, alliance, and family refer to the composition of the household and are based on the development of cyclical kinship relationships. Historically, five types of households have been identified. They include the nuclear family, extended family, augmented family, guesthouse, and individuals. (LeeDecker 1994: 348). Focus on cyclical family relationships instead of their activities limits a morphological approach by considering the household as a social and corporate unit linked by kinship and social ties (Ashmore and Wilk 1988: 3). Therefore, morphological studies do not consider instances where changes in the morphology of the domestic group occurs although the functional group remains the same, or cases in which the morphology of the group remains the same but there are functional modifications in the resident group (Wilk et al. 1984: 2-4).

A functional approach attempts to understand the function or activities of the household. Households are defined as co-resident groups that maintain close economic cooperation and share in the socialization of their offspring (Laslett 1972: 24-25; Quesnel and Lerner 1983: 46; Santley and Hirth 1993a: 3; Wilk and Rathje 1982: 618; Yanagisako 1979: 164-65). The functional approach focuses on the definition of the “domestic” and the complex of activities that it includes. Moreover, this approach examines the sharing of activities as valid criteria to include the individual within the household. Eight specific categories of activities have been identified including: production, distribution, pooling of resources, transmission of goods and rights, consumption, reproduction, collective ceremonies, and co-residency (Alexander 1999: 3-5).
Due to the nature of interrelationship among these activities, household comparison is possible. Households are the smallest units sharing maximal corporate functions. The relationship between activities and household morphology is complex and diachronic, but households are multi-functional and their nature changes cross-culturally (Wilk and Rathje 1982: 618; Wilk et al. 1984: 5-6).

For Yanagisako (1979: 166-68), there are internal and external variables that determine the kind of domestic organization in a society. These variables can induce significant changes in the size and composition of the household. As a result, these developmental cycles may be misinterpreted as particular forms of households. There are demographic factors, such as age at marriage, life expectancy and fertility rate, which affect the composition of households and families in a community. These demographic factors may also impact the economy of the household precipitating changes in the number of dependent offspring, number of working adults, and family work-time (Wilk and Rathje 1982: 631-33; Yanagisako 1979: 166-68). Economic factors, such as the transmission of goods and rights (including bride price, pre or postmortem inheritance, and dowry) are fundamental in determining the structure of the household. Labor is a powerful factor in the configuration of a household. Production activities conducted by distinct households may be functionally related to the social organization of production, labor division by sex and age, wage labor, household cooperation, and inter-household exchange of work (Netting 1982: 654-55; Yanagisako 1979: 169-71).
Other factors such as differential access to wealth, social mobility, and kinship ties also are subordinate economic and social variables that stimulate substantial changes in the structure of the households in a society (Netting 1982: 657-660; Yanagisako 1979: 175-76).

Hirth (1993: 22) suggests two approaches in the assessment of households. Under the first approach, households are stable social units in which change should be understood as development. By way of contrast, in the second approach households are fluid and adaptive, capable of a prompt response to changes in the cultural and natural landscape. The household represents a process more than an institution, an activity group more than the product of cultural regulations with levels of adaptation, consolidation and nucleation (Netting et al. 1984: xviii). In order to contextualize the dynamic of households as a cultural process, the research must rely on a dynamic and humanistic perspective of culture, one that embraces the complexity of human behavior and practice. For Richardson (1989), culture is a complex matter. The multiplicity of anthropological definitions provides an insight into the constant struggle of the discipline to define its subject of study. Following Richardson’s (1989:149) definition of culture as “...what we... humans achieve”, a humanistic and dynamic cultural perspective integrates both public and social constructions, ideational and material phenomena, and moves beyond what people do and share (knowledge), toward an understanding of the human cultural experience.

In summary, the definition of household must broadly consider the cultural and temporal characteristics of the social groups. Although anthropology generally defines
households as synchronic social entities, redefinition is necessary in order to understand behavior and address cultural change (Alexander 1999: 79). I employ a dynamic and humanistic definition of culture in this study to understand housing in Yucatan, Mexico.

Netting (1993) suggests using the term household, not as a subject, but as a verb. The term “householding” then, provides a “workable definition with material implications” providing a link to understanding its ecology and political economy (Alexander 1999: 79). In the archaeological study of households, this approach links material evidence to discrete behavior resulting in an understanding of household activities and their organization (Alexander 1999: 79).

Most of the research in household areas has focused in three lines of research: First, reconnaissance of domestic units aims to identify domestic areas in both prehistoric and historic settlements. Methods employed include survey and architectural identification (based on shape, size, height, orientation, habitability, cost, spatial proximity, and overall number of structures). Other data sources include cultural materials obtained through intensive excavations, ethnographic comparisons and ethnohistoric records. A second line of research is exploration of residential units to verify domestic areas by distinguishing activity areas, that is, locating material culture related to the function and organization of the household. Methods include detailed survey, surface collection, extensive excavations, chemical and functional analysis of soils and floors, as well as ethnographic, ethnohistoric, and ethnoarchaeological comparisons. The third line of research includes the identification of households, to
distinguish both the composition and social reproduction of domestic groups by using
DNA from skeletal remains, ethnographic analogies, epigraphic data, and ethnohistoric
sources (Ochoa 1995).

Ashmore and Wilk (1988:6) identify four areas of investigation in the study of
households including household, co-residential group, dwelling, and house. They
consider the household as a social unit consisting of a group of individuals that share a
maximum amount of activities such as production, consumption, distribution,
transmission of goods, co-residence, and reproduction. As a unit, the household might
have passive members and may or may not be recognized by its members. Household
residence might include one or several dispersed structures. The co-residential group is
a social unit including a group of persons sharing residential space. The co-residential
group is not equivalent to the household considering that its members may not
participate in the activities of the household. Instead, they may belong to a larger
household or not belong at all. Examples of co-residential groups include the menstrual
tent for women, stationary hunting camps, priest’s houses, and men’s houses. Evidence
regarding the activities carried out in separate structures allows for the identification of
co-residential groups. Ashmore and Wilk (1988) define the dwelling as a physical
structure or area in which domestic activities are carried out. Ethnographic data suggest
that a household may inhabit various dwellings or share one residence. Finally, the
house is defined as a dwelling or group of dwellings inhabited by a household. The
house is the elemental level of study. House identification depends on the recognition of
the household, the co-residence group, and the dwelling.
Santley and Hirth (1993a: 5) consider two sources of data necessary for the identification of households, notable the dwelling and the extramural activity areas or dwelling unit. The domestic area determines the distribution and organization of activities including garbage distribution. The design of domestic areas is closely linked to the built environment. It varies depending on the function of temporal and cultural elements such as status, economic activity, developmental cycle of the household, technology, symbolism, and length of occupation (Kent 1993a: 2; Santley and Hirth 1993a: 5). Another source of data is the analysis of the material culture associated with the domestic area. By studying material culture, we can gather information about household structure, status, relationships with other households, and craft specialization. Most material remains are discarded artifacts that have been reused or accumulated. Discarded artifacts yield information about waste management and the type and distribution of household activities (Santley and Hirth 1993a: 5). A dynamic process characterizes the shape and distribution of domestic areas and their material culture. Natural processes (deposition, sedimentation, and weathering) as well as cultural transformations (function of the household, abandonment, and reoccupation of the area) determine the structure of domestic areas and should be considered when studying these places (Manzanilla 1986: 10; Santley and Hirth 1993: 5-6).

In summary, several lines of research were identified in the study of households. Scholars commonly use four areas of study including the household, co-residence, dwelling, and house. Data sources incorporate the dwelling, extramural activity areas or dwelling unit, and the analysis of the material culture associated to the domestic area.
My research integrates both geographical and anthropological data into a multidisciplinary approach to understand housing in Yucatan, Mexico. In the following discussion, I present the geographical perspective to the study of houses as well as the concepts that most relate to it.

**Geography and Housing: Place, Habitus, and Landscape**

The geographical concept of place and the role it plays as a projection of human society is significant in the study of human settlements. Concepts of place and home combine to produce an individual’s conceptualized living space. For Castells (1985: 141), place is a material product closely related to other material products including people. Material products follow social regulations, which are ultimately responsible for the shape, function and significance of place and its elements. Place is defined as the tangible expression of a historical compound determined by a particular human group.

Tuan’s (1997: 4) definition of place also includes an experiential perspective. Places “... are centers of felt value where biological needs, such as those for food, water, rest and procreation, are satisfied.” For Tuan, architectural spaces elaborate human feeling and perception clarifying social roles and relations. Architecture is a key to comprehend reality. Architecture serves as a text for communicating tradition, symbols, rituals, social order, and ideas (Tuan 1997:102, 112). Tuan suggests that conservative peasant societies are characterized by the persistence of distinct architectural forms, use of perishable materials in the construction, and acute awareness of shape and space (Tuan 1997:104).
Hall (1966) considers the shape, function and meaning of place as the result of culture. Place has an important cultural component that allows for its analysis in a similar way to other less tangible aspects of culture. Sutro and Downing (1988) suggest that when considering the cultural content of place, its organization embodies a large symbolic component. This symbolic element of place can be approached through the study of material elements from both inhabited and unpopulated settlements. The study of place then, embodies two scales of investigation, the site and the situation (Sutro and Downing 1988). Questions such as “where is it”, “what is it like”, and “why is it there”, help us to understand the physical and cultural components of place, its relationship with other places, and to define regions. Domestic places are structures that serve as an imprint of the people, their identity, and beliefs in the cultural landscape. Domestic places change over time expressing several cultural perceptions and values. They reflect cultural phenomena such as diffusion, evolution and invention, and contain important information about the past. Domestic places are like historical texts that provide a more accurate account of a society.

Habitus is another important geographic concept applied in my research of domestic places. In the *Dictionary of Human Geography* Johnston, et al. (1995: 240) define habitus as a “way of elucidating the coherence of social life: its systematicity is always partial and precarious -always an achievement, something to be negotiated through social practice rather than imposed through a trans-situational logic- but it is none the less real.” In geography, the concept of habitus has been linked to discussions about human agency and time-space compression of the habitus. The term habitus was
coined by Bourdiu (1990:53) to understand the distinct relationship between thought and action in academics. For Bourdiu, habitus refers to habits socially learned and transmitted. They are “…principles which generate and organi[ze] practices and representations that can be objectively adapted to their outcomes without presupposing a conscious aiming at ends or an express mastery of the operations necessary to obtain them” (Bourdiu 1990:53). Habitus is a second nature in which thought, perception, and action are generally linked to social life. Practical action then, gives rise to thought and feeling but the way humans perceive their world also affects the way they act. Gosden (1999: 124-127), refers to habitus as “…ordinary everyday actions that go unnoticed because they are so common and basic to our lives.” Practical skills, social distinctions, and the perception and use of space are part of the habitus. Habitus is learned at an early age in life and varies as the relationship between the individual and the social group change over time (Gosden 1999: 177). In the study of Maya housing, the concept of habitus is a research parameter used to explore the way individuals learn to perceive and use domestic areas as part of the socialization process. By comparing generational perceptions of housing, I will assess the degree of continuity and change observed and its physical evidence in the built environment.

Landscape is another important geographical concept in the study of domestic areas. The word landscape derives from the Dutch term Landschap which was translated to English as landskip. Originally, the term was used to describe both a district owned by a lord and areas inhabited by a particular group of people. In the Sixteenth century, painters borrowed the concept of landscape to describe paintings
characterized by the use of distanced geometrical images. Landscape was conceptualized both as a map and as a picture (Gosden 1999: 153; Rowntree 1996: 128). Carl O. Sauer’s (1925) essay “The Morphology of Landscape” encouraged the study of landscape as a theme in human geography. He defined landscape as “an area, made up of a distinct association of forms, both physical and cultural” (Sauer 1963: 321). Sauer saw the landscape as an essential source of data on human transformations of the earth. Landscapes could be studied as spatial facts, historically assessed, explicated, and compared to other landscapes with the intent to create a systemic or taxonomic scheme. Therefore, a culture’s landscape is its geographic expression, a regional imprint and a permanent expression of history, aesthetics, meaning, and priorities.

During the period from 1950 to 1970, two main trends developed in the study of landscapes. The first focused on the visible and material details whereas the second concentrated on the cultural perception and visual preferences, sentiments and emotions of the surroundings (Rowntree 1996: 134). Studies regard landscapes as sources of historical information about the development and distribution of technologies and subsistence strategies (Nietschmann 1973). Research focuses on the study of agriculture (Sauer 1952), irrigation techniques (Butzer et al.1985), folk housing (Kniffen 1936, 1965, 1979, 1990), among others. Another perspective is the view of landscapes as material culture, a complex of features made by people. This approach studies landscapes for visual or material data on human occupation and settlement. Emphasis is on barn types, fence architecture, field patterns, and arrangement of outbuildings.
Material culture is used to gather inferences about social values, creation and maintenance of social activities, group boundaries and subsistence strategies (Rowntree 1996: 142-143). Jordan et al. (1994), describes five major themes relevant to cultural geography including landscapes, cultural hearths or cultural origins, dissemination and transmission of cultural attributes from their hearths or cultural diffusion processes, the role and impact of the natural environment in the ontogenesis of culture or cultural ecology, and the identification and analysis of cultural regions.

Rapoport (1990), suggests that the cultural landscape includes the built environment, space, and settings. Settings include a domain with an ongoing system of activities, the result of intentional human activity and culture. Three different features make up the built environment. They are fixed features or the architecture (permanent or perishable), semi-fixed features, including plants, signs, and furniture, and non-fixed features that involve the people, their behavior, and their activities. According to Rapoport’s (1990) analysis, the built environment comprises the organization of four elements including space, time, meaning, and communication. For Rapoport, a thorough understanding of the cultural landscape requires the study of the four elements, their interaction, and relationships. Changes with “modernization” often involve increasing differentiation (and specialization) of settings and consequent changes in the distribution of activities, lifestyle, urban form, choice of housing, and use of open space. In other words, more cues are necessary to communicate effectively. In contrast, small scale or traditional societies have the ability to function with minimal cues because of the homogeneity and rigidity of their behavior.
Rapoport (1969) distinguishes between a grand design tradition and a folk tradition in architecture. Buildings of the grand design tradition are constructed to impress following the criteria of a designer and taste of the patron. By way of contrast, folk tradition buildings are “...the direct and unself-conscious translation into physical form of a culture, its needs and values -as well as the desires, dreams, and passions of a people.” Within folk tradition, Rapoport (1969) identifies four categories namely primitive, vernacular, preindustrial vernacular, and modern vernacular. The first three built forms can be grouped into the tradition of folk, vernacular or popular architecture. They include the majority of the worldwide built environment today (Brown 1999: 10). Primitive architecture has few buildings types that follow a model with minimal individual variations. Structures are built mainly by the dwellers using materials from the surrounding environment. Preindustrial vernacular architecture involves the construction of most dwellings by special building tradesmen such as carpenters and masons although dwellers still are involved in the building and design process. Modern vernacular architecture is the result of specialization of trades and institutionalization (Rapoport 1969). Rapoport (1969) and Upton (1985) describe these types of buildings as rustic and not professionally designed by an elite class.

Gosden (1999) suggests that different cultures would interpret the same landscape in various ways. Therefore, the study of landscapes should focus on the cultural logic and structure of action by which landscapes are perceived and used. Researches should understand “...the practices by means of which actors construct their social world, and simultaneously their own selves and modes of being in the
world...” (Munn 1986: 7). Research should also examine human values and how they are connected to space and place by the things individuals do, where they do them, and their material culture (Gosden 1999: 158).

In summary, cultural geographers regard houses as structures that serve as an imprint of humans, their identity, and beliefs in the cultural landscape. Over time, changes in domestic places will be more likely related to variations in the set of perceptions and values of their residents. Houses reflect cultural phenomena such as diffusion, evolution, and invention, and contain important information about the past. Houses are like historical texts that provide an additional account of a society. Architecture and settlement patterns are crucial cultural traits for my research. Both are aspects of the cultural landscape and provide evidence necessary to understand the relationship between the Maya and their environment. In the course of their history, the Maya produced a readable landscape with a distinctive architecture. Houses are built from the collective memory of their inhabitants reflecting their traditions and their relationship with the physical landscape. Patterns of adaptation, diffusion and change through time are recorded in the cultural landscape.

**Understanding the Built Environment and Use of Space**

Folk or vernacular houses are important to cultural geographers to define formal cultural regions. Holdsworth (1993: 95) notes that interest in the house as a geographic form increased in the last 100 years. By offering an alternative to the quantitative approach, F. Kniffen’s (1965) Presidential Address to the Association of American Geographers entitled “Folk Housing, Key to Diffusion” was a keystone moment to cultural and human geography. For Kniffen (1979:60), “folk houses were... closer to the earth, and closer to the people and ...purer in form.” In his study of Louisiana folk housing, Kniffen found that folk architecture presented a broad perspective of society by creating a unique cultural landscape.

The geometric approach to housing was initially devised by Kniffen (1936) in his paper “Louisiana House Types.” For Glassie (1975), the geometry of the house or form effectively communicates several cultural meanings. Construction materials, methods, and other patterns are related to the natural environment and should be considered to avoid an environmental deterministic approach. For Kniffen (1936), the geometric perspective involves the development of a set of form classes that served as one component in the regional differentiation of culture in Louisiana. In time, Kniffen (1990) determined routes of diffusion and the origin of different house forms by using form classes and the regions identified. A base module or “initial occupance” was a useful concept that helped to define cultural hearths or source areas from which the initial house forms diffused and evolved elsewhere into a variety of forms (Brown 1999: 17-18). Through the identification of source areas and folk regions, Kniffen read behavioral patterns such as diffusion and adaptation and determined cultural regions. Among those
who followed Kniffen’s research were Lewis’ (1970, 1975) who studied housing in New Castle, Delaware, and Maysville, Kentucky, Noble’s (1984) research of houses and barn types in North America, and Jakle et al. (1989) examination of common houses from 20 small towns from the Atlantic seashore to the Mississippi Valley. Kniffen’s idea of diffusion offered a different alternative from that of Hägerstrand (Holdsworth 1993). Hägerstrand’s (1967) concept of diffusion focus on sharper categories including information and innovation ignoring what he regards as “vague” topics such as folk housing. Nevertheless, Holdsworth (1993) argues that the tradition of house-as-key-to diffusion in cultural geography emphasized form and type without considering social and economic aspects of housing. He suggests that geography needs to reevaluate the study of houses and move from a house-type geography toward an approach that examines the social meaning of property, tensions in class-segmented societies, unusual and invisible housing, among other topics.⁴ Holdsworth (1993: 105) considers the study of house diffusion “... not a question of simply placing arrows on a broad map, but rather of a careful reconstruction of information...” For Schlereth (1990: 8) and Prown (1988: 19-22) the advantages of studying folk houses and their material culture are evidential precedence, temporal tenacity, three-dimensionality, wider representativeness, and effective understanding.

Another important contribution to the study of houses derives from the realm of folklore. In his study of Middle Virginia folk housing, Glassie (1975:12) concludes that folk houses are a more democratic representation of history than written documents. He notes that folk architecture is more closely related to the culture of the majority of the
people’s life. Both Glassie (1975) and Edwards (1997) use a structuralist approach to the study of domestic architecture. In the study of material culture, structuralism seeks to find the meaning of artifacts in order to elucidate mental patterns or structures. These mental structures consist of binary oppositions that represent universal characteristics of human thought. The structuralist approach to domestic areas focuses on the identification of cognitive geometric patterns in housing, similar to the linguistic study of rule-governed grammars or syntax. Combination of geometric patterns defines tradition in folk architecture. Form classes are three-dimensional geometric shapes that persist over time and over a large geographic area. Form classes are external expressions of culture that display social-symbolic meaning. Plan types are two-dimensional and define both the geometry of different spaces and the accepted order that these spaces may take within any building. Plan types are internal expressions linked to the proxemic and communicate a covert message typical of ethnic or traditional groups (Edwards 1997). A base module refers to the simplest spatial unit that can stand-alone. Base modules are similar to traditions. Internal expansion of the base module consists of the addition of rooms or other spaces to the floor plan. External expansion includes the addition of floors and or appendages to the dwelling.

An example of the use of the structuralist and geometric approaches is Brown’s (1999) study of folk housing in northeastern Mexico. In his research, Brown suggests that unconscious mental templates from numerous sociocultural manifestations can generate patterns of cultural behavior including built forms. By identifying patterns in folk architecture, Brown’s ultimate goal is to define a culturogeographic area.
Wilk’s (1993) study of Kekchi Maya housing in Southern Belize provides an economic anthropology perspective to the study of domestic places. He examines the social value of houses in Kekchi culture and the impact of a diversified economy on social relationships. Wilk defines the built environment as the product of people’s consumption decisions. His approach focuses on the performance of the people and the processes by which the Kekchi balance diverse options. Housing is a significant category in many societies. Decisions about housing are linked to many other kind of choices, pragmatic and other. Wilk suggests that the amount of effort devoted to construction, and the shape and form of the built environment are the result of allocation decisions, choices that are conventionally considered to fall within the realm of consumer decision-making. He suggests that in order to understand housing decision-making, researches need to give a closer look to the relationships of people within the household and among different households, as well as to larger social entities such as lineages and the community. The process of allocation and distribution of resources within the household is critical for understanding housing as social and cultural stages.

The Kekchi frequently moved their house sites as relationships with kin and other villagers change. A location is used an average of 6.1 years before its abandonment. House location and orientation are acute indicators of the state of relations among households. People on good terms with one another tend to live closer to each other. Although households vary greatly in their wealth and status within the community, the uniformity of housing expresses the prevalent ideology of equality, communal land tenure, and conventions of ethnic identity that sets boundaries for the broader cultural
conceptualization of the Kekchi as a nation (Wilk 1993:37). Wilk (1993: 39), suggests that the shift from a subsistence farming economy to a cash-based economy is affecting Kekchi housing in some communities. Changes include the substitution of natural gathered materials by purchased ones such as using cut boards for walls, corrugated metal instead of thatch for ceilings, and concrete instead of dirt floors. Cash cropping, marijuana farming, and casual wage labor are elements of the cash economy inducing change in domestic architecture and the economic/ecological unity and corporateness of the community.

Rathje’s (2001), “integrated approach” represents a new venue on the archaeology of contemporary material culture. Beginning in 1973, Rathje’s still ongoing “garbage project” served as an inspiration for other scholars, such as Gould and Schiffer (1981). As Rathje (1979:2, 1981:52) declared, “archaeology can no longer be defined either by digging or a concern for old data, but is.... a focus on the interaction between material culture and human behavior, regardless of time or space.” For Rathje (2001), an integrated perspective offers a way to measure behavior, record different sets of data, and incorporate a new dimension in research by focusing on the understanding of behavioral change. He suggests that interview-surveys or observations of participants do not provide sufficient data to describe, analyze and understand the behavior and evolution of social systems. For Rathje, a thorough understanding of cultural behavior and change requires the combination of traditional ethnographic techniques with the analysis and interpretation of material culture. He proposes a research model to elucidate behavioral components by reconstructing six
distinct aspects of culture including perception elements, behavioral elements, and material traces. Perception elements are general cultural norms and values reported by informants, as well as the informants’ perception of the actual behavior resulting from these cultural rules. Behavioral elements are records of direct observation of cultural behavior and common behavioral concepts such as income level and ethnicity, used to initially sort people based on the types of shared behavior. Material traces include quantitative data procured by standard procedures of material culture and its remains in particular localities, and the general environment (natural, social, and economic) in which human behavior develops.

In summary, an integrated model of data gathering and analysis provides an adequate way to assess the various mechanisms involved in the perception of domestic landscapes. Household, habitus, and landscape are useful concepts for research design, data gathering, and hypothesis testing. Culture is integrated and dynamic. Therefore changes in one aspect of a society will cause changes in others. The Maya are not isolated and the changes impacting Mexico as a nation are affecting them too. My research on Maya housing employs an integrated perspective to material culture studies and behavior change. Combination of diverse data allows for the assessment of those agents responsible for Maya identity and how they are apparent in the cultural landscape. The notion of cultural integration is the most important for my study. This paper examines the degree of integration observed in domestic environments such as the effects of modernization in house design and construction materials, the attitudes of younger Maya toward folk housing, and the national policies on development directly
affecting rural architecture. Combination of data allow for the introduction of a fresh approach in the study of houses and access to a different database which may enhance a discipline’s pre-existing one. In the next chapter, I discuss the physical and cultural geography for the state of Yucatan, Mexico in order to provide a context for both a review of previous studies of Maya housing and to my own research.

**End Notes**

1. Nuclear families include a man and wife, and their offspring. An extended family consists of two or more nuclear families linked by kinship ties; an augmented family refers to one nuclear or extended family plus other individuals such as servants, retirees, or renters. The individual is one who lives single.

2. Production refers to the procurement of resources necessary for the household survival; distribution is the process of moving resources from producers to consumers; transmission is a particular form of distribution and refers to the transfer of rights, roles, land, and property between generations; finally, reproduction consists of the rearing and socialization of the offspring. Domestic functions are the middle point between the extensive socioeconomic realm and the size and composition of the household *per se* (Wilk and Rathje 1982: 621).

3. For Yapa (1996: 231) “...spatial diffusion refers to the spread of a new item over a large area through time, starting from a few locations”. In cultural geography, diffusion focus on the spatial spread of learned ideas, innovations, and attitudes (Jordan et al.1994: 14).

4. There is a connection between the receptivity of certain kinds of innovations and the practice of culture (Yapa 1996: 250-51).
CHAPTER 3
THE PHYSICAL AND CULTURAL LANDSCAPE OF THE STUDY AREA

Wauchope (1938) proposed that traditional Maya housing was determined by particular environmental conditions evident in construction materials and ground plans. Variations in housing may be the result of cultural adaptations to the environment. Different environmental niches may trigger particular adaptative strategies that shaped Maya housing. These strategies may include the selection of local or non-local construction materials, the use of specific floor plans (e.g. square, round, oval, rectangular), the number of units in the house-lot, among others. Previous research has demonstrated that when a group of Yucatec Maya migrated to another area they modified their new homeland by employing traditional housing strategies and introducing formerly known crops. In this study, houses are considered an adaptive strategy to the environmental conditions particular to an area. My research on modern Maya housing aims to identify the different strategies used in the design and use of domestic areas. In order to assess how the Maya apply their environmental knowledge in the design and use of their domestic areas an understanding of both the physical and cultural geography of the study area is provided in this chapter. A description of both the physical and cultural landscapes provide a context for both a review of previous studies of Maya housing and to my own research. Next, I briefly describe the main aspects of milpa agriculture, the most significant economic activity of those communities where I gathered data.
Physical Geography of the Study Area

The area of study for this paper included the municipios of Chicxulub Pueblo, Tinum, and Yaxche, located in the modern state of Yucatan, Mexico (Figure 3.1). The Maya also reside in other states such as Campeche, Chiapas, and Quintana Roo, Mexico, as well as other countries including Belize, Guatemala, Honduras, and El Salvador. West and Augelli (1966) described the peninsula as part of the “Antillean Foreland.”

Figure 3.1. Map of the state of Yucatan showing municipal (county) boundaries.

Most of the peninsular surface might be characterized as a karst limestone solution surface having red soils derived from limestone (West 1964). Soils in northern Yucatan are dominated by kaolinite. Kaolinitic soils occur in relatively well-drained areas
experiencing moderate rainfall. In pockets where drainage is poor, such as large basins, soils contain high levels of montmorillonite (Schultz et al. 1971). Both soil types are red in color due to the presence of iron. In some areas the soil has turned dark red through oxidation of organic materials. The oxidation process occurs more rapidly in areas where the Maya have burned fields for *milpa* agriculture. The resultant exposure accelerates the oxidation process. In northern Yucatan, a hardened and discolored surface layer of limestone covers an altered, softer, usually friable and nearly pure calcium carbonate material known as *sascab* (Figure 3.2)

![Geology of the Yucatan Peninsula](image)

Figure 3.2. Geology of the Yucatan Peninsula. Data from INEGI Carta geologica 1:1 000 000.

This subsurface zone extends to depths ranging from 50 centimeters to several meters (Wilson 1980: 11). The formation of *sascab* deposits is brought about by the
disintegration of surrounding limestone by weathering (Littman 1958: 175-176). The
most prominent structure in the region is the Ticul Fault and associated Sierrita de Ticul
escarpment, which trends N60W for about 200 km (Figure 3.3).

Movement on the fault has probably been sporadic since the Late Cretaceous. 
Sierrita de Ticul is a series of hills, forming an arcuate ridge with a relief of nearly 50 m
(West 1976a). The Sierrita marks the boundary between the level Yucatan Plain to the
north and the hilly Campeche region to the south, characterized by folded Eocene
limestone rows of linear ridges (an area known as the Puuc) and swampy swales in the
south east that follow a northeast to southwest trending fault pattern.

Figure 3.3. Shaded Relief with Height as Color for the Yucatan Peninsula 
showing The Sierrita de Ticul or Puuc Hills (C-Band Interferometric Radar). 
From Shuttle Radar Topography Mission (SRTM) JPL (February 11, 2000)
Near Campeche, the ridges rise to 350 meters (West 1976a; Wilson 1980). In the northern half of the peninsula, there are no surface streams. Instead, rainwater percolates through the surface rock forming underground streams. Solution features predominate in the landscape of Yucatan. Funnel-shaped dry sinkholes called “dolines” are named *reholladas* by the local inhabitants. The base of *reholladas* descends 20 to 30 meters below the surrounding terrain. Deep rich soils build up in these features as weathered limestone and organic deposits are transported to the base by rainfall runoff. “Collapsed dolines” and “solution shafts,” in Yucatan are collectively referred to as *cenotes* (Stringfield and LeGrand 1974). The former funnel-shaped and the latter vertical walled circular features plunge beneath the groundwater level. In some instances, access to underground lakes is provided by partially collapsed surface rock.

In the eastern and western coastal plains, *aguadas* (lakes), *sartenejas* (small surface pools in the weathered and exposed limestone bedrock) can be found. South and southwest of the *Sierrita de Ticul*, *aguadas*, caverns, chambers, and underground streams and lakes are common (Stringfield and LeGrand 1974). Seasonality of rainfall, with dry season values nearing zero in some areas of Yucatan, causes near desert-like conditions and increases localized disparities between annual water consumption and rainfall. Much of the vegetal coverage is defoliated during the dry season (Stringfield and LeGrand 1974; Wilson 1980). The Yucatan altitude is the main factor determining regional climates (Figures 3.4, 3.5, and 3.6).
Figure 3.4. Climate zones identified for Yucatan. Data from INEGI Carta de climas 1:1 000 000.

Figure 3.5 Annual mean temperatures for Yucatan in degrees centigrade. Data from INEGI Carta de temperatura media anual 1: 1 000 000.
Figure 3.6. Annual mean rainfall for Yucatan. Data from INEGI Carta de precipitacion total anual 1: 1 000 000

Under the Köppen climate classification system, the majority of the study area is designated as Tropical Savanna (Aw) or Tropical Wet-and-Dry, with the driest month rainfall totaling less than 60 millimeters. The extreme northwestern coast of Yucatan is Semi-Arid type (Bs), having less than 500 millimeters of annual rainfall with high evaporation levels (Wilson 1980). Vegetation coverage is highly influenced by cultural activity (Figure 3.7). The slash-and-burn agricultural practices of the Maya have impacted native vegetation coverage throughout Yucatan. According to West (1976b), more than one-half of Yucatan has a shrub and tree profile belonging to the dry-evergreen-formation series as noted by Beard (1955).
Within the zone of dry-evergreen-formation the general vegetation coverage changes from “dry rain forest” to “evergreen bush land” as you move northward. Much of the northern area is dominated by low scrub forests interspersed with open patches of palmetto and mixed grasses. Along the coasts, Beard’s (1955) swamp series predominates in estuary settings. A transition between the dry-evergreen-formation, and a tropical-rainforest-formation begins at Campeche on the southwestern coast of Yucatan and extends northeastward to the coast north of Cozumel Island. Tropical forests have canopies reaching approximately 60 meters above the forest floor. Trees of the rainforest include mahogany, breadnut (ramón), rubber, sapodilla, palms, and the ceibas. There is a rich diversity of fauna in the region. Deer and peccary abound in
Yucatan. Spider monkeys, ocellated turkey, curassow (*Crax rubra*), guan (**Oreophasis derbianus**), and few jaguars still are hunted on the region.

**Human Geography**

**The Maya and the Spanish Conquest of Yucatan**

The Maya population has endured several transitions since the arrival of Francisco de Montejo and his forces on the Peninsula in 1527. During the Sixteenth century, the Maya political geography of northern Yucatan consisted of sixteen subdivisions or independent jurisdictions (Roys 1957). Towns laid scattered along these jurisdictions and their inhabitants seem to have considered themselves a single people. Each of these divisions was known as *cuchcabal* translated by the Spaniards as province (Roys 1939; Scholes and Adams 1938). A governor or *batab* ruled each province. Conflicts were common among the various jurisdictions. The fragmented state of political division along with a Maya view of time as cyclical, where history and prophecy were intertwined in recurring patterns of invasions and alliances, facilitated the conquest of Yucatan by Spanish invaders. By the beginning of the Sixteenth century, the discovery of Yucatan presented the Spaniards with a new horizon for expansion. Yucatan was something new and unknown, which offered fortune to those who adventured in its conquest. Along with illusions of acquisition of untold wealth, the conquerors were best at converting souls. Three expeditions were financed by Velazquez, the governor of Cuba. The first expedition in 1517 was commanded by Francisco Hernandez de Cordoba. In his report, Hernandez de Cordoba wrote that the land was rich in gold and occupied by people of high culture. In 1518 Velazquez sent
his captain Juan de Grijalva on a second expedition to Yucatan. This voyage established a route following the Gulf Coast to the Panuco province in Veracruz. Grijalva again reported that the land had towns rich with gold, cotton, and corn. A third expedition under the command of Hernan Cortez was organized in 1519. Cortez’s goals were to occupy the region and recover as much wealth as possible. Cortez and Velazquez intended to subjugate the indigenous population through religion conversions and war (Ancona 1889; Chamberlain 1974; Lizana 1893; Lopez Cogolludo 1957; Molina Solis 1904). The third expedition provided valuable contacts and accurate news about the economic, political and social reality of the Peninsula. At this time, the Spanish Crown transferred the government of the lands discovered by Hernandez de Cordoba to Velazquez who had not reported Grijalva’s discoveries. The dispute centering on governance of New Spain kept Cortez and Velazquez preoccupied. Yucatan was forgotten for a while. Indeed, Velazquez had jurisdiction over the Yucatan region, but never made it effective. Therefore, King Carlos V gave the right of colonization to the Almirante of Flandes. However, Spanish citizens were jealous of the crown rights and never allowed colonization to take place (Gonzalez Cicero 1978; Zavala 1964).

In 1526, Francisco de Montejo (known as the Adelantado) attempted the conquest and occupation of the Yucatan Peninsula. The king granted Montejo authority over the Peninsula under certain conditions: First, the funds for the endeavor would be entirely provided by Montejo. Second, in less than a year, he would depart from Spain and seat two fortresses and two towns, each with at least 100 men. Additionally, Montejo would be entitled for life as governor and general captain of Yucatan with a
yearly salary of 250,000 maravedies. The king also awarded him with land, two fortresses, the right to keep four percent of the income obtained in Yucatan, the exception to pay taxes, and a license to carry with him any kind of domestic animals. Regarding the population, the king required that the new settlers were in charge of the evangelization of the *naturales* (inhabitants) until the churches and monasteries were founded (Chamberlain 1974; Gonzalez Cicero 1978; Zavala 1964).

The conquest of Yucatan was accomplished with the help of Montejo’ son (known as Francisco de Montejo the Younger), and nephew (known as Francisco de Montejo the Nephew). From 1517 and until 1545, Montejo established alliances with Maya governors of the east. Chetumal city was founded and Montejo marched to Campeche. After the establishment of Salamanca de Campeche on February of 1541, Montejo the Younger decided to secure the northwest coast and founded the city of Merida, on January 6, 1542. From this city, Montejo the Younger and Montejo the Nephew conquered the remaining provinces and seated more Spanish towns. Valladolid was established on March 24, 1542, and Salamanca de Bacalar in 1545. By the end of the campaign, the Yucatan Peninsula was divided into four jurisdictions: San Francisco de Campeche, Merida, Valladolid, and Salamanca de Bacalar (Chamberlain 1974). The new settlers instituted the *encomienda* as basis for their economic support (Molina Solis 1904; Zavala 1964). Haring (1990) describes the *encomienda* institution as a written contract by which lots of fifty, hundred or more *naturales* were distributed among the Spaniards settlers to work in their ranches, farms, or gold mines. The Spanish *encomendero* payed a minimum wage to the missionaries to support the
evangelization endeavor (Farris 1998). The result was the unification of prehistoric and colonial ideas into a new syncretized belief structure.

The transition from a prehistoric pattern of organization to a colonial regimen of forced labor, relocation, and evangelization, and a dramatic fall of population due to diseases introduced by the Spanish characterized most of the Seventeenth and Eighteenth centuries (De Vos 1998: 495-505). The Nineteenth century witnessed the impact of the Mexican war for Independence resulting in changes and a new way of life for the Yucatec Maya. Emancipation and modernization brought new experiences to their world. First, the Maya were driven from their land, their primary source of subsistence. *Henequen haciendas* (see Kirk 1982 for a detail description of the Yucatec hacienda) pressed the rural population into proletarian forced labor followed by consequent division of the Maya socio-cultural world (De Vos 1998: 495-505). From 1847 and until 1955, indigenous communities resisted the neocolonial regimen resulting in a violent confrontation known as The Caste War. Fragmentation occurred in the Maya systems of belief as well. After the Mexican revolution of 1910, Yucatan slowly incorporated the expropriated hacienda lands. By 1927, 600 *haciendas* still remained on the Peninsula. In the 1930s, President Lazaro Cardenas expropriated all remaining hacienda lands and redistributed them to peasants creating *ejidos*. For Whetten (1948) *ejidos* are areas of land communally owned by a group of people known as *ejidatarios*. The purpose of the *ejido* was the non-commercial and small-scale production of agricultural products, mainly for private commerce or consumption. Originally, *ejidos* could not be sold, rented or used as collateral. Only the register resident *ejidatarios*
could work on them (Chavez 1995). The *ejido* was divided into three different areas (Konstant 1997). The first was the *lote urbano* consisting of approximately a 50 by 50 meters area for houses and gardens, the second area was the *parcela agricola* where individuals *ejidatarios* cultivate their products, and finally communal areas kept for forestry or grazing. All *ejidos* had the same fundamental structural and functional elements consisting mainly of Authorities, *ejidatarios* and General Assemblies.¹

In 1992, another significant event impacted the history of Yucatan, a reform to Article 27 of the Mexican Constitution. After the country’s economic decline, precipitated by the oil crisis and international debt of the 1980s, the United States loaned money and credit to Mexico resulting in tight economic ties. President Carlos Salinas de Gortari decided that an important step toward modernization was the privatization and commercialization of the *ejido* by which *ejidatarios* would be able to sell, buy or rent land, and to legally hire laborers (Hull 2004). This reform would ultimately help the country’s economy providing support to the North American Free Trade Agreement (NAFTA) in 1994.² However, remnants of the *ejido* structure still endure throughout Yucatan.

**Yucatan Today**

Bounded by the *Puuc* hills, forest, swamps, and the sea, the Yucatan Peninsula was isolated, from the rest of the Mexican nation, until not long ago. This isolation served to maintain a few cultural expressions such as language, indigenous clothing, dances, and festivities. *Yucatec*, a dialect of the *Mayan* language, is spoken by less than one half of the modern rural population (Press 1975).
A German ethnographer, O. Stoll, correctly identified the *Mayan* language family in 1884. This family, with 31 languages and nearly 3,500,000 speakers, is the most diversified and populous language family of Mesoamerica (Campbell and Kaufman 1985: 187). As the geography of *Mayan* suggests, people speaking the 31 known languages have been in contact with each other for many centuries. Linguists generally recognize five major subgroups of *Mayan*: *Huastecan*, *Yucatecan*, Eastern *Mayan*, Greater *Kanjobalan*, and Greater *Tzeltalan* (Campbell and Kaufman 1985: 188-189).

Prior to 2000 BC, near the end of the archaic period, a single *Mayan* language existed, *Proto-Mayan* (Campbell 1997, 1985; Fox 1978; Kaufman 1976, 1978; Kaufman and Norman 1985; Norman and Campbell 1978), perhaps located in the western Guatemalan Highlands. Around 2200 BC, *Huastecan* and *Yucatecan* split off from the parent body, with *Huastecan* speakers migrating up to the Gulf Coast to northern Veracruz and Tamaulipas in Mexico, and *Yucatecan* speakers occupying the Yucatan Peninsula around 1,000 BC (Campbell and Kaufman 1985: 187). Of the *Yucatecan* language, *Yucatec* today is the dominant tongue while *Lacandon* is represented by only a few hundred remaining natives inhabiting the Chiapas rainforest. The parent body also split into the Greater *Cholan*, which moved down into the Central area around the same period of time (Campbell and Kaufman 1985: 187). Other Maya languages include *Kanjobal*, *Tojobal*, *Motozintlec*, and *Chuj*. Though the geographical extent of *Mayan* languages is considerable, the Maya peoples, languages, and cultures (as contrasted with those of the Aztec), have never been particularly expansionist.
In Mexico, *Yucatec Mayan* speakers occupy most of the territory covered by the modern states of Yucatan, Quintana Roo, and Campeche. Native speakers include both townspeople and farmers concentrated in rural areas. Merida, Valladolid, and Campeche city constitute more than one half the Maya population living in the region (Sharer 1994). Merida, having a population of more than 600,000 people, is the capital of the state of Yucatan and center of political, economical and religious activity in the area.

The state of Yucatan covers an area of 52,508 square kilometers divided into 106 municipios with a total population of 1,362,540 inhabitants. Forty percent of the population is bilingual, that is both *Spanish-Mayan* speakers, and three percent speak only *Yucatec Mayan* (Guemez 1994). Today, two major economic zones have been defined for Yucatan: The first is a zone covered by the remains of *henequen* (sisal) haciendas and plantations. This area covers 34 percent of the state surface (62 municipios) surrounding the modern city of Merida and is considered to be the most acculturated in the region. Wage labor, alcoholism and loss of Maya indigenous traits characterized the inhabitants of the *henequen* belt. Thirty percent of *Mayan* speakers (384,029) live in the *henequen* area mostly concentrated in the cities of Merida, Izamal, Motul, Kanasin, Uman, Conkal, and Progreso (Nahmed, 2002).

After the *henequen* industry collapsed as principal monocrop in the late 1970s, the economy has diversified to include the production of different herbs and fruits, meat and poultry processing, tourism, government, construction, and assembly plants known as *maquiladoras*. Today 20 percent of the population continues to subsist only on
revenues from *henequen*. Most of the inhabitants of the region have wage jobs that force them to travel every day from their rural communities into the large cities. A combination of seasonal jobs in construction, cleaning, gardening, and salt processing along with some *milpa* agriculture and *henequen* provide the daily income of the rural population. In the *henequen* zone, 38 percent of women hold jobs mostly cleaning houses, washing clothes, or baby sitting children for families living in Merida (Nahmed, 2002).

A second area lies east of the *henequen* core including 44 counties with a *Mayan* speaking population totaling 30 percent of the state total. This maize producing area is divided into three zones. The south portion includes the communities of Oxkutztcab, Peto, Ticul, and Tekax where the economy draws upon sugar plantations, *milpa* agriculture, and orchard production of citrus fruits for foreign markets. The eastern portion of the state includes 20 municipios with Valladolid as its urban center. Traditional corn agriculture is the main economic activity for this zone. The northwest portion of the state includes the community of Tzimin and the coastal counties of San Felipe and Rio Lagartos where cattle ranching cover more than 600,000 hectares of the productive land (de Vos 1998; Nahmed, 2002; Press 1975).

In general, *milpa* agriculture is the main economic activity of at least 50,000 people in the area. Average *milpa* size is four hectares with fallow periods between ten and twelve years. Generally, a family needs a total of 48 hectares committing three per year to *milpa roza* (new *milpa*) and one hectare to *milpa caña* (second year *milpa*). However, land use practices are changing due to the need of larger grazing areas for
cattle. Another economic strategy is the temporary migration of adult males from 15 to 35 years of age, to large tourism areas such as Cancun, Cozumel, Playa del Carmen, and Merida pursuing jobs in masonry, gardening or cleaning. Migration is lower among women who typically develop cooperatives for the tourist producing textiles and/or other crafts (Nahmed, 2002).

The Maya traditional lifestyle is being threatened by globalization⁴, protestant missionaries, catholic priests, leftist activists, and governmental organizations (De Vos 1998: 495-505). Unemployment, famine, and lack of health services affect the people in both economic areas although in different degrees. Communities in the maize producing area tend to depend more on the milpa, wear traditional dress, and not be dependent on urban job markets as is the case for those living in the henequen area. As De Vos (1998) suggested, the Maya continue to be a poor and marginalized segment of Mexican society fighting against all odds to maintain their identity.⁵

The identity of those who lived in the rural landscape of Yucatan is changing. As Hervik (2003) demonstrated, the issue of social categorization in Yucatan is a complex matter. In his study of social categories at the town of Oskutzcab, Yucatan, Hervik described that two social categories, mestizos and catrines, were commonly used as terms for self-identification. Bilingual individuals who wear Western style clothing are referred as catrines whereas those who speak Mayan, wear traditional clothing, know how to cultivate the milpa and perform rituals related to it, celebrate the patron saints, and dance jarana, are mestizos. Maya refers to those who lived before The Caste War or fought on it, and also to the use of the language. However, members of a family can
belong to either catrines or mestizo categories depending on who makes the categorization and the criteria used for self-identification. The domestic environment is where changes in self-categorization are taking place (Hervik 1990: 30-31). Historical events and the individual strategies employed to adapt to those changes resulted in a mass shift from mestizos to catrines. This process is evident in strategies at the family level where parents who are Mayan speakers only talk to their children in Spanish and do not involve them in the milpa. Children do not wear traditional dress but instead Western clothing. Children have a higher level of education than their parents. They are also more involved in a wage-based economy than their parents. The government contributes to these changes. The Mexican education system requires children to wear uniforms in elementary schools. In most cases Spanish is the only language used in the classroom. Both practices not only help to dismiss the pattern of wearing traditional dressing, specially women who have incorporated modern clothing in their dressing praxes but, also contributed to the increase of a non-Mayan speaking mestizo population.

In addition to the categorization of catrines and mestizos, there are other social categories in Oskutzkab used to identify non-mestizos. No-mestizos are characterized by a higher education, wearing modern clothing, and overall lacking the knowledge and practice of the milpa. Categories include ts’uul, j-waach, and gringo. The category ts’uul (or dzul) refers to those who are disliked, envied, or admired because of their economic power and/or lack of familiarity with the local ways of living (particularly the milpa). J-waach (or huach) applies to any Mexican from outside Yucatan and is commonly used
in the derogative sense to characterize missionaries, researchers, politicians, and anybody who interfere in local affairs. The term *gringo* applies mainly to tourists particularly those who have pale skin, blond hair, and unusual behavior (Hervik 2003: 26-28).

**A Cornerstone for Maya Life: *Milpa* Agriculture**

*Milpa* agriculture represents an important criterion for self-identification as *catrines* or *mestizos*. *Milpa* is still practiced by a large percentage of the rural population in Yucatan who depend on corn for daily nourishment and believe in its sacredness. According to Arias (1995), *Milpa*\(^6\) is a traditional inter-cropping agricultural system of corn, lima bean, common beans, and squash. Using a slash-and-burn method, *Maya* farmers cultivate *milpa* along with small plots of other vegetable crops such as chiles and pumpkins. Production of corn, beans, squash and chile from *milpa* provides the essential food basis for local and regional needs. The *milpa* cycle involves two years of cultivation and eight years of fallow, or secondary growth, to allow for natural regeneration of vegetation (see Table 3.1). As long as this rotation continues without shortening fallow periods, the system is sustained indefinitely (Arias 1995).

One of the most thorough descriptions of *milpa* agriculture is found in Perez Toro (1945) “La agricultura Milpera de los Mayas de Yucatan”. In this article, Perez Toro describes seven stages for *milpa* agriculture. The first stage consists of the selection of the plot. Dark soils, especially black or with dark reddish coloration are particularly favored because of their richness in organic material and abundance of large trees.
Table 3.1. Milpa activities throughout the year. Data from Perez Toro (1945).

<table>
<thead>
<tr>
<th>Month</th>
<th>Milpa related activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>Harvesting of late corn</td>
</tr>
<tr>
<td>February</td>
<td>Harvesting of beans, cleaning of forest</td>
</tr>
<tr>
<td>March</td>
<td>Cleaning of forest, burning</td>
</tr>
<tr>
<td>April</td>
<td>Burning</td>
</tr>
<tr>
<td>May</td>
<td>Last burning</td>
</tr>
<tr>
<td>June</td>
<td>Planting begins</td>
</tr>
<tr>
<td>July</td>
<td>Planting continues</td>
</tr>
<tr>
<td>August</td>
<td>Planting of beans</td>
</tr>
<tr>
<td>September</td>
<td>Folding of corn stalks</td>
</tr>
<tr>
<td>October</td>
<td>Folding of corn stalks continues</td>
</tr>
<tr>
<td>November</td>
<td>Harvesting of small corn</td>
</tr>
<tr>
<td>December</td>
<td>Harvesting of small corn concludes</td>
</tr>
</tbody>
</table>

Once the plot is selected, the farmer delimits the plot by cutting a trail and putting a pile of three stones every 20 meters. These 20-meter markers are known as mecates (or k’aan). Then, the milpero measures the plot using a stick (or p’isi-che’) that is one sixth of a linear mecate in length. Next, the farmer clears all the bushes, low branches, and cuts the trees to a height of one meter. All the trimmings are shredded and used to build a fence around the plot, to stop cattle from entering the field. The initial trail surrounding the plot is cleaned to provide a barrier when the field is burned. Then the farmer waits until the beginning of the rainy season and the first full moon to start planting. A sharp wooden stick, known as xul, is used for planting a mixture of corn, beans, and pumpkin seeds called xaak’winal (see Figure 3.8).
The *milpero* uses the *xul* to dig holes in a linear path, six to seven centimeters in depth, separated approximately one meter from each other. The farmer then drops four to five corn seeds, three to four bean and *calabaza* seeds, and covers the hole by pushing dirt with the tip of his foot. *Milperos* distinguish at least eleven classes of corn (see Table 3.2). The most popular are the *xnuk-nal* and the *xmehem-nal*. Under normal conditions, the *xnuk-nal* matures in six to seven months whereas the *xmehem-nal* only needs three months.

There are several classes of beans and squash planted in a *milpa*. The most common types of beans are the *X-kol-i-bul*, a class that has medium size grains, and the *ib*, a legume similar to the bean but from a different genus. Other beans associated with the *milpa* are the *Tsam’a* with large grains, the *X-pelon* commonly used as a type of “green bean”, the fast maturing *X-ma-yum*, a small bean called *Mehen buul*, and a
Table 3.2. Classes of corn identified by the Yucatec Maya. Data from Perez Toro 1945.

<table>
<thead>
<tr>
<th>Corn classes (Mayan name)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xnuk-nal</td>
<td>Any large ear of corn</td>
</tr>
<tr>
<td>Xmehem-nal</td>
<td>Any small ear of corn</td>
</tr>
<tr>
<td>T’sit bakal</td>
<td>Large with numerous white kernels</td>
</tr>
<tr>
<td>Sahum</td>
<td>Yellowish kernels</td>
</tr>
<tr>
<td>Chak-chob</td>
<td>Reddish kernels</td>
</tr>
<tr>
<td>Xbel-bakal</td>
<td>It only has 2 row of kernels from</td>
</tr>
<tr>
<td>Eek’chob</td>
<td>Dark reddish kernels almost black</td>
</tr>
<tr>
<td>Xk’an-nal</td>
<td>Dark yellow kernels</td>
</tr>
<tr>
<td>Nal-t’el</td>
<td>White kernels. It only needs 60</td>
</tr>
<tr>
<td>Xt’up-nal</td>
<td>Small with colorfull kernels</td>
</tr>
<tr>
<td>Xe-hu</td>
<td>Blue and purple kernels</td>
</tr>
</tbody>
</table>

red class or Chak-wayakab. The X-ka, and the T’sol are usual classes of squash found in a milpa. Both are medium sized with thin skin. They are appreciated for their seeds known as pepitas and also used to prepare several traditional dishes. Other squash classes include a large cream color vegetable known as X-nuk-k’uum, a melon-type known as X-kalisk’uum, and the X-koko-k’uum, an oval-shaped melon-like squash. Additionally, some milperos may plant watermelons, tomatoes, several varieties of chiles, yucas, jicamas, macales, and sweet potatoes or camotes.

Approximately fifteen to twenty days after planting, weeds are removed by cutting them as close to the soil as the rocky nature of the land will allow. During this stage, the milpero also takes care of diseases, insects, and mammals that may affect the milpa.
Locust, birds, lizards, deers, wild pigs, badgers, hares, rats, mice, foxes, and gophers represent some of the challenges to overcome to produce a successful crop. The milpero uses several strategies including guarding the milpa, maintaining the fence and paths around it, and performing religious ceremonies (see Redfield and Villarojas 1971 for a detailed account of the ceremonies related to the milpa). The final stage is the simultaneous harvesting of the corn and beans. Once the corn stalks have reached their maximum height but before the kernels are dry, the milpero folds the stalks to protect them from the rain. While the harvesting is taking place, the milpero selects the seeds for the next crop. Baskets are used to carry the cobs that are stored in a unit known as troje. During the night, grains from large cobs are shaken out by hand and kept apart from the rest to use as seeds. The rest of the corn is placed on an elevated bench or kaanche; shaken using wooden sticks or packed in cloth bags known as costales. Finally, a portion of the harvest may be transported to the household and stored in the main house or in an additional troje.

In summary, milpa agriculture is a complex agro-system involving a variety of plants and methods practiced by a large portion of the rural population in Yucatan. As discussed above, milpa is also an essential element of ethnic self-identification and for many of Mayaness. However, as in other aspects of Maya life, milpa agriculture is changing. Today, farmers are integrating modern pesticides to combat diseases, reducing the size of the plots and fallow periods, using commercial seeds, and planting grassy areas for cattle. In some cases farmers are mechanized and moving toward a monocrop-based agriculture focusing on citrus fruit for the national and international
market. In the last twenty years, international and Mexican agricultural agencies have introduced new alternatives to the slash-and-burn method in order to overcome problems associated with it, such as soil depletion, and aridity. At the state level, the coexistence of traditional milpa agriculture along with mechanized monocrop farming (nontraditional milpa) is consistent with the pattern identified by Re Cruz (1996) in the community of Chan Kom.

Throughout this chapter I attempted to describe the variations in the physical environment and the complexities of the historical development of the Yucatec people. This chapter provides the physical and cultural context for my research on traditional houses in Yucatan.

End Notes

1. According to Konstant (1997), ejidos are represented by a committee, which is voted in on a rotational basis every three years, called the authorities. They provide an unpaid service to the community and may have to invest considerable time and effort. The authorities are divided into three subcommittees with different functions:
   
   a). The consejo del comisariado: Includes a president or comisario, secretary, treasurer and deputy. They are responsible for anything the community needs to have done and the organisation of all communal affairs. The president calls and leads general assemblies.

   b) The consejo de la vigilancia: Also includes a president, secretary, treasurer and deputy. Ensures that the rest of The Authorities fulfill their function and that funds are not misappropriated. They take a roll call at general assemblies and fine ejidatarios who are absent. They are also responsible for maintaining the boundaries of the ejido, for checking on incursions from outside and policing illegal forest use.

   c). La autoridad municipal: Includes a municipal agent and deputy above a number of policemen, and a rural judge and deputy. Deals with problems or crimes within the colony, and includes a community judge to whom serious matters can be referred. They are responsible for maintenance of social law and order and have no responsibility for controlling illegal forest use.

2. Under the NAFTA, all nontariff barriers to agricultural trade between the United States and Mexico were eliminated. In addition, many tariffs were eliminated
immediately, with others being phased out over periods of 5 to 15 years. All agricultural provisions will be implemented by the year 2008. For import-sensitive industries, long transition periods and special safeguards will allow for an orderly adjustment to free trade with Mexico. The agricultural provisions of the U.S.-Canada Free Trade Agreement, in effect since 1989, were incorporated into the NAFTA. Mexico and Canada reached a separate bilateral NAFTA agreement on market access for agricultural products. The Mexican-Canadian agreement eliminated most tariffs either immediately or over 5, 10, or 15 years. Tariffs between the two countries affecting trade in dairy, poultry, eggs, and sugar are maintained (quote from the U.S. Foreign Agricultural Department, U.S. Department of Agriculture, September 6, 1992).

3. Maquiladoras are assembly and manufacturing plants owned by multinational corporations to take advantage of Mexican inexpensive wages. In Yucatan, these assembly plants focus on cloth manufacturing for both the Mexican and American markets. Most of them import almost all of their supplies and employ mainly females.

4. For Harris (1993: 755-766) globalization refers to “...either the set of processes that bring people and places together in either more frequent contact, more sustained contact, or contact in a wider variety of activities than was the case in the past, or simply the result of these processes.” He identified three main causes for the phenomenon of globalization: First, the reduction in trade and investment barriers particularly after the WWII; secondly, the rapid growth and increase in size of the developing countries economies and their impact on global production capacity; finally, changes in technologies specially in communication and transportation.

5. According to Hervik (2003), terms such as Maya, indigenous, ethnic, peasants, rural proletarians, ladinos, mestizos, Maya Indians, and catrines are generally used by both scholars and public media to identify those who speak one of the Mayan family languages. However, these categories only reflect an idealized and sometimes biased perspective that is not shared by those labeled as such and do not provide a lived, practical, and reflexive perspective to ethnic identity in Yucatan.

6. Milpa agriculture is often referred as “slash and burn”, shifting cultivation, or swidden agriculture. In most cases, these terms describe a farming system that alternates periods of annual cropping with extended fallow periods. "Slash and burn" systems of shifting cultivation use fire to clear fallow areas for cropping (Arias 1995).
CHAPTER 4

STUDIES OF MAYA TRADITIONAL HOUSING IN THE YUCATAN PENINSULA

Since the Spanish conquest of Yucatan, several missionaries, travelers and scholars have described where the Maya lived. In this chapter, I discuss previous research on traditional Maya housing beginning with Sixteenth century descriptions and finishing with contemporary research by cultural geography, cultural anthropology, archaeology, history, and linguistics.

Historic Accounts

Some of the earliest reports on Maya housing focus generally on construction methods without detailing certain aspects of the dwelling, such as floor plans or the number of structures per family. Sixteenth century accounts such as Bishop de Landa’s Relación de las Cosas de Yucatan (1938) described the construction of Yucatec houses as:

In building their houses their method was to cover them with an excellent thatch they have in abundance, or with the leaves of a palm well adapted to that purpose, the roof being very steep to prevent its raining through. They then run a wall lengthways of the whole house, leaving certain doorways into the half, which they call the back of the house, where they have their beds. The other half they whiten with a very fine whitewash, and the chiefs also have beautiful frescos there. This part serves for the reception and lodging of guests, and has no doorway but is open along the whole length of the house. The roof drops very low in front as a protection against sun and rain; also they say, the better to defend the interior from enemies in case of necessity... The houses having no doors, it is held a grave offense to do any wrong to another house; in the back, however, they have a small door for household uses. They sleep on beds made of small rods, covered with mats, and with their mantles of cotton as covering. In they summer they sleep in the front part of the house on the mats, especially the men (de Landa 1938).
In 1577, a decree issued by King Philip II of Spain provided instructions for a comprehensive report of each town in the Yucatan Peninsula. The report consisted of answers to a printed questionnaire included in the royal instructions. Question 31 states, “describe the form and construction of their houses and the materials for building them that are in the said town or in other places from which they are brought.” The questionnaire sought details on house construction but not about the floor plan. In the Relacion de Tecanto y Tepacan we read:

Usually the Indians make their houses of wood and pointed poles covered with straw and palm leaves, of which there is an abundance in some regions; although they could make them of stone, since there is much in the land, they say that they make them as they do on account of its being healthier to live in houses of straw than stone, because of the heat which they have from the month of April to September... most of the houses face the east, the north, and the south (medio dia), and none face the west unless they area oratorios or temples, some of which do face west...(De la Garza 1983).

Some Nineteenth century travelers and historians alluded to the presence of houses with rounded ends. Stephens (1843:358) described a dwelling in Nohcacab, Yucatan as “...a single room rounded at each end.” Norman’s Rambles in Yucatan (1843: 72) presented a drawing of a Maya hut with rounded walls. In Carrillo y Ancona’s Historia Antigua de Yucatan (1883: 268-69) the Maya house was described as“...palizada y hojas de palma sobre una pared semicircular de mas o menos amplitud, unas veces construida de cal y canto, otras de adobe y no pocas de piedra seca...” In his article “The genesis of the Maya arch”, Thompson (1911) reports apsidal houses in the area of Chichen Itza.
From the 1920s to the 1940s, the Maya Lowlands of Guatemala and Mexico became the focus of research by the Carnegie Institution of Washington and the University of Chicago. Shattuck’s (1933:141) medical, biological, meteorological, and sociological study of the Peninsula of Yucatan briefly describes Maya housing as “generally, the family lives together in a single-room hut having an earthen floor which measures about 4 by 5.5 meters, or even less, in diameter.”

Wauchope’s (1938:1) Modern Maya Houses offered the first detailed study of house types for the purpose of “...collecting data to facilitate interpretation of ancient dwelling sites” (1938: 1). Wauchope (1938) noted similarities between contemporary structures and those depicted on frescoes at Chichen Itza, Uxmal, and Tzula, grafittis (Nakum), and as decorative elements in architecture at Uxmal, Chacmultun, and Labna. In House Mounds of Uaxactun, Guatemala, Wauchope (1934) cautioned about the inconsistency in scale and the nature of artistic representation of iconographic and architectural data. However, depictions of houses revealed that they were located either on top of a foundation or directly on the ground, have wooden lintels with walls made of vertical poles covered with an exterior layer or stone, and thatched roofs with a crowning tuft and porches.

Wauchope (1938:1) suggests that explanations of ancient Maya domestic architecture would be more accurate if scholars gathered data on contemporary houses and compared to the archaeological record. His research was multi-disciplinary combining both archaeological methods and a geographic perspective to the study of Maya housing.
Wauchope’s field research began in 1934 focused on abandoned houses in an attempt to answer the following questions: How did the dwellings fall to pieces? What means of identifying the house framing could be developed from a study of imperishable remains after the timbers themselves had disappeared? What distinguishing marks were left by various types of wall construction? How could the original ground plan of a house be determined after the house was gone? What effects of fire were revealed by the remains of burned houses? Wauchope (1938: 16-22) considered rounded-end houses a puzzle. He described two types: apsidal and flattened-ends. Apsidal houses have a rectangular plan with rounded ends or apses. The main posts, which support the roof frame, were generally located inside the line of the walls. Likewise, flattened-end houses had a long rectangle plan with rounded corners perhaps as an attempt to build a rectangular house on an apsidal frame. A major difference was the main posts located not so far from the wall as in the apsidal houses.

Wauchope’s research involved 81 communities in the modern states of Campeche, Chiapas, Quintana Roo, Tabasco, and Yucatan in Mexico, and the communities of Benque Viejo, San Antonio, and San Jose, Belize. Wauchope’s data collection included boundary walls and related property, sociological and religious topics related to the house, and an Indian word list. His work is divided into eight sections: foundation features, house framing, walls, extraneous features, thatch, interiors, miscellaneous property, and non-material aspects. Every feature identified by Wauchope was described, measured, and labeled by its Mayan referent. Analysis consisted of a spatial comparison at the inter and intra-site levels of each registered feature. In his conclusions, Wauchope suggested that present day Maya communities
were assembled more systematically than their prehistoric counterparts. This orderly arrangement was the result of Colonial policies that dated to 1523.

Wauchope believed that there was a significant correlation between the distribution of ground plans and the events in Maya history and prehistory (1938:147). Apsidal houses were absent in Guatemala and coastal towns such as Lerma and Champoton with large numbers of non-Maya population but common at Yucatan and Campeche, particularly in those areas where Yucatec speaking population was common. In contrast, the distribution of flattened-end houses coincided with that of the rectangular plan houses suggesting that both houses were interrelated. Both houses were common at the East coast of Yucatan, Tizimin, Catmis, and Campeche City (see Figure 4.1).

Although Wauchope cautioned against the use of direct analogy between modern and prehistoric remains, his analysis identified similarities in housing among the Maya communities researched. He believed that differences in construction material and ground plan were largely the result of the environment, diffusion, and historical events. Wauchope’s research was a cornerstone for settlement patterns studies in the Maya area. However, after Wauchope’ seminal study of Maya houses few attempts were made by researchers to collect contemporary data on residential areas and for comparison with that reported by Wauchope. Description of houses remained a necessary subject for cultural anthropology only to provide the cultural dimension to the overall physical setting in which the Maya lived. Examples of this descriptive approach to houses is found both at *Folk Culture of Yucatan* and *Chan Kom A Maya Village* where Redfield described Maya houses as “... [a] sort of hut of poles with rounded ends
and a thatched roof... that one finds, with small differences, in Quintana Roo” (1941: 89). Redfield (1971: 34-35) added that the house-group may have a number of lesser structures including a fowlhouse (zooy), pig pens (chiqueros), a corn granary (chil), elevated gardens (caanche), and beehives. Another description is found at the Enciclopedia Yucatense edited by the government of Yucatan between 1944 and 1946. Apsidal ground plans were connected to Yucatec Maya speakers with Campeche separating theapsidal houses of the north from the rectangular plans to the south (Gobierno de Yucatan 1944: 410; 1946: 13).

Contemporary Research: House-lot Organization

For the last 50 years, the study of the domestic areas including house design, use of space and housing policies, has become a major topic in several disciplines. Most of the data on domestic areas are usually descriptive and part of a general ethnographic study of a community. In Yucatan, current research on housing has been
conducted mainly in archeological contexts as necessary for the understanding of prehistoric settlement patterns. Research is still at the site or community level indicating a lack of regional perspective in the study of rural domestic areas. However, in few cases, data on housing move beyond the overall description of features to address cultural topics such as the use of space, effects of cash economy on the integration and corporateness of a community, migration, patterns of social organization, and identity issues. These studies provide a new insight on the complexities of Maya domestic areas and reinforce the need for an integrative approach to the study of modern rural housing. Next, I present seven different approaches to the study of domestic areas in Yucatan, discuss their results, and relevance to my research.

An interest on the study of space organization and function at domestic areas was illustrated by Pierrebourg’s (1989: 36-38) archaeological study of solares at Xculoc. According to Pierrebourg, solares consist of four different zones including a shrub area, a semi-clear area, the residential area, and the roofed area. The shrub area is located at the end of the lot covered by underbrush and outcrops or tzekeles (in Yucatec Mayan). This area does not have any structures or artifacts and it sets aside for human waste or for cutting firewood. Semi-cleared area or transitional is located between the shrub area and the residential one. This space also has some underbrush and stones scattered over the area. However, some activities are carried out here, such as garbage disposal, breeding of domestic animal, laundry, and the excavation of pits for baking purposes. The residential area is generally clean from underbrush, stones or garbage. Fruit trees, flowers and herbs are cultivated in the garden. Activities such as cooking and grinding corn kernels, male tasks, and child’s play are common in this area. Finally,
the roofed area includes a house, kitchen, and a latrine. According to Pierrebourg, a solar contains one to eleven buildings including sleeping areas, kitchens, storage areas, animal pens, and laundry areas (see Figure 4.2).

![Diagram of solar zones](image)

Figure 4.2 Idealized schema of solar zones reported at Xculoc by Pierrebourg (1989).

In Pierrebourg’s study, the most common solar arrangement consists of a structure functioning as a sleeping area and kitchen or two or more structures linked to one or two kitchens. The distribution and orientation of the buildings define the limits of the solar providing information about the evolution of the area and the effects of reproduction and functional factors. Most of the buildings are manufactured from perishable materials having an oval-shaped stone foundation. They have one or two entrances located on the longest sides of the structure. Kitchens have smaller roof areas and are either oval or square in shape. The kitchen has two extremities including one covered and used as a latrine, and the other uncovered where water storage units are located. Most of the solar area is multifunctional although Pierrebourg (1989)
identifies three different types of activities including systematic activities, such as cooking, that lead to assemblages of objects that make easier for their identification (such as the three-stones hearth, pottery), activities that use biodegradable materials such as laundry or waste disposal, and activities that can only be identified by direct observation of everyday life because they are carried out at indefinite areas resulting in no associated material remains.

In her ethnographic study at Uci, Yucatan Repetto (1991) identifies the function and distribution of domestic structures. The community of Uci has a grid settlement pattern with solares located along the streets. Some of the domestic structures are also aligned with the main streets, although they are separated from each other. Repetto reports solares as delimited by walls known as albarradas consisting of rough stone boulders piled on top of each other. Her sample includes traditional households and domestic activity areas. She identifies seven types of domestic structures including dwelling-dormitory, kitchen, storehouse or troje, animal pens, well, laundry, and latrine. For Repetto (1991), domestic structures are modules with internal divisions. Solares at Uci have one to three structures. Generally, a second structure is located at the posterior side of the primary dwelling but following the same axis. Sometimes, additional structures follow an angle of 90 degrees from the first dwelling. If the solar has three buildings, the structures define a quadrangular space (see Figure 4.3). Traditional dwellings have an oval-shaped floor plan with a stone foundation. Perishable materials such as palms, grass, and sticks (kolopche in Yucatec Maya) are used in the construction of the walls and roof. The earliest structure in the solar is built with the best construction materials. It functions as a reception area and dormitory. The kitchen with a
three-stones hearth is located in the second construction. If a corridor connects both structures then a second hearth is located in that area. Corn storage areas are located near the kitchen. These are small square-shaped structures elaborated with sticks and sometimes with a tilted roof.

![Diagram showing variants in solar organization](image)

**Figure 4.3.** Drawing showing the variants in solar organization reported at Uci, Yucatan by Repetto (1991).

The laundry area is usually located next to a large tree, has a roof, and water storage units surrounding the wash sink. When more than one family lives in the solar, every woman has her own wash sink. At Uci, most of the solares have pens for domesticated animals and a well. Latrines for human waste are located away from the dwellings. Bathing occurs at the dwelling-dormitory or in the kitchen.

Although both reports are highly descriptive, Pierrebourg (1989) and Repetto (1991) solar subdivisions (lots) for Northern Yucatan are useful for categorizing contemporary household data into comparable units. Their relatively overall acceptance
in the Peninsula makes the solar unit useful for my study, not only for data collection, but also as comparison framework for data analysis. I also employ their identification of different functional areas in the solar as analytical categories in my study of Maya houses.

Smyth’s (1988) suggestion that storage behavior affect the use of domestic areas is another important contribution to understanding the overall layout of the Maya solar. Smyth’s (1988, 1991) applies an ethnoarchaeological approach to the study of storage behavior in the Maya area. He develops a method for identifying storage in the archaeological record and to establish an interpretative base that centers on cultural issues associated with storage behavior. Adams (1985: 878) defines ethnoarchaeology as “...placing ethnographic data within an historical framework derived from archaeological and historical sources.” Smyth’s sample included 35 households located in 15 different communities in the Puuc region of the modern state of Yucatan. His research was one of the first to use a regional perspective in the analysis of storage behavior.

Using interviews, direct observations, mapping, and shallow excavations of test pits, Smyth (1988) identifies a pattern of features and refuse associated with storage areas. Feature patterning consists of the presence of postholes, elevating stones and compacted surfaces associated with storage structures. He found garbage disposal is closely related with food storage. Garbage disposal behavior consists mainly of sweeping and incinerating waste at areas far from the dwelling. Refuse patterning included organic and inorganic materials as well as charcoal. He distinguishes various storage areas such as warehouses, trojes, and orcones (see Figure 4.4).
Some of these structures are associated with kitchens, cisterns or dwellings. Smyth (1988) suggests that variation of food storage techniques is an important factor impacting the differential use of domestic areas. Activities related with storage occur generally at the main structure whereas cooking and washing of corn kernels takes place in an open area close to the dwelling or in the fringes of the patio. Smyth’s research represents a different venue on Maya domestic areas studies. His model for storage is innovative and provides a framework for gathering data that had been largely ignored before. I collected data on types garbage disposal and storage behavior of the solares in order to discuss use and design of space at Maya domestic areas.

Greenberg (1996) examines the role of house lots and their gardens in preserving traditional Yucatec crops and cuisine, as well as immigrant ethnicity using data on Maya gardens at Puerto Morelos. Her sample included 33 Yucatec households who had migrated from the town of Chemax, Yucatan to Puerto Morelos, Quintana Roo. Greenberg employs a geographical cultural ecology approach by using an inductive, case study approach within a small community and intensive field observations. She
defines a household as “...a group of people who share daily work and expenses throughout a calendar day.” (Greenberg 1996: 55). Methods of data collection consist of a household survey, house-lot garden inventory including land use and mapping, in depth interviews, and participant observation.

For Greenberg (1996), Yucatec immigrant house-lots are sites of in situ conservation of traditional Yucatec crop species and varieties. She identifies 44 ornamental species, 36 fruit or vegetable species, 19 medicinals, 13 condiments, and eight species with assorted uses. Several plant species found in house-lots are local to the Yucatan Peninsula or have been for a long time associated with the Yucatec Maya. Crop cultivation and raising livestock in house-lots offer Yucatec immigrants some control in the selection and preparation of typical Yucatec dishes. Cuisine stimulates the conservation of traditional Yucatec house-lot crops. Yucatec immigrants recreate their ethnicity by preserving many features of traditional Yucatec landscapes, crops and cuisine in family house-lots (see Figure 4.5).

Persistence and continuity of Yucatec ethnicity is evident in the house types, stone walls, the practices associated with plant cultivation and management, knowledge of the varied uses of plants, continuity in women’s role as house-lot managers, and the incorporation of house-lot crops into the preparation of traditional Yucatec dishes.

House lots are an essential space for ethnic continuity because they provide families with a place for ethnic and individual expression, autonomy in subsistence practices, and control over their diet (Greenberg 1996: 352-355). Following Greenberg’s suggestion that gardens are evidence of preservation of ethnic expression, my study of
Maya house lots incorporates data on location and shape of garden areas, type of plants cultivated, and use of crops for household consumption. Correlation of data at the community and regional levels is used to test Greenberg’s model.

Restall’s (1997) ethnohistorical account of common life in Yucatan from 1550 to 1850 provides an insight into the affairs of Colonial Yucatecs. Using legal documents and other records written in Mayan but in the Roman alphabet that remain stored in archives in United States, Mexico, and Spain, the author suggests that the fundamental unit of Sixteenth century Maya society and culture was the *cah* (community in Yucatec Mayan). Restall (1997: 20) defines *cah* as “... a geographical entity, contained within a
specific boundary that enclosed solares (house plots) of the community and also included land that could may lie miles from the house plots of the cah.” Along with the chibal (patronym group or extended family lineage), the cah determines social identity and both were vital in maintaining a sense of affiliation or belonging after the impact of Spanish colonization. Colonial era Mayas did not describe themselves as such. Terms such as Maya or Indian were not present. When the word Maya appeared it referred to the language but not to the people. Therefore, Maya self-identity was grounded in both the cah and the chibal. The residential cah location was determined by the presence and accessibility of underground water sources.

Spanish policies regarding relocation and town organization directly affected the cah by reorganizing dispersed settlement patterns, common to prehistoric communities, into layouts that followed the Roman gridiron system (Restall 1997: 22-23, 104-105). However, in order to facilitate this transition, the Spanish imposed the grid on top of the existing layout, which consisted of a central group of buildings surrounded by residential clusters each of them with two to four house structures (see Kurjack 1974 for a description of Dzibilchaltun). The central group then, became the central plaza where the church, government buildings, and stores were located. Residential clusters became the large blocks of the grid (see Figure 4.6).

Finally, platform or terraces became the solares (in the Spanish plan a solar consisted of a quarter block). Although in some cases, prehistoric residential clusters did not have visible boundaries, documents mention the use of stone piles as markers of the solar corners. Today, most solares are surrounded by a low stonewall known as albarrada. Colonial documentation also provides general information on the elements of
the solar. Most of the Maya domestic economy depended on the flora and fauna found in the solar. Fruit trees and raised vegetable gardens (kaanche in Yucatec Maya) complimented the daily diet. Protein needs were supplemented by geldings, pigs, fowls, and turkeys kept inside the solar boundary or as still happens today running freely around the community. Beehives, particularly the native stingless bee (Melipona beecheii), were the source of honey (xunan kab) and wax. Palm trees and henequen still provide raw materials for the construction of roofs and manufacture of hats. Cotton plants provided fibers for clothing and rope.

Modern house layout in which houses sit in a row with front and back doors aligned appeared during Colonial times with the establishment of the gridiron system.
The building closest to the street usually controls the access into the solar. Documents mention one story buildings usually detached from each other that are still common today. Testament data indicated that two residential structures were common per solar (Restall 1997). Other minor constructions may have existed but there was no mention of them in the documentation. Household values and furniture listed in testaments were commonly European in origin (Restall 1997: 106-107). Furnishings included beds, tables, chairs, chest or caja to store valuables (such as jewelry, money, silver cutlery, money, or clothing), saint images particularly the Virgin Mary (ca cilih colebil), rosaries, and tabernacles (a niche covering where the saint is displayed). Restall (1997:108) adds that for the Maya of Colonial times, money, clothing, and saint images were considered valuable items representing status, gender roles, sustenance, beauty, and life itself.

Another contribution to the study of Maya houses is Hanks’ (1990) study of language use in Oskutzcab, a contemporary Maya community in Yucatan. His focus was “...on the daily linguistic practices by which Maya speakers make reference to themselves and each other, to their immediate context, and to their socially constructed world.” (1990: 3) Although my research is not linguistic, I found Hanks’ chapters on spatial orientations and social relations in the homestead necessary to understanding the design of Maya solares. By describing the sociocultural constitution of space and time among contemporary Maya, Hanks (1990: 295) aimed to contextualize the deitic construction of referential and indexical space and time. He suggested that both the solar and the milpa plot embody elementary principles, processes and experiences vital for root construction.
Land and access to water are key resources in Oxkutzcab. Most men are responsible for the production and development of both domestic and agricultural areas. Therefore, a close relationship exists between residential and productive land. Depending on the location of the residential area, it may be labeled *kahtalil* (when it is located outside the town) or *solar* (when located within the town limits). *Solares* are delimited by the outer perimeter (*haal*), the *solar* center point, and the four corners delimiting the perimeter. Even when a visible wall does not bound the *solar*, visitors are aware of the existence of such boundary and do not trespass without the consent of residents. Hanks (1990: 324-325) recognizes three levels of spatial organization: a) the nuclear family space where every family has separate sleeping structures and kitchens but no visible fences; b) the shared space of kin family headed by brothers where visible boundaries delimit each space; and c) the space of adjacent affines which usually lacks organization into a single place. Most of the *solares* in Oxkutzcab are occupied by two to three nuclear families living in the same bounded perimeter similar to extended families.

Following Thompson' (1974) developmental cycle of the family, and Fortes (1958), temporal pattern, Hanks (1990: 96-102) identifies a cyclic pattern for the households at Oxkutzcab. The cycle begins with the establishment of an autonomous household by a nuclear family (husband, wife, and one child). Then, as the elder sons marry, expansion occurs when they bring their wives into the *solar* and produce more offspring; when daughters marry, dispersion occurs by venue of them moving out of the *solar*. This event would help the elder sons to gain economic independence and ultimately move out of the solar and establish new households. Finally, replacement
occurs when the founding couple dies and the remaining son and family occupied their place. Because land is inherited through the male line, the continuity of the original solar is indicative of the perseverance of the patriline. However, in some cases when land is scarce or non productive, the sons are forced to move out and seek jobs outside the agricultural realms disrupting the household developmental cycle. When the son’s wife moved into the founding solar, she entered into a subordinate relationship with the parents-in-law. However, sisters-in-law usually developed mutual affinity although ranked by the birth order of the husband, the length of residence in the solar, and in some cases the age of the women.

Every solar had a head represented by the senior resident either the eldest man or a widowed or divorced female. Among females, the wife of the senior resident is referred to as the head of the household. However, individuals exercise various degrees of authority in the solar with the senior resident being at the top because of his/her age and ownership of the lot. Relationships among consanguineal co-residents, (blood related e.g. brothers or sisters) are usually solidary although competition among brothers is common especially when they begin to inherit property. Co-resident affines (marriage related e.g. wives or husbands), on the other hand, maintain an ambiguous relationship with their parents-in-law that are either stressful or based on avoidance. In the case of the son-in-law moving into the wife’s parents solar, the general assumption is that he is either docile or in bad financial situation. Finally, the non co-resident affines (wife’s parents) maintain a distant relationship with the parents-in-law limited to sporadic visits to the solar.
The structure where the nuclear family resides is known as the *ic nah* (in the house). This building is where the residents sleep, where the family saint is located (mainly on the east side of the structure), and where valuables such as documents, jewelry, expensive tools, and clothing are stored. In traditional palm roof houses (or *xaz anih nah*) that have apsidal shape (*tuzuc*), the round ends (*moy*) are separated by a curtain from the central area becoming private spaces for sleeping, bathing or dressing.

For Hanks (1990: 325), location of the main structure reveals principles associated with it including that the structure follows the orientation of the *solar* boundary, and that the front wall of the house usually faces the front of the *solar* or the main access to the street; power and water utilities are usually located close to the main house, and when more than one household resides in the *solar*, their houses and other structures are also oriented following an invisible boundary dividing the lot. The second most important structure in the *solar* is the kitchen (*k’oob’en*). This is a female space where the fire, water storage, food preparation, and consumption take place. This building usually has a dirt floor and is usually located behind the main house parallel to each other and following the same axis (see Figure 4.7).

A second arrangement is an orthogonal or lateral one in which the main house and the kitchen face a single courtyard in a T-kind of formation. In both arrangements, the main house shelters the kitchen from the outside. In some instances, the kitchen is connected to the main house by a covered passage or paved walkway. Similar to the saint altar location, the three-stone hearth (*k’oob’en*) where cooking takes place is also located on one of the round ends (*moy*) of the structure. The wall behind the hearth is open so the smoke and heat can scape. Close to the hearth is a low table (*kaanche*)
Figure 4.7. Top, solar 3 from Yaxche showing parallel arrangement of main house and kitchen. Bottom, solar 1 from San Felipe Nuevo, showing “T” arrangement of main house and kitchen.
used by women as a utility table to store kitchen utensils and condiments. Other kitchen furniture includes gourd containers (leek), tools, cups, and pitchers hanging from the walls, and plastic shoulder bags (sabukan) with dried corn. Chairs, fruit crates, and tools would be stored on the opposite side of the hearth. Hanks (1990) describes the presence of other structures in the solar including fowl coops, pigsty, bull pens, water retainers and tanks, scrub basins (batea), and storage areas.

According to Hanks (1990: 95), the Maya household embodies principles such as segmentation, reciprocity, and asymmetry that are vital for the development of communicative patterns specially those that make reference to interaction in domestic spaces. Therefore, domestic areas along with body space are two core sources of schematic knowledge. Hanks suggests that the interaction of the members of a Maya household is characterized by asymmetric discourse based on differences in age, gender, or residential unit. However, he also identifies a relative symmetry in the household discourse based on affection, friendship, solidarity, and common experience.

Hanks (1990) research provides an important insight into the nature of social relationships that develop among residents of Maya solares. Age, gender, and the nature of familial or social interaction determine not only the speech pattern among household members but also their “place” in the solar unit. Therefore, analysis of the location of residential structures and the use of domestic space in Maya solares, particularly in the case of extended families (more than one co-resident nuclear family), may be used to understand the network of social relationships that characterizes a particular household.
In summary, most of the aforementioned research examines the morphology and function of Maya dwellings and house-lot organization. Some of the topics include ethnicity, storage behavior, variables that affect the built environment, social organization, and language practices. Their diverse approaches to the study of houses and the richness of their data suggest the complexity of domestic areas as subject of study. By examining a limited set of variables or focusing on a particular problem, these scholars limited their understanding of the Maya house and in some cases their ideas suggest persistence, continuity, and similarities of the domestic setting throughout Yucatan. In order to assess the domestic environment, it is important not only to isolate a wide variety of perceived physical and social factors influencing the selection of domestic areas, but also to investigate the interrelationships and behaviors associated with each one. By combining ethnographic, geographic, and archaeological data, my research offers an integrated perspective to the study of contemporary Maya houses. In the next chapters, I introduce a summary of the data by municipio and then by community visited. Discussion centers on the results obtained at both levels of research, the relevance of my study for understanding Maya housing, and finally the scope of future investigations in the topic.

End Notes

1. Redfield (1971: 48) description of beekeeping practices at Chan Kom mentions that “...The hive is a hollowed section cut from a tree known as yaxnic, from 50 to 60 centimeters in length and from 20 to 25 centimeters in diameter. The ends are closed with circular stoppers of wood, held in place with dried mud. A small entrance hole is made in the center of a small square or circular depression cut in the center of the side of the hive; over the entrance hole a small cross is cut. “ Hives are then grouped together on racks built of poles and a thatch shelter is built on top of them. Redfield mentions that racks are usually set up in a corner of the solar distant for the house and run east and west so the hives do not get wet when it rains.
2. **Deitic**: “...linguistic elements that specify the identity or placement in space or time of individuated objects relative to the participants in a verbal interaction (e.g. this, that, here, there, I, and you).” Hanks (1990: 5)

**Speaker’s reference**: Consists in what the person has in mind to talk about in uttering an expression (Donnellan 1978, 1979). For Hanks, speaker’s reference designates some aspects of deitic practice.

**Indexicality**: For Hanks (1990:38), “...deitic categories encode a relation (proximity, inclusion)... between some referent (the one, the place)... and the indexical context of the speech act (the speaker, addressee, or' here-now 'of the utterance.”

3. Two residential patterns common among the Maya are: transitory uxrilocal in which the son-in-law moves temporarily with the parents of the bride; and enduring patrilocal in which the wife resides in the home of her husband’s parents (Hanks (1990: 97).

4. Symmetry and asymmetry refer to patterns of interaction (relationships) among coresident members of a household. Symmetric relationships are reversible and involve solidarity and equivalence of the individuals participating such as “attending the same school” or “having the same parent”. Contrastingly, asymmetric relationships are those base that separate or distinguish members involved including “being older than” or “richer than” (Hanks 1990: 46). Hanks applies both concepts to identify linguistic forms exchanged by members of a household when speaking to each other. Segmentation alludes to linguistic forms that refer to space as “...an array of segmented parts...”(Hanks 1990: 27)

5. **Schema**: “…designates a prefabricated conceptual structure that remains relatively invariant throughout successive instantiations and that provides the holistic understanding of some portion of reality.” (Hanks 1990: 81-82)
CHAPTER 5

TRADITIONAL HOUSES IN YUCATAN

The purpose of this chapter is to present data gathered from thirty-one solares (house-lots) from fieldwork in four communities during 2002 (see Table 5.1). A brief description of the municipios (county) and each community’s cultural ecology, economics, and social setting provides the context for a discussion of Maya house form and use of domestic space in Maya solares. Detailed descriptions of each house-lot with additional photos and maps are in Appendix A. Next, field observations, interview data, maps of each community and solar are used to characterized rural houses as well as the material culture associated with them.

Table 5.1. Communities and solares (house-lots) surveyed in 2002.

<table>
<thead>
<tr>
<th>County</th>
<th>Community</th>
<th>Solares</th>
<th>Percentage total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicxulub Pueblo</td>
<td>Chicxulub Pueblo</td>
<td>8</td>
<td>25.81</td>
</tr>
<tr>
<td>Dzitas</td>
<td>Yaxche</td>
<td>4</td>
<td>12.90</td>
</tr>
<tr>
<td>Tinum</td>
<td>Piste</td>
<td>2</td>
<td>6.45</td>
</tr>
<tr>
<td>San Felipe Nuevo</td>
<td></td>
<td>17</td>
<td>54.84</td>
</tr>
</tbody>
</table>

Municipio of Chicxulub Pueblo

Chicxulub Pueblo is located between 20° 40’ and 20° 20’ North and 88° 13’ 88° 01’ West, in the north-central region of the State of Yucatan. The municipio covers an area of 8,371.6 square kilometers with an average elevation of 26 meters above sea level. The area has a mean annual temperature of less of 26 degrees centigrade with average rainfall between 600 and 1000 millimeters. Vegetation coverage consists of a
low scrub forest with trees reaching a maximum of between seven to eight meters and a dense undergrowth of deciduous shrubs. *Petenes* or tree islands as wells as a low mangrove forest dominate the north portion of the *municipio* (Wilson 1980).

The *municipio* consists of 12 communities, including the towns of Chicxulub Pueblo, Guadalupe Labastida, San Jose Chacan, San Antonio Baspul, Santa Maria Ontiveros, X-Cotum, El Huayabo, El Esfuerzo, Chum Jabin, Santa Clara, as well as the haciendas Xiutumuc, Cofradia, Pedregal, San Juan X’utun, and Lactun (Ley Organica del Estado de Yucatan 2002). In 1988, the *municipio* changed its name from Chicxulub to Chicxulub Pueblo and declared the town of Chicxulub Pueblo, located 20 kilometers north of Merida, as head of the *municipio*, (INEGI Archivo Historico de Comunidades, 2002). Chicxulub Pueblo has a population of 3,134 (0.21 percent of the state total) with 16.75 percent reported as Mayan speakers (INEGI 1997)

During Colonial times, Spanish haciendas engaged in self-sustaining cattle and corn enterprises dominated the economy. Occasionally, haciendas exported surpluses of certain products. In the mid 1800s, Chicxulub’s economy shifted toward henequen production until the industry collapsed in the 1970s. Today, the economy of Chicxulub Pueblo is diverse. More than seventy percent of the work force is males employed at *maquiladoras* located along the Merida-Progreso highway. Construction, commerce, transportation, and the service and tourism industries in Merida also provide jobs for the residents of Chicxulub. Women take jobs in the manufacturing industry, services, and education in the surrounding area. Some families own local roadside stores that carry a wide variety of groceries and non-food items. More wealthy families own the larger stores but most are small convenience stores that are known as *tienditas* that service
the families living in each block. The older generation of Chicxulubeños is still practicing *milpa* agriculture combined with cattle ranching, pig raising, and beekeeping. Chicxulub Pueblo has 437 *ejido* communities covering an area of 4,853 hectares of the *municipio* area (see Figure 5.1).

![Figure 5.1. Map showing the *municipio* of Chicxulub Pueblo *ejido* boundaries, town layout, and thatch-roofed houses distribution.](image)

**The Town of Chicxulub Pueblo**

Chicxulub Pueblo is a transitional community located between the urban area of Merida and the rural landscape that characterizes the northwest coast of Yucatan. The settlement covers an area of 4.34 square kilometers. Its layout follows a grid pattern typical of the Spanish settlements founded during Colonial times. A highway running from the south end of town to the northwest, divides the town in half. The road connects Chicxulub with the *ejido* fields to the north and northwest, and to the town of Chicxulub Puerto in the coast. An impressive Sixteenth century stone Church dominates the main
plaza (see Figure 5.2). Built by Spanish Franciscan missionaries during *reducciones* period, the Catholic church is the center for festivities and weekly worship for the community. A vacant field, south of the church and a children’s playground located to the north are often used as an arena for bullfights and food stands during the Virgin of the Candelaria celebration. The *municipio* and *ejido* buildings located in the northeast section of town, have a parking lot that serves as grounds for a yearly community fair. West of the church is a large field used mainly for weekend soccer and baseball games. A public market with bright orange and white walls and a park with a basketball court are located northwest of the field. The market opens daily offering fresh produce. Several *loncherias* (restaurants), located alongside it, serve traditional food, sandwiches, and refreshments. The area around the park and market is the center for community gathering and daily commuting to Merida (Figure 5.3).

Most of the inhabitants use public transportation including buses, *combis* (vans), and *tricitaxis* (tricycles) although cars are common among the wealthy residents. Houses surrounding the main plaza are constructed of stone or concrete block with all the services (such as interior plumbing, power, telephone service) of contemporary architecture. My survey revealed close to 147 traditional thatched-roofed houses scattered around nontraditional stone buildings. Public services include paved streets, lamps, water lines, telephone, and cable TV. Chicxulub Pueblo has two abandoned *henequen* fields in the northeast section of the community, a health clinic, and a *molino* (corn mill) and *tortilleria*, a bakery, some *cantinas* (bars), schools, and a gated cemetery on the western outskirts of the town.
Figure 5.2. Chicxulub Pueblo Sixteenth century Church.

Figure 5.3. Chicxulub Pueblo main street and market area.

From September 20 to 24, 2002, Hurricane Isidore caused a significant amount of damage in the Yucatan Peninsula. Chicxulub Pueblo was among those municipios declared disaster zones by the Mexican government on September 27th, 2002. Damages included the destruction of most of the thatched-roofed houses, the loss of
corn and bean crops, as well as damage to the cattle, honey, and poultry industries (Secretaria de Gobernacion Diario Oficial 2002). My data on traditional housing from the town of Chicxulub Pueblo represent the last record of those structures.

**Traditional Houses at Chicxulub Pueblo**

Data from this community include eight _solares_ (5.44 percent of total thatched-roofed houses) whose residents were either friends of or related to the _comisario ejidal_ authority. Five _solares_ were occupied by residents, one was being used as a welding shop, another was a convenience store, and the last _solar_ contained only the remains of stone foundations where structures once stood. Distribution of traditional houses in Chicxulub revealed that dwellings followed the street layout creating a “C” shaped spatial pattern along the north, west, and south sides of town (see Figure 5.4). On the west side, thatched houses are situated on the old road to the _henequen_ fields. Colonial era stone-houses surround the main plaza whereas modern concrete or block construction is located mostly in the east portion of the community or has replaced historic buildings. The distribution of Colonial era architecture follows a concentric pattern for the town layout. The Spanish authorities lived around the church and the indigenous population was confined to the outskirts near roads, fields, and haciendas. Today, the Colonial pattern has been reinterpreted and traditional houses are spatially distributed by the occupation of its residents. There is an outer semicircle where people practice agriculture and reside in thatched-roof houses and an inner circle, located east of town, whose residents are not involved in food production, have larger incomes or an education beyond elementary school.
Data revealed that in Chicxulub Pueblo, family size averages 3.75 members, with females representing 53.12 percent of the total. Both adult males and females have similar education with secundaria (junior high) being the highest level of instruction. All the families practice Roman Catholicism and wear nontraditional clothing. Less than 38 percent of the residents are ejidatarios and of these, only 15.62 percent are Mayan speakers. An average of 1.5 persons per solar worked outside the domestic space earning a median monthly income of $175.00 dollars. In most cases, seventy percent of the total income is used to pay for groceries (50 percent), utilities (5.63 percent), and health expenses (15 percent) and the balance is invested in domestic animals (chicken,
turkeys, and pigs), appliances, or jewelry. All the solares I sampled are privately owned. In seventy-five percent of the cases, the solar is inhabited by nuclear families that originated from Chicxulub Pueblo. In the instance of extended families, one case presented a matrilocal residency pattern wherein the daughter, her husband, and offspring established residency with the wife’s parents. The other extended family included a daughter and her children who also moved in back with her parents after becoming divorced.

The average solar is rectangular in shape covering a surface area of 1217.39 square meters and is surrounded by albarradas (87.5 percent) (see Figure 5.5). Roofed areas add an average of 113.58 square meters (9.32 percent of the total solar area), allowing for more than 90 percent of the solar domain to be used for other activities. Solares have an average of six structures including main house, kitchen, palapa, fenced-in-toilet, pig or chicken pen, a well, and a roof area for the laundry basin (batea). In all solares I surveyed, the main house and the kitchen were arranged along the same axis. The kitchen is located behind the main structure. Behind it the laundry basin is found. These structures constitute the residential area used on average for 25 years. In 50 percent of the sample, the residential area dates to the 1970s with the oldest dating to 1902. Palapas, pens for chicken and pigs, and in half of the cases a well, are built in transitional areas. The shrub area usually contains a fenced-in-toilet (62.5 percent of cases), fruit trees and bushes, and piles of refuse (50 percent). In 37 percent of the solares the well is located in the shrub area. The more common trees found in shrub and transitional areas are citrus trees (lemon, sour orange, sweet orange, or lime),
Figure 5.5. Rectangular-shaped lots at Chicxulub Pueblo.  
ramon (*Brosimum alicastrum*), guaya (*Talisia olivaeiformis*), and guano palms (*Sabal mexicanum*). Only one solar (12.5 percent) had a *kaanche* (elevated garden) with green and Habanero chiles, papaya seedlings, and *brujita* plants (*Bryophyllum calycinum*). In 87.5 percent of the cases, *solares* have both electrical power and potable water. The preferred cooking fuel is firewood (62.5 percent). One half of the *solares* also have a gas stove. In general, solar residents sort their refuse, separating cans, glass, and other metal utensils. Organic refuse is destroyed by fire (50 percent) and the remaining garbage is transported to the *municipio* landfill (50 percent). None of the families practice any form of recycling although reuse of some materials as fill was observed in 25 percent of the cases.

On average, the main structure is apsidal shaped with a stone foundation, cement floor, *kolopche* exterior walls covered with grass and mud in the interior, and *guano* roof combined with tar cardboard or tin boards. More than 60 percent of the main structures are in good shape, that is, habitable and with no major leaks in the roof. Structure dimensions average 7.91 meters in length (modes of 7.50 and 8.30 meters) with a standard deviation of 0.77 meters, a width of 4.06 meters (mode of 4.00 meters, standard deviation of 0.33 meters), and 1.85 meters in height of walls (mode of 1.70 meters) (see Table 5.2 and Figure 5.6). In 62.5 percent of the cases, the structure was oriented in an east-west axis, and with the main access facing the street.

All kitchens in Chicxulub Pueblo are rectangular shaped. Kitchens have stone foundations (62.50 percent), dirt or cement floors, no walls (37.5 percent) or if present *kolopche* was used for exterior walls (25.00 percent), and tar cardboard for the roofs. As in the case of the main structures, 50 percent of the kitchens were in good condition and
Table 5.2. Summary of dimensions for Chicxulub Pueblo lots, main structures, and kitchen areas in square meters.

<table>
<thead>
<tr>
<th>Chicxulub</th>
<th>Average</th>
<th>Standard Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size Lot</td>
<td>1217.39</td>
<td>621.55</td>
</tr>
<tr>
<td>Roof area</td>
<td>113.58</td>
<td>59.38</td>
</tr>
<tr>
<td>No roof area</td>
<td>1103.87</td>
<td>651.62</td>
</tr>
<tr>
<td>Main length</td>
<td>7.91</td>
<td>0.77</td>
</tr>
<tr>
<td>Main Width</td>
<td>4.06</td>
<td>0.33</td>
</tr>
<tr>
<td>Kitchen Length</td>
<td>5.85</td>
<td>2.97</td>
</tr>
<tr>
<td>Kitchen Width</td>
<td>3.36</td>
<td>1.64</td>
</tr>
</tbody>
</table>

Figure 5.6. Main structure measurements for Chicxulub Pueblo.

not in need of repairs. Kitchens have a length of 5.85 meters (2.97 standard deviation, mode of 7.00 meters), a width of 3.36 meters with a standard deviation of 1.64 meters.
(mode 4.60 meters), and a wall height of 1.31 meters (1.80 mode, 0.92 standard deviation). In 75 percent of the cases, the kitchen also has an east-west axis parallel to the main structure. In 62.5 percent of the sample, the kitchen and main structure are joined (see Figure 5.7).

![Figure 5.7. Kitchen measurements for Chicxulub Pueblo.](image)

I compiled a listing of domestic artifacts described by both Redfield and Villa Rojas (1934) for the households of Chankom, Yucatan, and Wauchope’s (1938) study of Maya houses (see Table 5.3). This list was used in every case to assess the changes occurring in material culture. Items were separated by structure (main structure and kitchen), and reflect a generalization of common household possessions in the 1930s. By then, iron and metal items as well as some European artifacts had replaced prehistoric artifacts. However, Redfield and Villa Rojas (1934) suggested that the people still identified the current artifacts with the Mayan words used for the old ones.
For example, the original griddle made of ceramic and called *xamach* was replaced by an iron version in the 1930s, but still referred to with the same Mayan word. Similar examples were described for metal and iron artifacts including machetes, axes, pails, and knives that had replaced obsidian, chert, or wood versions.

Table 5.3. List of traditional material culture found in Maya houses and kitchens. From Wauchope 1938, Redfield and Villa Rojas 1934.

<table>
<thead>
<tr>
<th>TRADITIONAL MATERIAL CULTURE</th>
<th>LOCATION</th>
<th>ITEMS</th>
<th>LOCATION</th>
<th>ITEMS</th>
</tr>
</thead>
</table>
| Main Structure               | Hammock        | Kitchen 3-stones Hearth 
(\textit{k’oben}) | Kitchen        | Griddle                        |
| \textit{Quinque}             |                |                               | \textit{Banqueta} |                              |
| \textit{Kaanche} (Bench)     |                |                               |                |                              |
| Wooden Shelves               | \textit{Metate} and \textit{Mano} | Metate and Mano |                |                              |
| Wooden Boxes                 | Metal Hand Mill |                               |                |                              |
| Metal Bound Trunk            | Banco          |                               |                |                              |
| Clothing                     | Calabashes     |                               |                |                              |
| Draw-string Bags             | Gourds         |                               |                |                              |
| Small Wooden Table           | Metal Kettle   |                               |                |                              |
| Wash Troughs                 | Ceramic Pots   |                               |                |                              |
| Woven Baskets                | Ceramic Bowls  |                               |                |                              |
| Gourds                       | \textit{Botijuela} |                              |                |                              |
| Ears of Corn                 | Baskets        |                               |                |                              |
| Family Shrine                | \textit{Peten} |                               |                |                              |
| \textit{Peten}               | Metal Pots     |                               |                |                              |
| Machete                      | Metal Pails    |                               |                |                              |
| Ax                           | Knives         |                               |                |                              |
| Wooden Hooks                 | \textit{Batidor} |                              |                |                              |
| Candle Lights                | Wooden Utensils|                               |                |                              |
Analysis of cultural material from Chicxulub Pueblo reveals that traditional items only represent 13.25 percent of the artifactual inventory (see Figure 5.8). Main structures have more traditional items (16.6 percent) than kitchens (8.57 percent) with family shrines, *kaanches* (bench), hammocks, *bancos* (small table), and the *k’oben* (three-stones hearth) being the most commonly found respectively. Modern artifacts constitute 86.75 percent of the inventory with the kitchen having a larger percentage (91.42) than the main structure (83.3 percent).

![Figure 5.8. Percentages of material culture for Chicxulub Pueblo.](image)

Aluminum pots and pans are widely distributed and have replaced iron-cooking utensils common to Maya kitchens of the 1930s. Chairs represent another artifact commonly found in main structures sampled around Chicxulub Pueblo. They are usually located in the main structure suggesting that *kaanches* (benches) are no longer operational and were replaced by an European style alternative that provides function and perhaps status. Other modern commodities include television sets, plastic products such as bags, buckets, and dinnerware, cardboard boxes, and cleaning utensils.
Since Colonial times, Chicxulub Pueblo has experienced changes that affected the community layout and its organization. A concentric pattern centered around Spanish authorities was replaced by a similar configuration concentrated on those who lived in non traditional housing. Data suggest that in most cases agriculture does not fully provide for household economies and wage-based jobs offer alternatives. The effects of exposure to the urban area of Merida, as well as a shift in the economic basis are evident both in traditional house construction and in the material culture found in households. Scarcity of raw materials may have initially triggered the replacement of traditional paraphernalia used in roofing, walls, and floors construction, including palms, kolopche, and sascab (white powdery calcium carbonate), with modern, more convenient, and low-cost alternatives such as tar cardboard, concrete blocks, and cement.

**Municipio of Tinum**

Tinum is located between 20°40' and 20°53' North, and 88°21' and 88°33' West, in the eastern section of the state of Yucatan. The municipio covers an area of 393.44 square kilometers with and average altitude of 22 meters above sea level (see Figure 5.9). The area has a mean annual temperature of 26 degrees centigrade with a mean rainfall ranging between 1100 and 1300 millimeters. Vegetation coverage consists of deciduous seasonal forest with trees reaching a maximum between 20 and 10 meters. This forest is characterized by trees that shed their leaves during the dry season and evergreen species growing underneath.
The municipio of Tinum consists of 36 communities, including Tinum, Loop Xul, Piste, Tohopku, San Francisco, X-Calakoop, San Felipe (Viejo), San Felipe Nuevo, Balantun, Chichen Itza, Pom, San Fabian, Kuxche, Macuchen, Santiago, Zodzila, Balmi, Chacnicte, Chendzonot, Dolores Alba, San Felipe Kicil, Xmahkaba, San Angel, San Cristobal, San Rafael, Santa Tomas, Tasbichen, Los Tres Reyes, Chan Xkanyuyum, Santa Ana, San Marcos, San Diego, San Mateo, San Jose, Chichil, and Dzolotk. The town of Tinum, head of the municipio is situated 120 kilometers southeast of Merida. The municipio of Tinum has a population of 8,327 individuals (0.55 percent of the state total) with 75 percent of them (6,301) reported to be Mayan speakers (INEGI 1997). Males made up 80 percent of the total work force in the municipio and are

Figure 5.9. Map showing the Municipios of Tinum and Dzitas as well as the location of communities surveyed.
involved mostly in *milpa* agriculture, cattle ranching, commerce, and hotel and restaurant services. For females who work outside the household, commerce, manufacture, and education are the main sources of income. Tinum has 1,421 *ejido* communities covering approximately 1,684 hectares of the *municipio* area.

**The Town of Piste**

Piste covers an area of 2.51 square kilometers with a semi-dispersed street pattern along a main highway. Mexico’s highway A 180 runs east-west connecting the town of Piste with the archaeological zone of Chichen Itza and Valladolid 50 kilometers to the east. Piste is a town divided in two parts, a residential area for permanent residents and a tourist area. This division is evident in the town layout. The residential area has public buildings, such as the main plaza with a stone Catholic Church dating *circa* 1734, a *municipio* building, a market, elementary and high schools, small businesses such as drugstores, *cantinas* (bars), a grocery store, and craft stores (see Figures 5.10 and 5.11). The tourist area includes hotels, *posadas* (lodges), and restaurants, all located along the highway. Situated on narrow non-paved streets hidden from tourist areas are more than 250 *solares*, most (80 percent) with thatched-roof houses where people who work for the tourism industry and/or still practice *milpa* agriculture live. The *municipio* building also houses a jail and is the quarters for the two-man police force that patrols the streets. A four-lane highway connecting Merida and Cancun passes in one kilometer north of the town limits. Construction of the highway lasted three years (1991-1994) providing jobs for several community members. Due to a lack of interest from the community and scarcity of research funds I gathered data from
Figure 5.10. Piste, Eighteenth century Church

Figure 5.11. Piste community map.
only two solares at Piste (representing one percent of the solares counted). Both families were related to the comisario ejidal from San Felipe Nuevo, a relationship that certainly helped throughout the survey and interview process.

**Comisariado Ejidal San Felipe Nuevo**

In 1980, scarcity of agricultural land and family disputes prompted two families to move to the northern section of the ejido of San Felipe and established the rancho of Nuevo San Felipe. This new community initially had 45 inhabitants. In twenty years the rancho has doubled in population to more than 92 people. In 2000, the community was renamed San Felipe Nuevo and categorized as “undefined” by INEGI (Archivo Historico de Comunidades, 2002). The settlement covers an area of 0.083 square kilometers and is divided into eighteen solares, a public park, and an elementary school. Although thatched-roof houses dominate the landscape, modern constructions include the comisariado ejidal, an abandoned chapel located on the middle of the park, and the school (see Figures 5.12 and 5.13).

In 1995, the State of Yucatan provided public services -such as water, electricity, cable television-, a water pump, paved streets and lamps around the park and the school, a community clinic, and a molino (electric corn mill). By 2000, Solidaridad, a state program created to improve living conditions of rural communities, granted the solares cement floors and hearths for the main structure and kitchen respectively. Today, the community clinic is abandoned; only the foundation of the molino remains, and the machinery was moved to one of the houses at solar 5.
Figure 5.12. San Felipe Nuevo community map.

Figure 5.13. San Felipe Nuevo: Comisariado ejidal building.
Although San Felipe Nuevo began as an *ejido*, today the community consists mostly of *parcelarios* (who owned *ejido* land), and those who rent land from *parcelarios* of San Felipe Viejo. The main economic activity for the men of San Felipe Nuevo is *milpa* agriculture combined with temporary jobs at Piste or masonry work for the archaeological project at Chichen Itza. Some of the adults worked in Cancun for short periods of time but returned to San Felipe Nuevo.

Women stay at home to care for the children, tend to the fruit gardens, and raise pigs, chickens, and turkeys. Eggs and fruit trees supplement their dietary needs, however meat from poultry and pigs is only consumed during family gatherings and community festivities. At the time of my research, the *Solidaridad* program provided ten rams and sheep to three families to pursue a new meat production enterprise. These families built a large fenced pen just north of *solar* 5 and furnished it with a water tank and feeding bowls. They hope to sell the meat at weekend markets in both Piste and Valladolid. Another family also started a leather craft shop to produce wall decorations adorned with Maya glyphs to be sold to the thousands of tourists who visit Chichen Itza daily. At San Felipe Nuevo, I interviewed the inhabitants of and surveyed sixteen *solares* (89 percent). Data include the community clinic and *molino* structures; both structures had thatched-roofed buildings as well.

**Traditional Houses at Piste and San Felipe Nuevo**

From the 19 *solares* with traditional housing investigated in Piste and San Felipe Nuevo, both communities of Tinum County, 21.05 percent have house structures that were not used as residences. One structure was used as a leather craft shop, another
functioned as a storage area, one was under construction, and the last was a kitchen that had recently burned. Tinum data reveal that solares used as residences have a family size averaging 4.89 individuals with females accounting for 52.69 percent of the population sampled. A mean of 2.32 individuals per solar are Mayan speakers and 94.73 percent of the families are ejidatarios practicing milpa agriculture. An average of 1.53 individuals per solar are cultivating milpas. In general, agricultural fields have a size of 1.95 hectares and on average are located 2.39 kilometers from the house-lot. More than forty-four percent of the ejidatarios own their fields. The rest lease the plots from San Felipe Viejo holders. Nuclear families account for 73.7 percent of the house-lots surveyed and three solares from San Felipe Nuevo have extended families. In 66.66 percent of the cases, the extended family follows a patrilocal residency pattern with the son and his wife moving back with his parents. Only one case of matrilocal residence was documented in San Felipe Nuevo in which the eldest daughter and her husband returned to her parents’ household. However, the entire community of San Felipe Nuevo is linked by kinship. The adult married offspring would often establish residence close to their parents (see Figures 5.14 and 5.15).

At San Felipe Nuevo, spatial organization of solares is a physical manifestation of the network of kin relationships; kinship is reflected in space throughout closeness. Two families, the U., and the C., (represented by initials to maintain anonymity) are the descendants of the original founders of the community. The N., family is related to both the U., and the C. As Figure 5.14 shows, founder families divided the town into two sections, each surrounding an open space or plaza. The nature of social relationships suggests that the settlement layout depicts at least two generations of close corporate
groups that favored cross-cousin marriage as well as patrilocal and neolocal residency. Cross-cousins are the children of one’s parent’s sibling of the opposite sex (mother’s brother or father’s sister, see Egan (1934) for a discussion of cross-cousin marriage among the Maya). Redfield and Villa Rojas (1971:97) described that at Chankom, parents were responsible for finding a suitable wife for their sons either in the village or outside it. Unfortunately, I was not able to determine the degree of parental involvement in marriage arrangements in San Felipe Nuevo. However, in the case of households where one spouse is from outside the community, the parents typically know each other or are distantly related. I will return to this point later in the discussion of settlement configuration at Yaxche. In the case of the Piste households, the head of solar 2 is also an U., the eldest son of the comisario ejidal at San Felipe Nuevo married
Figure 5.15. Kinship chart showing family relationships for San Felipe Nuevo
to an M., from Yaxche. Members of solar 1 are related to the C., family also from Yaxche.

Land accessibility is an important factor affecting post-marital residency decisions. Because San Felipe Nuevo is a reasonably new settlement, the community has sufficient land available so that new households could establish a new solar next to either parent. However, San Felipe Nuevo was founded in an archaeological site, Chichen Itza, and the Mexican government has federal regulations that limit any construction of permanent buildings on the area. For example, solares 1, 2, and 12 are located on top of a prehistoric Maya platform supporting the remains of several structures. Residents from those solares cannot legally dig wells or build structures on top of the archaeological remains. Instead, they resort to building structures around them. A similar situation was noted in solares 7, 10, and 11. Additionally, population growth as well as changes in ejido land ownership (refer to chapter 2 for a discussion of the ejido) are altering this pattern by forcing parents to subdivide their solar to accommodate the new couple wanting to reside with them. Otherwise, the new couple will have to move into another community.

Still, by living in the same community and close to each other, households are able to share the maximum of corporate functions (including production, distribution, consumption, reproduction, collective ceremonies, and co-residency) facilitating the transmission of rights and property, pooling of resources, and performance of collective ceremonies. An example of this cooperation was the organization of a Chaak Chaak, a rain ceremony, during the summer of 2001 (see Redfield and Villarojas 1971 for a
description of the ritual). While participating in another project (see Winemiller 2003), I
was invited by the U., family to document the ceremony in San Felipe Nuevo. Each
household provided chickens, masa, and liquor for the ceremony as well as money to
pay the h’mem (priest in Yucatec Mayan). Females were not allowed to directly
participate in the ritual but their involvement was also important consisting in getting
together to prepare the ceremonial food in one of the households. On the other hand,
males of all ages were directly involved and remained in one place for two days, the
duration of the ceremony. As spectator of this “family” event, I became aware of the
degree of cooperation among members of this extended household as well as the
effects of gender and age in both labor and ceremonial participation. Both adult males
and females have similar education and secundaria (junior high) is also the highest level
of instruction. Forty four percent of households wear traditional dress (huipil) or a
combination of nontraditional clothing and huipil. All the families are Roman Catholics
and Mayan speakers. More than 77 percent of the residents are ejidatarios with 22.22
percent earning an additional salary working in Piste. An average of 1.5 persons per
solar work earning a median monthly income of $111.00 dollars. In most cases, 57.23
percent of the total income is used to pay for groceries, utilities, and health expenses
and the rest invested in domestic animals (chicken, turkeys, and pigs), appliances,
electronics, or jewelry.

In the municipio of Tinum, 57.9 percent of the solares have rectangular shape
with an average surface area of 1608.78 square meters (891.97 square meters as
standard deviation) and are surrounded by albarradas (84.21 percent) (see Figure
5.16). Roofed areas extend an average of 115.23 square meters (7.16 percent of the
Figure 5.16. Rectangular-shaped lots at Tinum. Top, solar 2 in Piste. Center, solar 9 in San Felipe Nuevo. Bottom, solar 10 in San Felipe Nuevo.
total solar area), resulting in more than 92 percent of the solar domain left for other activities. Solares have a mean of 6.16 structures including main house with shower area, kitchen, fenced garden, pig or chicken pens, water tank, storage area for corn or logwood, kaanche (elevated garden), a roofed area for the laundry basin (batea), and in three cases a shelter for beehives. In 72.22 percent of the solares investigated, the main house and the kitchen follow the same axis.

The kitchen is located behind the main structure with the laundry basin behind. In 11.11 percent of the cases, the main structure and the kitchen are arranged following a 90 degrees angle as described by Repetto (1991) for the town of Uci (see Figure 3.5). Another type of arrangement found is when the kitchen joins the main structure in one of the corners but parallel to it. This pattern is evident in solares 3, 4, and 6 of San Felipe Nuevo wherein all individuals are members of the same family (see Figure 5.17). In all cases the main structure and the kitchen constitute the residential area and have an average residency period of 14 years. More than 37 percent of the solares sampled in San Felipe Nuevo date to the 1970s with the oldest dating to 1978. One solar in Piste dates to 1972, and the other to 1998.

Kaanches (elevated gardens), fenced gardens, pens for chickens, and storage structures were built in the transitional area. The shrub area usually contains the toilet, pens for pigs, fruit trees and bushes, beehive structures, and piles of refuse (50 percent, see Figure 5.18). Only one solar has a well located in the boundary with the offspring households. Common trees to the shrub and transitional areas are citrus trees nance (Byrsonima crassifolia), plums, almonds, oak, cedar, zapote (Manilkara zapota), chaka (Bursera simaruba), jabin (Piscidia piscipula), piich (Enterolobium cyclocarpum),
chukum (*Phuthecellobium albicans*), tamarindo, *be* (*Sida acuta*), and *chaya* (*Bursera simaruba*) plants.

Eight *solares* (42.1 percent) had *kaanches* (elevated gardens) with herbs including mint, chives, onion, and garlic. Three *solares* had elevated metal screens used to dry pumpkin seeds. Once dried, the seeds are grounded to form a soft paste that would be used as a condiment for several traditional and ritual dishes. All the *solares* have power, potable water, and cable television. Preferred cooking fuel is firewood (94.44 percent), and only one *solar* in Piste has a gas stove. In average, a family consumes 33 kilograms of wood per week. They usually collect the firewood from the *milpa* or the forest surrounding the house-lot. A total of 61.11 percent of the *solar* residents sort their refuse separating cans, glass, and other metal utensils. Organic refuse is destroyed by fire (94.74 percent) and the rest is transported to the *municipio* landfill (61.11 percent). Only one of the families practice any recycling although reuse of some materials as fill was observed in all the cases.
Figure 5.18. Structures found in the transitional area from San Felipe Nuevo. Top left, *kaanche* in *solar* 1. Top right, pig enclosure also in *solar* 1. Center left, Beehive structure from *solar* 10. Center right, turkey pens in *solar* 6. Bottom left, toilet area in *solar* 10. Bottom right, metal screens used to dry seeds also from *solar* 10.
More than 47 percent of the main structures are rectangular shaped with cement foundation, cement floor, kolopche exterior walls occasionally covered with cardboard (5.26 percent), block and mortar (21.05), or plastic bags (5.26 percent) on the interior, and guano roof combined with tar cardboard. Almost all of the main structures are in good shape (94.73 percent) that is habitable and have no major leaks in the roof.

Structure dimensions average 7.69 meters for the length (modes of 7.00 and 7.90 meters) with a standard deviation of 1.33 meters, a width of 4.39 meters (mode of 4.40 meters, standard deviation of 0.57 meters), and 1.88 meters for the height of the walls (mode of 1.87 meters) (see Table 5.4 and Figure 5.19). In 73.68 percent of the cases, the structure axis is east-west, with the main access facing the street.

Table 5.4. Summary of dimensions for both Piste and San Felipe Nuevo (SFN) lots, main structures, and kitchen areas in square meters.

<table>
<thead>
<tr>
<th>Piste/SFN</th>
<th>Average</th>
<th>Standard Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size Lot</td>
<td>1608.78</td>
<td>891.97</td>
</tr>
<tr>
<td>Roof area</td>
<td>115.23</td>
<td>63.95</td>
</tr>
<tr>
<td>No roof area</td>
<td>1495.94</td>
<td>861.67</td>
</tr>
<tr>
<td>Main length</td>
<td>7.68</td>
<td>1.33</td>
</tr>
<tr>
<td>Main Width</td>
<td>4.39</td>
<td>0.57</td>
</tr>
<tr>
<td>Kitchen Length</td>
<td>5.68</td>
<td>1.45</td>
</tr>
<tr>
<td>Kitchen Width</td>
<td>3.19</td>
<td>0.93</td>
</tr>
</tbody>
</table>

In 57.89 percent of the cases, kitchens in the municipio of Tinum are apsidal in shape with stone foundations (52.63 percent), dirt floors (buk’tun), kolopche as exterior
walls (73.68 percent) or if present cardboard interior walls (10.53 percent), and guano roofs (78.94 percent). In 52.63 percent of the cases, the kitchen is situated on a north-south axis and the balance has an east-west axis (see Figure 5.20).

Cultural material from the municipio of Tinum revealed that traditional items represent 16.09 percent of the household inventory (see Figure 5.21). Main structures and kitchens have similar amounts of traditional items (17.14 percent and 15.0 percent respectively) with hammocks, kaanches (benches), family altars, petenes, gourds, wooden shelves, and ceramic pots being the most common items in the compound. Modern artifacts constituted 83.90 percent of the total inventory.
Figure 5.20. Kitchen measurements for Piste (PST) and San Felipe Nuevo (SFN).

Figure 5.21. Percentages of material culture for Piste and San Felipe Nuevo

Overall, the kitchen total inventory of modern items (85 percent) is larger than the observed at the main structure (82.6 percent). Aluminum pots and pans are also widely distributed and have replaced iron-cooking utensils. Cement hearths are replacing the traditional *k’oben* (three-stones hearth). Plastic products including bags, containers, and
dinnerware are found in every house-lot. Television sets, sewing machines, refrigerators, stereo units, blenders, and washing machines are a few of the modern appliances and electronics that now are part of the Maya house-lot. Chairs and large tables are commonly found in main structures sampled around Tinum. Tables are located either in the main structure or in the kitchen whereas chairs are mostly found in the main structure. The integration of these artifacts into the domestic landscape may be interpreted as the result of the globalization phenomenon affecting yet the most isolated communities around the world. In the case of San Felipe Nuevo, located inside the archaeological site of Chichen Itza, the government of Yucatan has not only constructed new highways but also introduced services such as cable television, potable water, and power to the smallest communities located around Chichen Itza.

The cultural landscape has changed considerable since Redfield and Villa Rojas were in Chankom in the 1930s. In particular, the tourism industry has built large hotels, restaurants, and shops to take care of visitors casting a shadow upon the rural landscape once covered only with *milpas*. People living in the surrounding areas are not only able to buy items that were restricted to urban areas but traveling to cities such as Merida and Cancun is also easier and sometimes necessary. In years when *milpa* production is particularly poor, farmers are forced to search for temporary jobs at Piste, Valladolid, or Cancun. Migration to urban areas as wells as community participation in the cash economy are factors to consider when addressing changes in material culture and housing at both San Felipe Nuevo and Piste.
In summary, Piste and San Felipe are two different communities experiencing similar changes. Data suggest that migration, and participation in a cash economy are two of the factors responsible for the adoption of modern material culture and the changes evident in house construction. However, San Felipe Nuevo is still a close corporate community in which kinship relationships play an important role in the configuration of the settlement and the identity of its inhabitants. In that sense, the social landscape is still rural and innovations are being reinterpreted so the integrity of the community persists to reinforce social bonds. Differences are mostly evident inside the structures where new and old objects are incorporated without affecting the roles and activities of the household residents. Nevertheless, changes in the solar area and structures are not affecting the relationship between the community and the household because kinship bonds are stronger than any expression of wealth.

**Municipio of Dzitas**

Dzitas is located at 20° 45' and 20° 55' North, and 88° 27' and 88° 38' West. The municipio covers an area of 456.03 square kilometers at an average elevation of 20 meters above sea level. The area has a mean annual temperature greater than 26 degrees centigrade with mean rainfall ranging between 1100 and 1200 millimeters. The surrounding vegetation coverage is similar to that described for Tinum. Dzitas consists of ten communities including Xocempich, Yaxche, Dzitcacao, Lanchen, X-Noh Sahcab, Santa Esperanza, Santa Ines, Belen Uno, and Santa Rosa. The head of the municipio is the town of Dzitas located 108 kilometers southeast from Merida. INEGI (1997) reported that the municipio of Dzitas has a population totaling 3,045 individuals (0.20
percent of the state total) 67 percent of which (2,038) are Maya speakers. The county economic basis is *milpa* agriculture and cattle ranching with construction jobs occupying a second place. These activities involve mostly men who constitute 78 percent of the work force. Other sources of income include manufacturing hammocks and similar products that are marketed directly to the tourists in both Merida and Cancun, and performance of wage labor in the service industry. Both activities involve mostly women who work at home weaving hammocks in between household chores (for details on the hammock weaving industry in Yucatan refer to Hull 2004). Dzitas has 407 *ejido* communities covering 1,200 hectares of the *municipio* area.

**Comisariado Ejidal Yaxche**

In 1900, three men and two women founded Yaxche as a country state (*finca*) with the original name of Yochec. In 1910, the census reports fourteen individuals living in a place (*paraje*) named Yaxche. By 1921, Yaxche became a ranch with a population totaling 27 persons. The 1980 census reported a population of 124 individuals, 63 males and 61 females (INEGI Archivo Historico de Cominidades, 2002). Land scarcity, poor crops, and a desire for better opportunities have impacted the community. Families migrated to Cancun, Merida or the United States reducing the population to less than 60 individuals.

Today, Yaxche covers an area of 0.020 square kilometers with nine *solares*, a *comisariado ejidal* building, a chapel with Sunday services, an elementary school, and a park with basketball hoops (see Figures 5.22 and 5.23). Public services including water, power, and cable TV, were introduced in 2000. In 1987, an unpaved road opened that
connects Yaxche with the main highway. Neither this road nor the community streets are paved. The community has eighteen *ejidatarios* practicing mainly *milpa* agriculture. As in San Felipe Nuevo, males combine farming activities with temporary jobs at Piste or in some cases travel to Cancun during the low of the agricultural season.

Figure 5.22. Yaxche community map.

In Yaxche, most of the females combine household chores with commercial hammock weaving. They sell their products to distributors in Dzitas. I collected data from four *solares* (44.4 percent) at Yaxche because the remaining families were unavailable. Some of them have temporarily moved to Cancun for seasonal jobs but maintain houses in the community. As in the case of Piste, the comisario ejidal of San Felipe Nuevo helped to schedule interviews with those families related to his household.
Traditional Houses at Yaxche

All solares with traditional housing investigated at Yaxche were used as residences. In Yaxche, the average family has 6.75 individuals with females accounting for 51.85 percent of the population sampled. All family members are Mayan speakers and all the families are ejidatarios practicing milpa agriculture. Nuclear families account for one half of the house-lots visited. In the case of extend families, data suggest a patrilineal residential pattern wherein the son and his wife are establishing residency with the man’s parents. This is evident particularly in solar 2, where a son and his stepbrother are sharing their father’s solar along with the stepmother. Similar to San Felipe Nuevo, data from Yaxche suggest that the community is linked by kinship. A network of kin relationships becomes evident when combining social and locational data.
from solares investigated. Those who are related live close to each other (see Figure 5.24).

Settlement layout exhibits two generations of close corporate groups that in 50 percent of the cases practiced patrilocal residency. A look at the kin relationship chart in Figure 5.25 suggests a pattern of inter-community marriage for the community. In this case, members of the M. family are descendants of the original founders of the community and occupy more than 44 percent of the settlement. Their residences are located in the north and west sides of town surrounding the main plaza. The M. family is related to the U. family from San Felipe Nuevo. The wife of the head of solar 1 is the sister of the comisario ejidal. Furthermore, the wife of the head of solar 2 from Piste is

Figure 5.24. Map of Yaxche showing those related by kin.
also a member of the M. household and married to a U. resident from solar 1 in Piste.

She is also related to the M. kin from Yaxche. In general, data suggest that when finding a suitable wife, residents from San Felipe Nuevo and Yaxche would travel back and forth to either community to establish relationships with the help of family members.
Land accessibility, lack of economic resources, or job availability might be factors prompting couples to establish new households in Yaxche. In particular, migration to urban areas represents a substantial impact upon settlement configuration. Although migrating families maintain their homes in Yaxche, their connection with the community is overshadowed by improved economic conditions elsewhere. A similar pattern was described by Re Cruz (1996) in her study of Chan Kom. For those who still lived in the community, hammock weaving and inter-community marriage are economic and social strategies that serve to preserve the settlement structure.

In Yaxche, elementary school is the highest level of education attained by both male and female adults. Seventy five percent of those households interviewed wear modern dress although all the families speak the traditional Mayan language. Roman Catholicism is the religion of choice in Yaxche and milpa agriculture the occupation of all the men. An average of 66.66 percent of the household members help with milpa chores during the agricultural season. All the families interviewed owned agricultural plots averaging 2.25 hectares in size and located an average distance of 1.25 kilometers from the house-lot. In 50 percent of the households, women hand-weave hammocks for a supplemental income. An average of 3.25 persons per solar work outside the lot earning a median monthly income of $176.00 dollars. Groceries, utilities, and health expenses account for 34.09 percent of the total income and the rest is invested in domestic animals (chicken, turkeys, and pigs), electronics, or jewelry.

In Yaxche, fifty percent of the solares have a rectangular shape and the other fifty are polygonal in shape (see Figure 5.26). Average surface area is 1805.50 square
Figure 5.26. Rectangular and polygonal-shaped lots at Yaxche. Top, solar 1. Bottom solar 2.
meters with a standard deviation of 553.21 square meters (see Table 5.5). All the solares are surrounded by albarradas. Average roofed area is 125.51 square meters (7.15 percent of the total solar area), leaving more than 92.85 percent of the solar domain for other activities. Solares in Yaxche have an average of 8.5 structures including main house, kitchen, shower/storage, lavatory area, pens for chickens, turkeys, ducks, and pigs, enclosed gardens, a roofed area for the laundry basin (batea), and water tank.

In one half of the solares surveyed, the kitchen is located behind the main structure following the same axis. One case (solar 4), has a kitchen joined to the main structure in one of the corners forming a 90 degrees angle (see Figure 5.27). In solar 1, the kitchen also follows a 90-degree angle but separated from the main structure.

Table 5.5. Summary of dimensions for Dzitas lots, main structures, and kitchen areas in square meters

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Standard Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size Lot</td>
<td>1805.50</td>
<td>553.21</td>
</tr>
<tr>
<td>Roof area</td>
<td>125.51</td>
<td>71.58</td>
</tr>
<tr>
<td>No roof area</td>
<td>1693.30</td>
<td>544.35</td>
</tr>
<tr>
<td>Main length</td>
<td>6.42</td>
<td>0.77</td>
</tr>
<tr>
<td>Main Width</td>
<td>3.68</td>
<td>0.29</td>
</tr>
<tr>
<td>Kitchen Length</td>
<td>5.38</td>
<td>0.97</td>
</tr>
<tr>
<td>Kitchen Width</td>
<td>3.43</td>
<td>0.07</td>
</tr>
</tbody>
</table>
Figure 5.27. Solar 4 in Yaxche. Notice the kitchen attached to the main house.

The residential area consists mainly of the main structure and the kitchen having an average residency period of 24.67 years. Seventy five percent of the solares sampled in Yaxche date to the 1980s with the oldest case dating to 1946. The transitional area consists of kaanches, fenced gardens, laundry area, pens for domestic animals, and storage structures. In one case, frames used to weave hammocks are also located next to the laundry section of the lot, in the transitional area. The lavatory, pens for pigs, fruit trees and bushes, as well as refuse piles are located on the shrub area. Two solares have wells located next to albarradas that surround the lots (see Figure 5.28).
Vegetation in the shrub and transitional areas consists of citrus trees (lemon, sour oranges, and tangerine), oak trees, banana plants, coconut palms, guaya (*Talisia olivaeiformis*), plum, and anona (*Annona Primigenia*) trees. All the solares have *kaanches* (elevated gardens) used to cultivate herbs (basil, chives, mint, garlic, chili peppers, cilantro, and *epazote* (*Chenopodium ambrosioides* L.) (See Figure 5.29). One solar has metal screens for drying pumpkin seeds. Electricity, potable water, and cable television are utilities common to all solares. Each solar consumes an average of 90 kilograms of firewood per week collected mainly from the *milpa* or the forest surrounding.
the community. In general, solar residents prefer to sort their refuse separating aluminum cans and glass bottles before transporting it to the nearby landfill. Organic material is typically destroyed by fire and in 75 percent of the cases reused to level the ground around the solar. Large items are often reused as planters, feeding bowls, or kaanches (elevated gardens).

In Yaxche, more than 66.66 percent of the main structures are apsidal-shaped with cement foundations and floors. Main structures have exterior walls made of kolopche (33.33) or combined with cardboard (66.66 percent). Cardboard is used to cover interior walls and as roof material in one half of the cases. The rest of the houses
have roofs made of guano palms. Two-thirds of the structures were in good condition and the rest needed minor repairs of the walls and roof. On average, the main house has a length of 6.42 meters with a standard deviation of 0.77 meters, a width of 3.68 meters (mode of 3.80 meters, standard deviation of 0.29 meters), and the height of the walls measured 1.76 meters (mode 1.80, standard deviation 0.07 meters) (Figure 5.30). All the main structures surveyed are oriented in an east-west axis and the main access faced the street.

![Figure 5.30. Main structure measurements for Yaxche (YXC).](image)

One half of the kitchens are rectangular in shape with either stone or cement foundations. More than sixty percent of the kitchens have cement floors and roofs constructed from guano palms. In all cases, the exterior walls are built using *kolopche* covered inside with cardboard in fifty percent of the kitchens. Seventy-five percent of the kitchens were in good condition and the rest needed some repairs in the roof. Kitchens
in Yaxche have an average length of 5.38 meters (mode of 5.4 meters and standard deviation of 0.97 meter), a width of 3.43 meters with a mode of 3.8 meters. More than sixty percent of the kitchens are oriented on an east-west axis, and in two cases have a north-south orientation (standard deviation of 0.50 meter), and the walls have an average height of 1.73 meters (mode of 1.8 meters, standard deviation of 0.068 meter) (see Figure 5.31).

![Figure 5.31. Kitchen measurements for Yaxche (YXC).](image)

Analysis of cultural material from Yaxche demonstrated that traditional items represented more than 25 percent of the total household inventory (Figure 5.32). A slightly larger percentage of traditional items is found in the main structure (27.08 percent) rather than the kitchen (23.91 percent). The inventory of traditional items includes family shrines (*altares*), wooden shelves, hammocks, the *k’ooben* (three-
stones hearth), calabashes and gourds, *kaanches* (benches), and candle lights. Data collected for this paper suggest that Yaxche households have more traditional material culture than their neighbors from Piste and San Felipe Nuevo. Modern items represent 74.47 percent of the compound total inventory with plastic products including bags, buckets, and containers, cardboard boxes, and large wooden tables observed in all the *solas* investigated.

![Figure 5.32. Material culture for Yaxche.](image)

In Yaxche, like changes occurring in San Felipe Nuevo, families are acquiring modern appliances, electronics, as well as furniture commonly found in urban centers. In these cases, seasonal migration for jobs and participation in the cash economy might be factors responsible for changes observed in material culture at Yaxche.

To summarize, my data reveal that Yaxche households on average are larger in size and have more *Mayan* speakers than those found at Piste and San Felipe Nuevo. However, settlement layout follows the pattern identified at San Felipe in which the
community is linked by kinship. These relationships have physically shaped the landscape. Seasonal job migration is an important factor affecting the configuration of the settlement as well as material culture and house construction. A decline in population is evident from the census data. However, the community is resorting to alternative economic and social strategies to preserve the settlement. In the next chapter, a comparison of data from the three municipios is used to construct a model for rural housing in Yucatan and I discuss Wauchope’s hypothesis of cultural continuity for the Maya.
CHAPTER 6

YUCATEC MAYA HOUSING: CHANGE OR CONTINUITY?

“The fundamental tools of life lie rooted in the oldest folkways; we know they have not changed essentially in four hundred years; they are probably very much older”
Robert Redfield (1934).

Wauchope (1938) considered Maya houses as sources of data that facilitated an understanding of prehistoric buildings in archaeological sites. From his perspective, houses were important because of their architecture and function. The role of domestic architecture in the overall configuration of Maya society was overlooked. Hawkes (1977: 134) argues that utilitarian buildings not only organize space, but also deliver a meaningful message about social structure, environmental perception, political, and economical organization of their inhabitants. Therefore, domestic places are mnemonic devices that provide clues to the individual to recall how to properly interact in a particular cultural setting. In that sense, architecture functions to organize the landscape and to create stages for social interaction or places (Perinbanayagan 1985).

As mentioned elsewhere in this paper, previous studies of Maya houses focused on social categorization, ethnic identity, linguistic construction, or use of space. However, an integrated perspective that combines data from various sources is lacking in the study of housing. In this chapter, a comparison of the principal elements of Yucatec houses including variations in both house and material culture in each community and the circumstances responsible for them, such as socio-economic, technological, or ideological changes is used to introduce a model of Maya housing. The model I present integrates those factors involved in house construction and serves
as a basis to evaluate Wauchope’s idea of cultural continuity, to assess the role of “traditional” architecture in mestizo identity, place conceptualization, and for regional differentiation.

A Model for Maya Housing in Yucatan, Mexico

In the 1930s, Wauchope (1938) described a Yucatec Maya house as a compound of several elements bounded by a walled lot area. House foundations (either apsidal, flattened-ends or rectangular), beehive shelters, chicken pens (either wooden or stone), rock enclosures for pigs, shelters, storehouses, wash through shelters, granaries, gardens and trees, and wells are some of the elements that Wauchope observed in his study of housing. Wauchope’s study portrays a unique characterization of the techniques and methods used to build domestic structures. Due to sampling limitations inherent to my research I cannot replicate his endeavor. Therefore my comparison is circumscribed to the municipios and geographic areas covered by my survey.

My study of 31 solares from Yucatan revealed variation in the number of structures, size, layout, use of space, garden configuration, and grade of innovations introduced in both house construction and material culture. Chicxulub Pueblo has the longest residency period of the three communities (33.25 years) with an average of six structures per solar (see Table 6.1). In contrast, Tinum and Dzitas solares are relatively new settlements (14 and 24.67 years respectively) but their solares have six to eight and one half structures each. Number of structures then, is not related to length of residency but to type of family.
Solares with extended families have more structures (8.5 buildings at Dzitas) than those inhabited by nuclear families (6 structures at Chicxulub Pueblo). Number of structures per lot and family type also correlate with average roofed area. At Dzitas, roofed areas were the highest with an average of 125.51 square meters and 6.75 individuals per solar. Tinum follows with a coverage averaging 115.23 square meters and 4.89 residents per solar. By contrast, Chicxulub Pueblo has the lowest number of residents (3.75 persons) and the smallest roof area averaging 113.58 square meters. Family type, number of residents per solar, roof area or number of structures do not correlate with length of residency. On average, the number of residents per solar from Chicxulub Pueblo and Tinum are lower than the estimate of 5.6 made by Haviland (1972) or the 9.4 figure reported by Farris (1984: 134) for Colonial times (see Table 6.2). Clearly, contemporary solares have fewer residents today than during the last part of the Sixteenth century. However, Wauchope (1938: 145) reports an average of 4.5 residents per solar for the town of Dzitas, a figure lower than my estimate of 6.75 for Yaxche. Similarly, Steggerda (1941: 21) reports that solares in Piste had an average of 4.22 individuals whereas my data show 4.89 residents per solar for both Piste and San Felipe Nuevo. Such demographic fluctuations observed in solares may result from

<table>
<thead>
<tr>
<th>County</th>
<th>Family</th>
<th>No. Res.</th>
<th>Residency</th>
<th>Structures</th>
<th>Roof area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicxulub Pueblo</td>
<td>Nuclear</td>
<td>3.75</td>
<td>33.25</td>
<td>6.0</td>
<td>113.58</td>
</tr>
<tr>
<td>Dtizas</td>
<td>Extended</td>
<td>6.75</td>
<td>24.67</td>
<td>8.5</td>
<td>125.51</td>
</tr>
<tr>
<td>Tinum</td>
<td>Nuclear</td>
<td>4.89</td>
<td>14.00</td>
<td>6.0</td>
<td>115.23</td>
</tr>
</tbody>
</table>
availability of healthcare services that are reducing infant mortality rates, but more data are needed to test the validity of such assumption and the reasons behind the pattern.

Table 6.2. Variation on the number of residents per solar for various Yucatec towns.

<table>
<thead>
<tr>
<th>Source</th>
<th>Year</th>
<th>Residents</th>
<th>Town</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haviland (1972)</td>
<td>1570</td>
<td>5.6</td>
<td>Cozumel</td>
</tr>
<tr>
<td>Farris (1984)</td>
<td>1583</td>
<td>9.4</td>
<td>Tizimin</td>
</tr>
<tr>
<td>Wauchope (1938)</td>
<td>1938</td>
<td>4.5</td>
<td>Dzitas</td>
</tr>
<tr>
<td>Steggerda (1941)</td>
<td>1941</td>
<td>4.22</td>
<td>Piste</td>
</tr>
</tbody>
</table>

At the community level, social and locational data revealed the impact of family relationships in settlement configuration. For both San Felipe Nuevo and Yaxche, kin interconnections are directly involved in the spatial organization of solares. Families have a tendency to live around a major plaza and more likely next to each other. This pattern results in a physical layout depicting two or more generations of close corporate groups. Plazas then, are kin-shared spaces where domestic animals roam freely and children play with each other. However, solares remain as restricted spaces. Visitors must wait by the albarrada until granted permission to enter the family place. Where extended families exist, the cyclical household pattern identified by Hanks (1990) is also visible in these communities. Usually, the founder of the solar has more structures and a better location than the eldest son or daughter. Data from Tinum and Dzitas reveal three cases of dispersion and seven of expansion.
Members of these communities also practice cross-cousin marriages as well as patrilocal and neolocal residency. Post marriage residency appears to be a function of land availability, job opportunities, and economic resources. The involvement of parents in bride selection is a topic that requires additional study. A substantial difference between San Felipe Nuevo and Yaxche is the decline in population resulting from seasonal migration to urban areas that Yaxche is experiencing (see Table 6.3). Residents are favoring social strategies such as inter-community marriage to overcome recent population declines.

Table 6.3. Comparison of population figures per town for the years of 1980 and 2002.

<table>
<thead>
<tr>
<th>Community</th>
<th>Pop. 1980</th>
<th>Pop. 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicxulub Pueblo</td>
<td>2819</td>
<td>3401</td>
</tr>
<tr>
<td>Piste</td>
<td>1724</td>
<td>4399</td>
</tr>
<tr>
<td>San Felipe Nuevo</td>
<td>45</td>
<td>92</td>
</tr>
<tr>
<td>Yaxche</td>
<td>124</td>
<td>60</td>
</tr>
</tbody>
</table>

Garden areas also differ in the three communities. Chicxulub Pueblo has restricted garden areas averaging 1103.87 square meters whereas both Tinum and Dzitas have larger garden areas (1495.94 square meters and 1679.99 square meters respectively, see Table 6.4). A listing of plants I identified in gardens and their usage is presented in Table 6.5. I used the Ramirez-Bamonde et al. (2000 303-321) study on plants from solares at Hampolol Campeche, as basis for plant designation and usage. Under their study, plant usage was assigned using criteria obtained throughout participant observation and open interviews.
Table 6.4. Average size of solar gardens by county.

<table>
<thead>
<tr>
<th>County</th>
<th>Lot size</th>
<th>Garden size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicxulub Pueblo</td>
<td>1217.39 m²</td>
<td>1103.87 m²</td>
<td>90.67</td>
</tr>
<tr>
<td>Dzitas</td>
<td>1805.50 m²</td>
<td>1679.99 m²</td>
<td>93.05</td>
</tr>
<tr>
<td>Tinum</td>
<td>1608.78 m²</td>
<td>1495.94 m²</td>
<td>92.98</td>
</tr>
</tbody>
</table>

Data obtained in my survey of gardens reveal 53 species including 29 types of trees (54.72 percent), 18 different herbs (33.96 percent), and six bushes (11.32 percent). From this collection, 75.47 percent are local and the remaining exotic not habitual to the flora of Yucatan. Thirty-four species of plants are employed for one purpose whereas 19 have multiple uses. Among those plants with multiple applications are cedar trees, citrus fruits (including sweet oranges, sour oranges, limes, and lemons), oak and almond trees, basil, and avocado, to mention some of them. More than twenty two percent of the plants I found in solares surveyed are used for medicinal purposes (see Barrera Marin et al. 1976 and Ramirez-Bamonde et al. 2000: 303-321 for a description of plant medicinal properties). Seven species including coconut, bananas, guayas, tangerines, lemons, and sour oranges are present in most gardens surveyed. Comparison of gardens from communities surveyed revealed significant differences in vegetation types, use, and provenance.

Gardens at Chicxulub Pueblo and Tinum are more similar to each other than Dzitas (see Figure 6.1). Both communities have more trees and local plants whereas Dzitas gardens have a large percentage of plants used as condiments (42.11 percent). Tinum and Chicxulub Pueblo gardens have more plants for consumption including fruits.
Table 6.5. List of common plants found in solares surveyed.

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Shape</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aguacate (avocado)</td>
<td><em>Persea americana</em></td>
<td>Tree</td>
<td>CO, HM</td>
</tr>
<tr>
<td>Anona (custard apple)</td>
<td><em>Annona Primigenia</em></td>
<td>Tree</td>
<td>CO, HM</td>
</tr>
<tr>
<td>Brujita</td>
<td><em>Bryophyllum calycinum</em></td>
<td>Bush</td>
<td>CD, HM</td>
</tr>
<tr>
<td>Caimito (star apple)</td>
<td><em>Achras caimito</em></td>
<td>Tree</td>
<td>CO</td>
</tr>
<tr>
<td>Chaka</td>
<td><em>Bursera simaruba</em></td>
<td>Tree</td>
<td>HM, FE</td>
</tr>
<tr>
<td>Chaya</td>
<td><em>Cnidoscolus chayamansa</em></td>
<td>Bush</td>
<td>CO, HM</td>
</tr>
<tr>
<td>Chukum</td>
<td><em>Phuthecellobium albicans</em></td>
<td>Tree</td>
<td>CN</td>
</tr>
<tr>
<td>Cilantro</td>
<td><em>Corandrium sativum</em></td>
<td>Herb</td>
<td>CD</td>
</tr>
<tr>
<td>*Epazote (wormseed)</td>
<td><em>Chenopodium ambrosioides L.</em></td>
<td>Herb</td>
<td>CD, HM</td>
</tr>
<tr>
<td>Guanabana</td>
<td><em>Annona muricata L.</em></td>
<td>Tree</td>
<td>CO</td>
</tr>
<tr>
<td>Guano</td>
<td><em>Sabal mexicanum</em></td>
<td>Herb</td>
<td>CN, CF</td>
</tr>
<tr>
<td>Guaya (guava)</td>
<td><em>Talisia olivaeiformis</em></td>
<td>Tree</td>
<td>CO</td>
</tr>
<tr>
<td>Jabin</td>
<td><em>Piscidia piscipula</em></td>
<td>Tree</td>
<td>HM, FW</td>
</tr>
<tr>
<td>*Mango</td>
<td><em>Mangifera indica</em></td>
<td>Tree</td>
<td>CO</td>
</tr>
<tr>
<td>Nance</td>
<td><em>Byrsonima crassifolia</em></td>
<td>Tree</td>
<td>CO</td>
</tr>
<tr>
<td>Papaya</td>
<td><em>Carica papaya</em></td>
<td>Tree</td>
<td>CO</td>
</tr>
<tr>
<td>Piich</td>
<td><em>Enterolobium cyclocarpum</em></td>
<td>Tree</td>
<td>SH</td>
</tr>
<tr>
<td>Pitaya</td>
<td><em>Hylocereus undatus</em></td>
<td>Herb</td>
<td>CO</td>
</tr>
<tr>
<td>Roble (oak)</td>
<td><em>Ehretia tinifolia</em></td>
<td>Tree</td>
<td>HM, FW</td>
</tr>
<tr>
<td>*Tamarindo</td>
<td><em>Tamarindus indica</em></td>
<td>Tree</td>
<td>CO</td>
</tr>
<tr>
<td>Zapote</td>
<td><em>Manilkara zapota</em></td>
<td>Tree</td>
<td>CO</td>
</tr>
</tbody>
</table>

Note: See bottom of table for a key to the use of plants.
Table 6.5. List of common plants found in solares surveyed (continued)

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Shape</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achiote</td>
<td>Bixa orellana L.</td>
<td>Bush</td>
<td>PI, CD</td>
</tr>
<tr>
<td>*Almendro (almonds)</td>
<td>Terminalia catappa L.</td>
<td>Tree</td>
<td>LD, SH</td>
</tr>
<tr>
<td>Bugambilia</td>
<td>Bouganvillea glabra choisy</td>
<td>Bush</td>
<td>LD</td>
</tr>
<tr>
<td>Calabaza (squash)</td>
<td>Curcubita moschata</td>
<td>Herb</td>
<td>CO</td>
</tr>
<tr>
<td>Cebollina (chives)</td>
<td>Allium schoenoprasum</td>
<td>Herb</td>
<td>CD</td>
</tr>
<tr>
<td>Cedro (cedar)</td>
<td>Cedrela odorata L.</td>
<td>Tree</td>
<td>HM, CN</td>
</tr>
<tr>
<td>Chi chi be</td>
<td>Sida acuta</td>
<td>Herb</td>
<td>LD</td>
</tr>
<tr>
<td>*China (sweet orange)</td>
<td>Citrus sinencis</td>
<td>Tree</td>
<td>CO, HM</td>
</tr>
<tr>
<td>Ciruela (plum)</td>
<td>Spondias purpurea</td>
<td>Tree</td>
<td>CO</td>
</tr>
<tr>
<td>*Coco (coconut)</td>
<td>Cocos nucifera L.</td>
<td>Herb</td>
<td>CO</td>
</tr>
<tr>
<td>Guayaba</td>
<td>Psidium guajava L.</td>
<td>Tree</td>
<td>CO, HM</td>
</tr>
<tr>
<td>Henequen</td>
<td>Agave fourcroydes</td>
<td>Herb</td>
<td>CN, CF</td>
</tr>
<tr>
<td>*Lima (lime)</td>
<td>Citrus limetta</td>
<td>Tree</td>
<td>CO, HM</td>
</tr>
<tr>
<td>*Limon (lemon)</td>
<td>Citrus aurantifolia</td>
<td>Tree</td>
<td>CO, HM</td>
</tr>
<tr>
<td>*Mandarina (tangerine)</td>
<td>Citrus reticulata</td>
<td>Tree</td>
<td>CO</td>
</tr>
<tr>
<td>*Naranja (sour orange)</td>
<td>Citrus aurantium</td>
<td>Tree</td>
<td>CO, HM</td>
</tr>
<tr>
<td>Piñuela</td>
<td>Bromelia plumieri</td>
<td>Herb</td>
<td>CO</td>
</tr>
<tr>
<td>Rose</td>
<td>Several species</td>
<td>Bush</td>
<td>LD</td>
</tr>
<tr>
<td>*Toronja (grape fruit)</td>
<td>Citrus x paradisi</td>
<td>Tree</td>
<td>CO</td>
</tr>
<tr>
<td>*Tulipan (hibiscus)</td>
<td>Hibiscus rosa sinencis. L.</td>
<td>Bush</td>
<td>LD</td>
</tr>
</tbody>
</table>
Table. 6.5. List of common plants found in solares surveyed (continued)

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Shape</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Ajo (garlic)</td>
<td>Allium sativum</td>
<td>Herb</td>
<td>CD</td>
</tr>
<tr>
<td>*Cebolla (onion)</td>
<td>Allium molly</td>
<td>Herb</td>
<td>CD</td>
</tr>
<tr>
<td>Chile Mash</td>
<td>Capsicum annun L.</td>
<td>Herb</td>
<td>CD</td>
</tr>
<tr>
<td>Chile Habanero</td>
<td>Capsicum chinese</td>
<td>Herb</td>
<td>CD</td>
</tr>
<tr>
<td>Chile Verde (jalapeno)</td>
<td>Capsicum annun</td>
<td>Herb</td>
<td>CD</td>
</tr>
<tr>
<td>Mamey</td>
<td>Mammea americana L.</td>
<td>Tree</td>
<td>CO</td>
</tr>
<tr>
<td>*Platanos (banana)</td>
<td>Musa paradisiaca L.</td>
<td>Herb</td>
<td>CO</td>
</tr>
<tr>
<td>*Romero (basil)</td>
<td>Ruta chalapensis L. C.</td>
<td>Herb</td>
<td>CD, HM</td>
</tr>
<tr>
<td>Tsalam</td>
<td>Lysiloma latisiliqua</td>
<td>Tree</td>
<td>CN</td>
</tr>
<tr>
<td>*Yerbabuena (peppermint)</td>
<td>Mentha piperita</td>
<td>Herb</td>
<td>CD, HM</td>
</tr>
<tr>
<td>Zaramuyo</td>
<td>Annona cachiman</td>
<td>Tree</td>
<td>CO</td>
</tr>
</tbody>
</table>

CD= condiment            HM= medicinal use for humans
AM= medicinal use for animals CO= consumption
CN= construction     PI= pigment
CF= crafts            LD= landscape
SH= shade             FE=fence
FW= firewood         FR= forage

* Exotic (introduced specie)

and vegetables. The pattern of plant use observed during my survey of gardens is
similar in some respects to that reported for Hampolol, Campeche (Ramirez-Bamonde et al. 2000: 303-321). Percentages of plant types and exotic species are similar to
Hampolol, but my sample has more plants used for consumption or as condiment than for medicinal purposes.

Figure 6.1. Frequency of plant types, provenance, and use by county.

In Greenberg's (1996) survey of gardens from Puerto Morelos, Quintana Roo a larger proportion of plants were ornamental or for landscaping purposes (44 species) followed by plants cultivated for consumption (36), medicinal purposes (19), and used as meal condiments (13). She interprets this pattern of controlled selection of species
as a strategy used to preserve traditional Yucatec crops and eventually for ethnic continuity. In general, data suggest that function plays an important role in selecting vegetation species for garden areas. In gardens surveyed, plants used as condiments, medicinal purposes, and consumption represent the majority of the vegetation followed by those species used for house construction or landscaping. Solar residents prefer to cultivate local species rather than exotics. This practice might be more related to availability and previous knowledge than anything else. Considering the output they provide, gardens represent an important investment for the household. In most cases, garden care is a family chore controlled mostly by women under the supervision of the head of the household. Differences in garden size and plants cultivated might be a function of the physical environment, availability, and familiarity with certain species. Overall, trees and bushes need less care than herbs and provide higher yields over the long term. In the case of Chicxulub Pueblo, economic changes and acculturation affecting the area could be responsible for the variations observed in gardens (see Figure 6.2).

Predictable differences are also evident in house shape and construction materials. Main structures are larger and wider at Chicxulub Pueblo than at Dzitas or Tinum. Apsidal shaped structures constructed with perishable materials in both roofs and exterior walls are the most common type found during my survey. Rectangular-shaped main structures were only observed at San Felipe Nuevo and Piste and in most cases these buildings are relatively new or still under construction. Data support Wauchope’s (1938) assumption that the distribution of apsidal shaped structures is in direct proportion to that of the Mayan speaking population. Figure 6.3 shows a map of
Yucatan with the distribution of Yucatec Mayan speakers as well as the sites visited by Wauchope and my sample. The map suggests that Wauchope’s sample was restricted to those areas with larger incidences of Mayan speakers.

However, an examination of Figure 6.4, a map of Yucatan showing the distribution of palm-roofed houses, indicates sizable proportions of this type of housing in areas with similar incidence of Mayan speakers. Although Wauchope’ sampling strategy may have been the source of his assumption of a direct correlation between architecture and language, the map put together with INEGI data seems to confirm the validity of such argument. At the regional level, distribution of both traditional houses
and *Mayan* speakers increases as you move away from Merida. Data suggests an inverse distance decay pattern from both urban areas and the north coast. Wauchope (1938) argued that a similar pattern was observed around Campeche City where traditional houses were scarce by comparison with the hinterlands.

Urbanism, acculturation, and as Wilk (1993: 39) argues the shift from a subsistence farming economy to one of cash economy are factors responsible for changes in housing observed in Yucatec settlements around the city of Merida. The expansion that Merida has undergone has transformed the rural landscape surrounding the city (figure 6.5). Towns such as Chuburna Pueblo, Uman, and Kanasin are being
incorporated into the urban area. New roads, utilities, transportation, and jobs that provide alternative sources of income that appear to be better than the *milpa* are some of the circumstances facilitating the incorporation of rural areas located in the vicinity of cities. Corn and henequen fields are also being transformed by affordable housing projects, factories, and retail stores.

The transformation of the cultural landscape is happening at a rapid rate. Despite the fact that structure shape seems to be constant, changes are evident in the construction of the main building. Cement is now used as floor material, tar cardboard and tin boards are replacing *guano* in roof construction, and block, mortar or plastic are used for wall construction instead of the traditional *kolopche* (see Figure 6.6).
Orientation of the structure as well as size are nearly constant in all communities surveyed (see Table 6.6). The main building usually has an east-west orientation and there is no significant variation in length (6.42 to 7.91 meters), width (3.68 to 4.39 meters), or height (1.76 to 1.88 meters). Kitchens follow a similar pattern to that observed for main structures. Most kitchens are rectangular shaped structures with stone foundations, cement floors, and perishable walls and roofs. Kitchen walls are lower in height in Chicxulub Pueblo than in other communities investigated.
Changes are evident in the use of cement for floors or foundations, and tar cardboard for roofs and wall construction. Even so, variations in orientation (east-west), length (5.48 to 5.85 meters), and width (3.19 to 3.43 meters) are minimal. Shape, orientation, and certain dimensions are constant in both main structures and kitchens surveyed.

Using Wauchope’s (1938) description of houses, I compiled an abbreviated list of six features and their construction materials common to domestic structures in the 1930s (see Table 6.7). This list served as a basis for calculating the ratio of introduction for new materials and also for inter-community comparisons. I calculated the ratio of
Table 6.6. Comparison of main house shape by economic activity in each county.

<table>
<thead>
<tr>
<th>County</th>
<th>Milpa</th>
<th>Ind. Work</th>
<th>Crafts</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicxulub Pueblo</td>
<td>oval</td>
<td>oval</td>
<td>n/d</td>
<td>flat-ends</td>
</tr>
<tr>
<td>Dzitas</td>
<td>oval</td>
<td>rectangular</td>
<td>rectangular</td>
<td>rectangular</td>
</tr>
<tr>
<td>Tinum</td>
<td>rectangular oval</td>
<td>rectangular</td>
<td>rectangular</td>
<td>n/d</td>
</tr>
</tbody>
</table>

Introduction by counting the total number of features built with traditional and non-traditional materials for both the main structure and kitchen (see Table 6.8). Next, I divided both totals by the lowest number and stated the final counts as a ratio. For example, in Chicxulub Pueblo the main structure has 4.5 features built with traditional materials and 1.5 with non-traditional. For the kitchen, 3 features have traditional material and the rest do not. These counts can be expressed as a ratio of 4.5:1.5 for the main structure and 3:3 for the kitchen. By dividing the totals by the lowest number the resulting ratio is 3:1 for the main structure and 1:1 for the kitchen. The first number refers to traditional material culture and the second to non-traditional. When compared to the data obtained from the three communities surveyed (see Table 6.9), the ratio of changes is higher in Dzitas (1:1.4) than in Tinum (1:1) and Chicxulub Pueblo (1.6:1). In Chicxulub Pueblo, the ratio of traditional to non traditional materials is higher for the main structure (3:1) than for the kitchen (1:1). The opposite pattern is evident at Dzitas where the ratio of modern materials is twice than traditional (1:2) for the main structure.
Table 6.7 Features and construction materials found in domestic structures from Wauchope (1938).

<table>
<thead>
<tr>
<th>Features</th>
<th>Main Structure</th>
<th>Kitchen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape</td>
<td>apsidal, rectangular, flat-ends</td>
<td>apsidal, rectangular, flat-ends</td>
</tr>
<tr>
<td>Foundation</td>
<td>stone</td>
<td>stone, dirt</td>
</tr>
<tr>
<td>Walls (exterior)</td>
<td>kolopche, dry rubble masonry</td>
<td>kolopche, dry rubble masonry</td>
</tr>
<tr>
<td>Walls (interior)</td>
<td>pakluum</td>
<td>pakluum, none</td>
</tr>
<tr>
<td>Roof</td>
<td>guano palm, grass</td>
<td>guano palm, grass</td>
</tr>
<tr>
<td>Floor</td>
<td>buk’tun (dirt)</td>
<td>buk’tun (dirt)</td>
</tr>
</tbody>
</table>

Table 6.8. Summary of traditional construction materials found at communities surveyed.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Chicxulub Pueblo Main\Kitchen</th>
<th>Dzitas Main\Kitchen</th>
<th>Tinum Main\Kitchen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape</td>
<td>apsidal\rectangular</td>
<td>apsidal\rectangular</td>
<td>rectangular\apsidal</td>
</tr>
<tr>
<td>Foundation</td>
<td>stone\stone</td>
<td>cement\cement or stone</td>
<td>cement\stone</td>
</tr>
<tr>
<td>Walls (exterior)</td>
<td>kolopche\kolopche</td>
<td>kolopche cardboard\ kolopche</td>
<td>kolopche\kolopche</td>
</tr>
<tr>
<td>Walls (interior)</td>
<td>pakluum\none</td>
<td>cardboard\cardboard</td>
<td>cardboard, plastic, block\cardboard</td>
</tr>
<tr>
<td>Roof</td>
<td>tar cardboard, guano, tin\cardboard</td>
<td>tar cardboard guano\ guano</td>
<td>tar cardboard, guano\ guano</td>
</tr>
<tr>
<td>Floor</td>
<td>cement\cement</td>
<td>cement\cement</td>
<td>cement\dirt</td>
</tr>
</tbody>
</table>

and 1:1 for the kitchen. Overall, use of traditional materials is more evident in Chicxulub Pueblo main structures (3:1 ratio) and Tinum kitchens (2:1 ratio). Yucatec rural housing
Table 6.9. Summary of traditional and modern materials found in houses by structure in each county surveyed.

<table>
<thead>
<tr>
<th>County</th>
<th>Main Trad.</th>
<th>Main Modern</th>
<th>Kitch. Trad.</th>
<th>Kitch. Modern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicxulub Pueblo</td>
<td>4.5</td>
<td>1.5</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Dzitas</td>
<td>2.0</td>
<td>4.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Tinum</td>
<td>2.0</td>
<td>4.0</td>
<td>4.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

conforms to Rapoport’s (1969) definition of primitive architecture wherein few building types follow a model with fewer individual variations.

However, changes are evident and the traditional knowledge required to build this type of architecture is also disappearing. For example, from all the households surveyed, only one belonging to the Comisario Ejidal of Chicxulub Pueblo provided information regarding traditional knowledge required for house construction. He learned the skill of building houses from his father. When asked how he determined the size and orientation of a building, he explained that size depended on both wood poles length and the owner expectations whereas orientation was a function of the street grid. When the house is older than the paved road, its main access is usually not aligned to the street. Only those houses that were older than the street have an orientation not parallel to it. Houses averaging six by four meter will house a family of four and an eight by four meters structure will host eight hammocks. With experience, the ability to calculate measurements and materials needed becomes easier and size can be modified if needed. Construction of houses then, was a collaborative effort requiring at least four individuals and involving four weeks to complete. The Comisario also
explained that thatched roof houses are less expensive (average of $2,000 dollars) than modern structures, provide more ventilation, and last a lifetime when compared to those built using nontraditional alternatives. However, a problem that traditional houses are facing is the scarcity and high prices of raw materials needed. An example of this situation is the cost of *guano* palms and grass. The Comisario suggested that on average, a house needs 8,000 palms depending on the size of *guano* leaves needed per *enguila*. In Chicxulub Pueblo, every leave costs approximately $0.15 dollars already installed. Guano leaves are scarce in the area. By comparison, people living in Dzitas and Tinum do not have to purchase materials needed for house construction because they are available in the forest and *milpas* surrounding their communities. Availability and cost of materials then, may explain the differences already mentioned for roof, floors, and walls.

Comparison of material culture from the three communities also reveals differences in the type of materials adopted and rate of introduction of those innovations. I used a formula similar to the one conveyed for construction materials to calculate the ratio of changes in material culture. Chicxulub Pueblo with a 1:7 ratio of traditional to non-traditional artifacts is most modern followed by Tinum (ratio of 1.5), and finally Dzitas (ratio of 1:3). Data reveal that the introduction of artifacts is occurring at a more rapid rate than the observed for the house construction materials. Non-traditional items are frequently located in the main structure including aluminum pots and pans, chairs, plastic products, television sets, sewing machines, stereo units, blender, washing machines, large wooden tables, and cardboard boxes. The main
structure also contains traditional elements such as the family shrine (see Figure 6.7), hammocks, *kaanches* (benches), wooden shelves, and *banquetas*. In the kitchen, traditional material culture includes calabashes and gourds, ceramic pots, *kaanches* (benches), *banquetas*, *bancos*, and the three-stones hearth (see Figure 6.8).

Differences in adoption of modern alternatives might be related to status. That is, a shift from rural to urban identity is affecting the people living around Merida, and that shift is reflected not only on a reduction in the number of *Mayan* speakers, but also on rapid incorporation of modern, more “urban” related domestic inventory. With respect to those communities from Tinum and Dzitas, data showed that migration to urban areas as well as community participation in the cash economy are factors analogous to the changes in material culture. Changes in the cultural landscape including the introduction of new highways, and availability of services such as cable television, potable water, and power, are providing for the once isolated rural population, the opportunity to buy items that were restricted to urban areas.

In most cases agriculture does not fully provide for household economies, particularly during a bad harvest season. Wage-based jobs offer alternatives and the cash necessary to acquire modern goods. As described in Chapter 4, most of the traditional material observed by both Wauchope (1938), and Redfield and Villa Rojas (1938) consisted of items that were manufactured from materials easily obtained from the forest and fields surrounding the Maya household. Replacement of those items is a function of availability and cost related to the raw materials necessary. Substitution of traditional raw material is more evident in larger settlements such as Chicxulub Pueblo.
and Piste for both house construction materials and domestic artifacts. However, in small communities such as San Felipe Nuevo and Yaxche, changes are for the most part covert. That is taking place inside the structures where traditional and modern
artifacts interact to facilitate domestic chores and are not affecting the roles and activities of the solar residents. Nevertheless, changes do not affect the relationship between the community and the household because kinship bonds appear stronger than expressions of wealth.

Final examination of data suggests an association of settlement size, household developmental stage, subsistence strategy, and spatial layout. In Yucatan, small communities where subsistence is primarily based on horticulture, households follow two different strategies. In the expansion scheme, the solar will be subdivided to incorporate married children. Solares with eight or more structures exemplified such strategy. However, once the solar space is no longer available or the married offspring has enough resources to establish a new household then they will resort to a dispersion scheme and live as close as possible from the founder solar. Because the settlement is small, availability of land is not a problem. Most likely, kin related solares would be located next to each other along a street or surrounding an open area such as a plaza. New solares will likely have three to six structures depending on the resources available to the family or the alternative economic strategies of the household. The spatial layout then, corresponds to close corporate groups wherein kinship relationships play an important role in their configuration by reinforcing the mestizo identity of its inhabitants. This pattern is also evident in the material culture, and house construction. Small-scale communities are social landscapes where innovations are reinterpreted and function to integrate the group social bonds. This pattern seems to correspond with Restall’s (1997: 20) cah. As a geographical entity, the cah bounded extended family lineages and
functioned to maintain a sense of affiliation or belonging after the impact of Spanish colonization. Economic differences are covertly displayed so they do not disturb the settlement configuration or the group acceptable standards. New construction materials are being introduced in house construction but following traditional structure layout. The rate of introduction is slower and consistency is evident in shape and orientation. The opposite is evident with respect to the adoption of modern appliances and domestic artifacts. Here, the rate of introduction is related to the degree of exposure to urban areas and availability of cash.

When communities have denser layouts and subsistence is not longer primarily based on agriculture, the pattern of kinship bonds is no longer expressed in the cultural landscape. Instead, other forces such as status become the basis of locational decisions. Chuburna Pueblo, a community located north of Merida, exemplifies the pattern of location by status. Nevertheless, changes in housing will be the last step necessary to achieve a catrin-urban identity in the sense described by Hervik (2003) for the town of Oxkutzcab (see chapter 3 for a discussion of Hervik’s social categorization research). Catrin-urbanities do not speak Mayan, nor do they wear traditional dress because both are associated with a mestizo-farming culture regarded as low in status. In some instances, traditional architecture remains but not primarily as residences for the household. Palm houses function then as storage units, retail stores, or shops. Changes in function and design are also evident in garden areas where landscaping species have replaced fruit trees, condiments, and medicinal herbs common to
traditional gardens. *Kaanches* (elevated gardens) and corn storage structures are also not longer evident in these *catrin*-urban households.

The dichotomy of identities results in the creation of two different, tangible and conceptual, places: *mestizo*-farmer and *catrin*-urban. In this sense, place is understood as the interaction between a person and his or her environment. *Mestizo*-farmer places are small-scale folk oriented communities characterized by homogeneity of housing, use of traditional construction materials and artifacts, settlements arranged around kin relationships and household developmental stages, and subsistence strategies based mainly in horticulture. In *mestizo*-farmer communities, the adoption of new artifacts and construction materials is a consequence of seasonal migration exposing the individual to the dominant *catrin-urban* culture controlling alternative sources of income, the introduction of public services, transportation routes, and Spanish-based education programs. However, in *mestizo*-farmer places, the domestic domain forms the context for the development and reinforcement of social bonds, where people learn how to “live” and socially perform in their parents-family houses. Domestic areas ensure social reproduction and the transmission of traditions through the socialization of children (enculturation) or by interacting with a pre-existing network of relationships. For *mestizo*-farmers, domestic areas and material culture codify the *mestizo* worldview including family structure, religion, and both female and male roles. Uniformity then, is a requirement for the code to be conveyed and to assure an adequate performance of the individual.
By way of contrast, *catrin-urban* places are medium to large-scale communities where houses are heterogeneous structures, and settlement configuration is a matter of status or economic achievements resulting from both wage-based jobs and the assimilation of the individual into the city-life. *Mestizo*-farmer communities located around large urban areas such as Merida, Cancun, or Campeche city, are being largely affected by the uncontrolled growth characterizing these urban centers. The result is the absorption of these communities and the transformation of the landscape into *catrin-urban* places. The *mestizo*-farmer incorporates the values and attitudes of the dominant urban centers in order to ensure acceptance and become an urbanity. Social performance is learned from the dominant culture through education, mass media, and work interaction (see Eaton 1952 and Teske and Nelson 1974 for a discussion on acculturation and assimilation). Those individuals who successfully learn the codes will also shift toward a negative perception of *mestizo*-farmer culture. Since domestic areas do not codify any longer behavior nor tradition, uniformity is not a requirement for housing and the tendency is to imitate the styles prevailing in the city.

**Continuity, Change, or Reinvention?**

In the 1930s, Wauchope suggested that regardless of the impact of European colonization on the Peninsula, Maya domestic architecture indicated cultural continuity from the prehistoric past to modern times. Wauchope’s (1938) idea suggests a marked resilience in one cultural trait in the face of dramatic changes in others such as economics, ideology, and politics. My analysis of rural housing from four communities in Yucatan reveals changes in both domestic architecture and material culture.
However, cultural change for *mestizo*-farmers is different than for *catrín*-urbanities. For *mestizo*-farmers, changes in architecture reveal not the rejection of traditional forms but their re-invention. This process of cultural re-invention is evident through the incorporation of new materials into traditional floor plans, coexistence of modern constructions alongside traditional structures, adoption of modern appliances without rejecting those that are less conventional (such as stoves and three-stone hearths, *bateas* and washing machines, hand mills and blenders), and the use of domestic spaces by extended families. Cultural survival is a reflection of the ability of the individuals to incorporate the new by reinventing the old.

The process of cultural change observed among *mestizo*-farmers corresponds to a new stage in the overall acculturation that the Maya experienced since Colonial times. In this sense, acculturation is understood as “cultural changes induced by contacts between ethnic enclaves and their encompassing societies...” (Siegel et al. 1953: 975). Teske and Nelson (1974:351-367) discuss acculturation as a dynamic process that develops both at the group and individual level. Direct contact is necessary for acculturation to occur and usually is an interchange between two traditions. The dominance of one tradition will be contingent upon political and/or normative structures, that is if one group is in a position of power.

During Colonial Times, the Maya were subjugated through culture conquest (Foster 1960:11), a situation wherein the Spanish had both military and political control over the indigenous people of Yucatan and use power to impose changes in their way of life. However, the Maya accepted European cultural elements by adapting them to
their system of values and beliefs. This process characterized the Sixteenth century Christianization endeavor in Yucatan. Franciscan missionaries were fundamental in changing the location and arrangement of towns as well as building massive structures of monasteries on top of prehistoric temples, sacred to the Maya. Although the cultural landscape was transformed, the Maya incorporated pre-Hispanic elements into the Christian liturgy, and struggled to use churches and saints as objects of worship. Cervantes (1994: 38-45) suggests a process of conversion wherein, underneath the growing distrust of native beliefs among the friars, the identification of Christian saints with native deities was often tolerated and even encouraged. The early development of cults such as those of the Virgin of Guadalupe on the site of the native goddess Tonantzin would be otherwise inexplicable. This process of conversion points to the existence of a strong unofficial tradition that tolerated the persistence of pre-Hispanic elements and their incorporation into the ceremonies and rituals of Christianity.

According to Bhaba (1994), cultural differences reflect the lack of racial and cultural purity in all cultures and at the same time are a sign not of diversity but hybridity. Bhaba (1994) defines cultural hybridity as a distinctive sense of identity experienced by members of postcolonial societies. Postcolonial groups combine their pre-colonial culture and history with that of the dominant colonial power. In their quest of integration into the national schema, postcolonial societies may pursue different venues of hybridity such as political cooptation, social conformity, creative transcendence, forced assimilation, among others (Shohat 1996).
Today, the acculturation that the rural Maya is experiencing is characterized by a controlled incorporation (Eaton 1952: 331-340) and adoption of cultural elements to fit the mestizo-farmer culture but with a different meaning. Similar to the Colonial Christianization process, the current Maya are trying to piece their cosmos together into the new schema of modernity and globalization affecting both Yucatan and Mexico. Changes in material culture are facilitating this transition for a rural-folk population that is still managing to integrate those transformations by reinventing their identity into a new self that is both rural and urban. This is evident in their close relationship with the environment based not solely on the availability of construction materials but on the kind of agriculture practiced and their management of garden areas. A new attitude toward community location and landscape design is the result of this relationship. Re-invention then, is an adaptive strategy helping traditional societies cope with the impact of modernization affecting their communities. Mass communication media and roadways have opened the world to the Maya, even in the most isolated areas of the Peninsula, exposing them to goods and ideas that were unavailable to prior generations. Thus, the Maya experience represents just another venue of cultural hybridization in a multicultural nation such as Mexico.

The degree of cultural change is in direct relationship to age group, Mayan language and traditional dress practices, as well as land availability. The younger generation of mestizo-farmers has been largely exposed to the urban/pop culture through the Government sponsored education system, seasonal migration, and the media. In larger settlements such as Chicxulub Pueblo and Piste, the introduction of
new materials to replace traditional ones is more evident in solares occupied by young couples that do not practice milpa agriculture. Heavier exposure and participation of the individual in the urban/pop culture is escalating the changes evident in house construction and material culture. The dynamics of the acculturation process can speed up by increasing the degree of exposure and closeness to urban areas (i.e. Merida).

Through the replacement of material culture and traditional architecture a new generation of mestizo-farmers, living in areas surrounding urban centers, are shifting their identity to become catrin-urbanities. They seek to incorporate themselves into the dominant city/pop culture. Because farming is not their principal life way, catrin-urbanities need to learn those behavioral patterns necessary to obtain wage-based jobs in the city. They are replacing the rural milpa for urbanized “milpa work”. In this sense, the acculturation process is one “…in which the individual has changed so much as to become dissociated from the value system of his group…” (Eaton 1952: 339). Changes are internal and require a shift in values. By embodying the values and attitudes of the dominant urban center, catrin-urbanities are also trying to be accepted and become city-dwellers. This process results in an abandonment of the Mayan language and traditional dress use, and ultimately in a negative perception of mestizo-farmer culture regarded as outdated, illiterate, and non-appropriate for the modern world. In Merida, catrin-urbanities will go to the extreme of changing their Maya names for Spanish ones in order to be accepted. In this sense, factors such as age group, income level, type of job, and education are responsible for cultural change and in fact become measures of status and prestige.
A contagious type of diffusion seems to be the process responsible for innovations observed in Maya rural housing design. For Yapa (1996: 231) “…spatial diffusion refers to the spread of a new item over a large area through time, starting from a few locations”. In cultural geography, study of diffusion focuses on the spatial spread of learned ideas, innovations, and attitudes (Jordan et al.1994: 14). Locational theory recognizes two types of diffusion: a) relocation diffusion, which involves an initial group of carriers of a particular trait or idea migrating into new locations and spreading the innovation to their new homeland; b) expansion diffusion, whereby the number of people who adopt an idea or trait grows by direct contact from area to area. Expansion diffusion is subdivided into 1) stimulus, when a specific trait is rejected but the underlying idea is accepted; 2) hierarchical, ideas spring from one urban center to another bypassing some areas temporarily; and 3) contagious diffusion involving the wavelike spread of traits or ideas without considering any hierarchy (Jordan et al.1994: 14). Larger settlements such as Cancun, Merida, and Valladolid are innovation nodes from which ideas and material culture spread into the rural periphery. Mass media along with seasonal migration to these urban centers are factors contributing to the exposure of mestizo-farmers to modern material culture. By working in waged-based jobs, mestizos can obtain the cash necessary to purchase products such as television sets, washing machines, or stereo units. The introduction of public services as well as roadways is facilitating transportation to urban areas and the incorporation of electronics into the Maya rural household. Finally, families and friends of the individual will contribute to the incorporation of modern items into the domestic inventory, effectively
neutralizing any barriers to diffusion than might have existed in the past. That is, the individual will take a decision based on the aggregated behavior around him/her or neighborhood effect (Johnston et al. 1994: 410). Still, the introduction of certain innovations will always be contingent upon the availability of the materials and the development of the infrastructure necessary for the items to perform.

In summary, analysis of data from four communities revealed patterns in house construction and solar design. Evidence suggest geographic differences correspond with age group, Mayan language and traditional dress use, land availability, income level, type of job, and education. Two identities, mestizo-farmer and catrin-urbanite are reflected in the cultural landscape by creating two particular places. Differences are evident in the rate of change and adoption of modern material culture and raw materials for house construction. A controlled acculturation process characterizes the cultural changes observed in mestizo-farmer communities. In catrin-urbanite settlements, the acculturation process is affecting values and attitudes. Abandonment of aspects of folk rural for urban/pop traits is essential in order for catrin-urbanities to be accepted, obtain jobs, and become city-dwellers. Changes observed in rural housing design are the result of a contagious type of diffusion. Urban centers are innovation nodes and seasonal migrations to these centers as well as the mass communication media are the forces facilitating the adoption of modern material culture.
CHAPTER 7

FINAL CONSIDERATIONS

“The important thing in science is not so much to obtain new facts as to discover new ways of thinking about them.”
Sir William Brag.

In 1938, Robert C. Wauchope published his seminal work on Maya housing. Until today no research has attempted to replicate Wauchope’s endeavor or test his ideas about the continuity he observed in Maya domestic architecture from the prehistoric past up to the time of his groundbreaking study. My review of the literature demonstrates that along with Wauchope, other scholars of the Maya assumed that similarities observed between modern structures and their remains in prehistoric sites indicated cultural continuities in housing. In the past, studies of Maya houses focused on issues of social categorization, ethnic identity, linguistic construction, or use of space from several perspectives notably cultural geography, cultural anthropology, linguistic anthropology, and ethnoarchaeology. However, an integrated perspective to the study of housing was lacking. In my study of Maya housing, I used an integrated approach to data gathering and analysis, that is, a combination of interviews, questionnaires, archaeological survey, and geographic information methods in order to evaluate the various mechanisms involved in the design and use of domestic areas. By examining data from three municipios located in the state of Yucatan, I compared contemporary information about residential areas with that published by Wauchope in 1938. My goals were to assess how the Maya define, use and conceptualize domestic areas, test the validity of Wauchope’s assumption of cultural continuity in Maya housing from the
ancient past to modern times, and to create a model for contemporary Maya domestic environment that could be spatially and temporally tested. Survey of thirty-one solares and descriptive statistical analysis provided the raw data for comparison and interpretation at two levels: intra-community and inter-community. Comparison of essential elements found in Yucatec houses revealed variations in each community. These variations along with the circumstances responsible for them, such as socio-economic, technological, or ideological changes were used to build a model of Maya housing and evaluate Wauchope’s idea of cultural continuity.

My initial assumption was that data would suggest differences in architectural form, construction materials, design and use of space at both the community and the inter-community scales. Spatially and historically, data sets would be heterogeneous suggesting a lack of continuity. Then, the Maya would not be living in traditional housing instead they would switch to alternatives offered by the introduction of new construction materials, fashion or external influences. The impact of modernization would be evident and influence how the Maya define, use, and understand their domestic surroundings. The relationship between construction material and environment would not be existent and Wauchope’s proposition of cultural continuity would not apply to present-day Maya housing in Yucatan. However, during fieldwork I found an alternative scenario in which heterogeneity reveals not the rejection of traditional architecture but its re-invention as a way of adapting to the phenomenon of globalization. Newspapers, television, radio, and overall roadways have opened the world to the Maya, even in the most isolated areas of the Peninsula, exposing them to commodities and values that were not available to
older generations. This process of cultural re-invention would be evident through the incorporation of new materials into traditional floor plans, coexistence of modern constructions along with traditional ones, adoption of modern appliances without rejecting those that are less conventional (such as stoves and three-stone hearths, \textit{bateas} and washing machines, hand mills and blenders), and the use of domestic spaces by extended families. Cultural survival then, is a reflection of the ability of the individuals to incorporate the new by reinventing the old resulting in a hybrid of both the dominant urban and the Maya rural traditions. This process can be accelerated by the degree of exposure and closeness to urban areas (i.e. Merida). In this scenario, the Maya have a close relationship with their environment not based solely on the availability of construction materials but still on the type of agriculture practiced and their management of garden areas. A new attitude toward community location and landscape design results from such relationship.

My study of 31 solares in the Yucatan uncovered variations in the number of structures per solar, size, layout, use of space, garden configuration, and grade of innovations introduced in both house construction and material culture. In general, data revealed that the number of structures in a solar is not related to the length of residency but central to the type of family. Solares with extended families have more structures than those occupied by nuclear families. The number of structures per solar as well as family type correlate with average roof area. Family type, number of residents per solar, roof area, and total structures per solar do not correlate with length of residency. Comparison of gardens from the communities I surveyed revealed variations in size,
vegetation types, use, and provenience. Function plays an important role in selection of plant species for residential garden areas. Plants used as condiments, for medicinal purposes, or consumption constitute the largest percent of the vegetation followed by those species used for house construction or landscaping. Availability and familiarity reinforce a preference for local species rather than exotics. Today, gardens represent significant investments for the household and care is a family task controlled by women under the supervision of the head of the household. Therefore, the physical environment, availability and familiarity with certain species, differences in garden size, and plants cultivated might explain the variation I observed in residential gardens. Data suggest that the Maya still have a close relationship with their environment based on the controlled use of local construction materials, agricultural practices, and management of garden areas.

In the smaller communities, social and locational data revealed the significance of family relationships in settlement configuration. Kin interconnections affect the spatial organization of solares. Families tend to live around a major plaza, near each other resulting in a physical layout depicting two or more generations of close corporate groups. In these communities, plazas function as kin-shared spaces where domestic animals and children interact outside the solar area. Cross-cousin marriages and patrilocal and neolocal residency practices were documented in these communities. Post marriage residency appears to be a function of land availability, employment opportunities, and available economic resources. Seasonal migration to urban areas is affecting some communities by decreasing the number of permanent residents. In these
instances, communities are resorting to social strategies, including inter-community marriage, to counteract population declines.

An association among settlement size, household developmental stage, subsistence strategy, and spatial layout was also indicated. In small-scale communities where subsistence is primarily based on horticulture, households follow two different strategies: an expansion scheme wherein the solar is subdivided to incorporate married children, or a dispersion scheme, in which the married offspring have significant resources to establish a neolocal residence living as close as possible to the founder solar. Both strategies lead to different solar layouts and number of structures. Settlement layout corresponds to close corporate groups wherein kinship relationships play an important role in its configuration and eventually reinforce the mestizo-farming identity of its inhabitants. This pattern is evident in material culture and house construction. In this sense, small-scale communities are social landscapes where innovations are reinterpreted and function to integrate the group social bonds. In instances where communities have denser layouts and where subsistence is not grounded on agriculture, kinship bonds are no longer expressed in the cultural landscape. Alternatively, forces such as status become the basis of locational decisions. The resulting changes in housing become the final step necessary to achieve a catrin-urbanite identity. These dissimilar identities are expressed in the landscape by two different, tangible and conceptual places: mestizo-farmer and catrin-urbanite.

Mestizo-farmer communities, such as San Felipe Nuevo and Yaxche, have a compact spatial layout with low population density. In these communities, domestic
areas are typically uniform and are places where development and reinforcement of social bonds takes place. The uniformity common to mestizo domestic places serves to ensure social reproduction and the transmission of traditions. Domestic places then, codify the mestizo “worldview.” By way of contrast, catrin-urbanite communities, such as Chicxulub Pueblo, have a medium to large spatial layout and a larger population. In catrin-urbanite settlements, domestic areas and structures are generally heterogeneous. Changes observed in domestic place design and material culture revealed that these areas no longer codify or ensure social bonds. Traditions related to domestic areas are downgraded to support the dominant urbanite culture. Schools, mass media, and work interaction are the means by which the individual learns social performance. A new attitude toward community location and landscape design results from such a correlation. This process is accelerated by the degree of exposure and closeness to urban areas.

Although Yucatec rural housing might be considered primitive architecture, changes are taking place. Tthe traditional knowledge, indispensable for the construction of traditional architecture, is disappearing. The introduction of new artifacts is occurring at a more rapid rate than observed for house-construction materials. Differences in the adoption of modern alternatives by those communities I investigated suggest that a shift from rural to an urban identity is affecting the people living near Merida, and that shift is evident in both a reduction of Mayan speakers and the accelerated incorporation of “urban” related domestic artifacts. Wage-based jobs also contribute to change by providing disposable income necessary to acquire modern goods. However, evidence
suggests that in mestizo-farmer communities, changes are covert and do not impact the roles and activities of solar residents. The relationship between the community and the household is not affected because kinship bonds appear to be stronger than expressions of wealth. A twofold process of urbanism and acculturation as indicated by the construction of new roads, the introduction of utilities and better transportation systems, and jobs that provide alternative sources of income rather than the milpa are few of the conditions that facilitate the incorporation of rural areas located in the vicinity of cities into an urban setting and responsible for changes in housing. The spatial distribution of traditional houses follows an inverse distance decay from urban areas and the northern Yucatan coast. Agricultural fields surrounding these areas are being transformed by both state policies and economic projects. These changes have accelerated in the last ten years, particularly after state regulations sustaining the ejido system were discontinued. Mass media and roadways are exposing the Maya to pop-culture with its innovations thereby introducing consumer goods and pop values that were not available to older generations. The acculturation process affecting the Maya of Yucatan is characterized by a controlled incorporation and adoption of cultural elements to fit the mestizo-farmer culture but with a different meaning. The Maya are trying to piece their cosmos together into the new schema of modernity and globalization by reinventing their identity into a new self that is both rural and urban.

The degree of cultural change is directly related to age group, Mayan language, traditional dress use, and land availability. In solares occupied by the younger generation of mestizo-farmers, the introduction of new materials replacing traditional
ones is more evident. Heavier exposure and participation of the individual in the urban/pop culture is intensifying the changes evident in house construction and material culture. By living in areas surrounding urban centers, *mestizo*-farmers seek to incorporate themselves into the dominant society and become *catrín*-urbanites. A contagious type of diffusion characterizes the process responsible for innovations observed in Maya rural housing design. Sizeable settlements such as Cancun, Merida, and Valladolid are innovation nodes from which ideas and material culture diffuse to a rural periphery. Through mass media and seasonal migration to urban centers, *mestizo*-farmers are exposed to pop material culture and obtain the cash necessary to purchase nontraditional goods. Public services and roadways are facilitating travel to urban areas and the incorporation of electronics into the Maya rural household. Neighborhood effect is adding to the incorporation of modern items by effectively counterbalancing any barriers to diffusion than might have existed in the past.

To summarize, the study of Maya houses revealed a social landscape integrated by a complexity of cultural factors that goes beyond what is apparent at first glance. My investigation of Yucatec rural housing demonstrates that an integrated approach to research is necessary to interpret these places and reveal the conditions responsible for their configuration and meaning. More questions remain and further testing of the model of Maya housing proposed in this dissertation will clarify its validity and illustrate its spatial distribution in various geographic settings.
REFERENCES


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SOLAR DESCRIPTIONS

Solares are described by community. Three types of information are provided for each solar. The family data, contain a description of the social and economic composition of the solar residents including number of residents (adults, children, sex), family type (nuclear or extended), family origin, language (Mayan or non Mayan speakers), religion, economic activity (farmers, independent workers, other; monthly income), real estate (type [private or rented] and size [square meters and hectares] of property owned by family), agricultural production and distance between solar and agricultural plot, investments or valuables found in the solar (appliances, electronics, jewelry, farm animals such as chicken, pigs, ducks, etcetera), monthly grocery, utilities, and health expenses. Income and expenses figures are in US dollars at an exchange rate of ten Mexican pesos per dollar. The lot data describe the overall shape of the solar, number of structures and other features, physical setting (relief, soil, and vegetation), total roof and non-roof areas (in square meters), date and sequence of construction, public utilities available (power, water, gas, cable, telephone), type of fence, presence of elevated gardens (kaanche in Yucatec Mayan) and herbs planted on it, knowledge and care of garden, cleaning patterns, refuse disposal, reuse and/or recycling practices. Structure data provide information for both the main structure and the kitchen. Description centers for the most part around traditional houses, although I included cases in which the main structure combines both traditional and modern materials or modern construction has substituted the traditional living space so that data
are vital for understanding a particular solar. Items discussed include shape and construction materials (foundation, walls, roof, and floor), length and width, orientation of main axis, type of domestic and non domestic activities carried out in those spaces (resting, entertainment, ritual, food preparation and consumption, cleaning, storing, disposal, and other), other activities observed, cooking fuel used (quantity per week, who collects it, and where), and finally the furniture found on both structures.

**Municipio of Chicxulub Pueblo**

**Chicxulub Pueblo Solar 1**

**Number of residents:** Four (adult: one female; children: one male, two females)

**Family type:** Nuclear (Divorsee mother and her children)

**Family originated from:** Finca Baspul (ex-husband), and Chicxulub Pueblo (mother)

**Number of Mayan speakers:** One

**Religion:** Roman Catholic

**Economic activity:** No working single parent, ex-husband works as night watch and is the current *comisario ejidal*. He provides a monthly stipend of $30.00 for children and pays for utilities expenses.

**Real Estate:** Ex-husband owns lot (1563.20 square meters) and *ejido* land (7 hectares)

**Agricultural production and location of plot:** Lot on fallow, no data on location

**Valuables and Investments:** Chickens, television set, radio, sewing machine, jewelry

**Grocery, utilities, and health expenses:** Groceries $30.00, utilities $9.60, health care provided community hospital paid with weekly voluntary work (*fajina*)

**Lot shape:** Polygonal

**Number of structures:** Nine structures including main house, kitchen, two storerooms,
toilet, chicken pen, pigpen, shower, modern construction; other features include water basin, laundry area (*batea*), and well

**Total roof and non-roof areas**: 133.82 square meters roof, 1429.38 square meters non-roof

**Physical setting**: Flat area with some areas filled with rubble, dark reddish color soils with loose rocks and some holes. Several trees including zapote, guanabana, citrus trees, guaya, mango, papaya, *caimito*, avocado, squash, and roses

**Date and sequence of construction**: the structure used as a shower was the initial main house along with the storeroom used as the original kitchen. Both were built in 1972. The actual main house and kitchen were built later by the eldest son of the original founder

**Public Utilities**: Water, cable television, and power

**Fence type and kaanche**: Lot surrounded by *albarrada* and divided in three sections. Two *kaanches* (herbs: green and Habanero chiles, papaya seedlings, *brujita*)

**Knowledge and care of garden**: Mother

**Cleaning patterns, refuse disposal, reuse, and recycling practices**: Living areas cleaned twice daily, no lot cleaning. Refuse is separated and reused as ground filling or burned

**Main structure shape and construction materials**: Apsidal stone foundation, dirt floor, dry rubble masonry as exterior walls, grass and mud covering interior walls, palm and cardboard for the roof

**Length, width, height walls, and orientation main axis**: 9.50 m by 4.00 m, 1.60 m
height walls, east-west main axis

**Domestic activities described by residents:** resting, entertainment, and storage

**Other activities observed:** ritual, cleaning

**Furniture:** Altar with several saint portraits, wooden crosses, plastic decorative items, **kaanche**, trunk, plastic bags and cardboard boxes used to store clothing and diverse items, hammocks, plastic chairs, bicycle, large wooden wardrobe, iron board, television set, radio, Christmas decorations, frames, wooden shelves, rope, plastic buckets and containers, display unit with ceramic figurines

**Kitchen shape and construction materials:** Rectangular stone foundation, dirt floor, no walls, and cardboard roof.

**Length, width, wall height, and orientation main axis:** 7.00 m by 4.60 m, 1.80 m wall height, east-west main axis

**Cooking fuel:** Wood (84 kg/week), collected by mother and children from the lot

**Domestic activities described by residents:** Food preparation and consumption, storage

**Other activities observed:** Cleaning, disposal, resting

**Furniture:** Aluminum tin used as fire pit, pots and pans, working tools, plastic containers, plastic buckets with water, large wash tray, one large table and one medium size, dishes, cups, hammocks, plastic bags used to store diverse items, bottles and cans, sewing machine, radio, tortilla-prep table, wooden shelves, pottery jars, clothing items, grocery items

**Figure:** A.1
Chicxulub Pueblo Solar 2

**Number of residents:** Seven (adults: 2 females, 3 males, children: 2 female)

**Family type:** Extended (family 1: Husband, wife, son; family 2: daughter, daughter’s husband, children)

**Family originated from:** Chicxulub Pueblo

**Number of Mayan speakers:** None

**Religion:** Roman Catholic

**Economic activity:** Husband works cleaning offices, son in law is a driver. Both work in Merida earning a combined monthly salary of approximately $120.00.

**Real Estate:** Father owns lot (880.7 square meters)

**Agricultural production and location of plot:** N/A
**Valuables and Investments:** Stove, refrigerator, sewing machine, television set, washing machine

**Grocery, utilities, and health expenses:** Groceries $84.00, utilities, $22.00, health care provided by community hospital paid with weekly voluntary work (*fajina*)

**Lot shape:** Rectangular

**Number of structures:** Six structures, including main house, kitchen, shower area, modern construction, unfinished foundation; other structures found are a roof laundry area (*batea*) and a well

**Total roof and non-roof areas:** 157.1 square meters roof, 723.6 square meters non-roof

**Physical setting:** Flat area with loose rocks and dark soils. Citrus trees and some bushes along the lot boundary.

**Date and sequence of construction:** Couple house and kitchen were built in 1977. Son-in-law concrete blockhouse was built in 2000. The foundation for a new house for the couple’s will be finished when the family budget allows it.

**Public Utilities:** Water, cable television, and power

**Fence type and *kaanche***: Concrete block and cement wall around lot, no *kaanche*

**Knowledge and care of garden:** Husband, wife, and son in law take care of the gardens; however, husband has more experience regarding plant care and production

**Cleaning patterns, refuse disposal, reuse, and recycling practices:** Living areas cleaned three times daily, lot cleaned twice daily. Refuse is separated and burned outside the lot or transported to the town landfill

**Main structure shape and construction materials:** Flat-ends stone foundation,
cement floor, *kolopche* as exterior walls, grass and mud covering interior walls, palms and tin for the roof

**Length, width, wall height, and orientation main axis:** 8.30 m by 4.40 m, 1.70 m wall height, east-west main axis

**Domestic activities described by residents:** resting, entertainment, ritual, storage

**Other activities observed:** cleaning,

**Furniture:** Wooden display unit, two television sets, family and saint portraits, two chairs, television table, children toys, altar with Mexican flag, velvet chair, niche with saint

**Kitchen shape, construction materials:** Rectangular stone foundation, cement floor, *kolopche* as exterior walls, no interior covering, and cardboard roof

**Length, width, wall height, and orientation main axis:** 9.80 m by 4.60 m, 1.68 m wall height, east-west main axis

**Cooking fuel:** Wood (126 kg/week) and gas, firewood collected from forest nearby

**Domestic activities described by residents:** Food preparation and consumption, storage, and waste disposal

**Other activities observed:** Cleaning and entertainment

**Furniture:** Two tables, stove, chair, plastic basins, aluminum pots and pans, refrigerator, cardboard boxes with clothing and other items, Christmas decorations, children toys, sewing machine, iron board, plastic storage bins, wicker trunk, washing machine

**Figure:** A.2
Chicxulub Pueblo Solar 3

**Number of residents:** Six (adults: two females, two males; children: one male, one female)

**Family type:** Extended (family 1: Husband, wife, son, and daughter; family 2: eldest daughter and her children)

**Family originated from:** Chicxulub Pueblo

**Number of Mayan speakers:** Two (Husband and wife)

**Religion:** Roman Catholic

**Economic activity:** Husband, independent worker, yard cleaning, repairing water lines, fixing thatched roofs, and medicine man. Son also works as taxi driver. Combined monthly salary is $220.00
**Real Estate:** Father owns lot (1250.2 square meters), and *ejido* land (4 hectares)

**Agricultural production and location of plot:** *Ejido* land is abandoned, no data on location

**Valuables and Investments:** Television set, radio, stove, washer, jewelry, pigs

**Grocery, Utilities, and Health expenses:** Groceries $151.80, utilities $8.20, health care provided by community hospital and paid with weekly voluntary work (*fajina*)

**Lot shape:** Trapezoid

**Number of structures:** Nine structures, including main house, *palapa*, kitchen, pig pen, shower, modern construction, store room, and toilet; also found were a cistern, laundry area (*batea*), and well

**Total roof and non-roof areas:** 185.27 square meters roof area, 1064.93 non-roof area

**Physical setting:** Irregular filled area with several outcrops, black soil and no stones. Vegetation includes ramon, mango, guayaba, caimito, and citrus trees, as well as medicinal herbs, and achiote plants

**Date and sequence of construction:** House was built in 1962. When the current family moved in the main house roof was in disrepair. Husband has done most of the repairs.

**Public Utilities:** Water, cable television, and Power

**Fence type and *kaanche***: *Albarrada*, no *kaanche*

**Knowledge and care of garden:** Husband, he plants medicinal herbs and provides healing advice to the community
Cleaning patterns, refuse disposal, reuse, and recycling practices: Living areas cleaned three times daily, lot cleaned once weekly. Refuse is separated and burned in the back yard, transported to the town landfill, or reused as ground fill.

Main structure shape and construction materials: Apsidal stone foundation, cement floor, dry rubble masonry as exterior walls, grass and mud covering the interior, palms and tin for roof.

Length, width, wall height, and orientation main axis: 7.50 m by 4.10 m, 1.90 m wall height, north-south main axis.

Domestic activities described by residents: Resting, entertainment, ritual, storage.

Other activities observed: Cleaning.

Furniture: Fan, bicycle, electric saw, wall display for music Compact discs, saint portraits, washing machine, clothing items, VCR, blender, car radio, table with altar, wooden cross, plastic bottles, books, aluminum cans, candles, chair.

Kitchen shape and construction materials: Rectangular stone foundation, dirt floor, *kolopche* exterior walls, no interior covering, and cardboard roof.

Length, width, wall height, and orientation main axis: 5.40 m by 4.30 m, 1.00 m wall height, east-west main axis.

Cooking fuel: Wood (126 kg/week) and sometimes gas. Husband collects the wood at his plot.

Domestic activities described by residents: Food preparation and consumption, entertaining, cleaning, storage.

Other activities observed: None.

Furniture: Clothing, bicycle, cardboard boxes with plastic bottles, wooden bench,
plastic cooler, thermos, and buckets

**Figure: A.3**

![Diagram of Chicxulub Pueblo solar 3.](image)

Figure A.3. Chicxulub Pueblo solar 3.

**Chicxulub Pueblo Solar 4**

**Number of residents:** Five (Two adults: one female, one male; Three children: two females, one male)

**Family type:** Nuclear (Husband, wife, and children)

**Family originated from:** Chicxulub Pueblo, husband is the eldest son of couple at solar 3.

**Number of Mayan speakers:** None

**Religion:** Roman Catholic

**Economic activity:** Wife owns small grocery store located at thatched-roof main house.
Husband is a factory worker. Combined monthly income is $450.00

**Real Estate:** Lot (669.9 square meters)

**Agricultural production and location of plot:** N/A

**Valuables and Investments:** Refrigerator, television set, radio, stove, washer, jewelry

**Grocery, utilities, and health expenses:** $400.00 groceries, $25.50 utilities, $30.00 health expenses.

**Lot shape:** Rectangular

**Number of structures:** Five structures, including main house, kitchen, modern construction, toilet, and foundation; we also identify a drainage, laundry area (*batea*) and well

**Total roof and non-roof areas:** 77.86 square meters roof, 592.04 square meters non-roof

**Physical setting:** Flat area with some outcrops, light brown soil, sand, cement, and gravel. Lot has ramon, guaya, plums, and citrus trees, coconut and zaramuyo plants

**Date and sequence of construction:** Main house was built in 1974. Current residents moved in 1996 and built a modern addition in 1998 after the main house became a grocery store. Once they have enough budget they will add another room

**Public Utilities:** Power, cable television, and water

**Fence type and *kaanche***: *Albarrada*, no *kaanche*

**Knowledge and care of garden:** Wife and oldest children take care of the garden. Father-in-law is frequently consulted regarding plant care and use

**Cleaning patterns, refuse disposal, reuse, and recycling practices:** Living areas cleaned four times daily, lot cleaned once weekly. Refuse is separated and burned in
the back yard or transported to the town landfill

**Main structure shape and construction materials:** Apsidal stone foundation, cement floor, *kolopche* as exterior wall, grass and mud covering the interior, and palm and cardboard roof

**Length, width, wall height, and orientation main axis:** 7.50 m by 3.90m, 1.70m wall height, north-south main axis

**Domestic activities described by residents:** Entertainment, ritual, food preparation, storage, disposal, and commercial activities

**Other activities observed:** Food consumption

**Furniture:** Wooden table, metal display units with grocery items, brooms, table with weeding and family photos, Virgin of Guadalupe statue, tapes, blender, battery, toiletries, magazines, refuse, another table with statue of Jesus Christ, Virgin and kid portrait, grocery items, electric portable stove, aluminum pots and pans, cups, diapers, powder milk, cardboard boxes storing diverse items, plastic bins with carbonate drinks

**Kitchen shape and construction materials:** Rectangular foundation, partially covered cement floor, cardboard walls, and cardboard roof

**Length, width, wall height, and orientation main axis:** 5.90 m by 1.74 m, 1.60 wall height, and east-west main axis

**Cooking fuel:** None, family has an electric portable stove

**Domestic activities described by residents:** Entertainment, food preparation and consumption, storage and disposal

**Other activities observed:** Cleaning
**Furniture:** Two metal tables, plastic container, perishable food items, plastic bottles, broom, large aluminum pots containing water, table with dishes, cups, pots and pans, iron board, plastic bucket containing wood planks, plastic bags with clothing items.

**Figure:** A.4

![Figure A.4. Chicxulub Pueblo solar 4.](image)

**Chicxulub Pueblo Solar 5**

**Number of residents:** None, house is used as storage room for a welder and electric gates shop. Brother of owner provided lot data

**Family type:** N/A

**Family originated from:** Owner of lot is from Chicxulub Pueblo

**Number of Mayan speakers:** None

**Religion:** Roman Catholic

**Economic activity:** Owner of welding shop

**Real Estate:** Lot (703.4 square meters)
Agricultural production and location of plot: N/A

Valuables and Investments: Welding machinery

Grocery, utilities, and health expenses: N/A

Lot shape: Polygonal

Number of structures: Six, including main house, old kitchen, open shop, toilet, abandoned pigpens, modern construction, and a well

Total roof and non-roof areas: 183.47 square meters roof, 519.93 square meters no-roof

Physical setting: Flat leveled area with gravel and sand scattered around. Vegetation includes orange and lemon trees, caimito, pitaya, zapote, tamarindo, mango, and guano plants

Date and sequence of construction: Main house built in 1942, reused as welder shop since 1990

Public Utilities: Water and power

Fence type and kaanche: Albarrada, no kaanche

Knowledge and care of garden: N/A

Cleaning patterns, refuse disposal, reuse, and recycling practices: N/A

Main structure shape and construction materials: Apsidal stone foundation, cement floor, kolopche as exterior walls covered in the interior with grass and mud, and palm and tin roof

Length, width, wall height, and orientation main axis: 8.30m by 4.00 m, 2.00 m wall height, east-west main axis
Domestic activities described by residents: Storage

Other activities observed: None

Furniture: Metal grid, rocker, chairs, cement storage unit with metal door, blankets, clothing items

Kitchen shape and construction materials: Rectangular stone foundation, cement floor, cement and concrete block walls, and palm roof

Length, width, wall height, orientation main axis: 7.00 m by 4.00 m, 2.60 m wall height, east-west main axis.

Cooking fuel: N/A

Domestic activities described by residents: Storage

Other activities observed: None

Furniture: Chair, metal sheets, wall shelves, two bicycles, wicker basket, christmas decorations, tools and mechanical parts, cement bag, shovel

Figure: A.5

Chicxulub Pueblo Solar 6

Number of residents: Four (house was rented one week before our visit, family was absent during interview. Owner of lot provided lot data)

Family type: Nuclear, (Adults: one female, one male; children: two females)

Family originated from: N/A

Number of Mayan speakers: N/A

Religion: N/A
Figure A.5. Chicxulub Pueblo solar 5.

**Economic activity:** N/A

**Real Estate:** The lot belongs to a Chicxulub Pueblo family and is rented

**Agricultural production and location of plot:** N/A

**Valuables and Investments:** N/A

**Grocery, utilities, and health expenses:** N/A

**Lot shape:** Rectangular

**Number of structures:** Six, including main house, foundation, toilet, two chicken pens, pigpen, and a well

**Total roof and non-roof areas:** 34.00 square meters roof, 2511.9 square meters non-roof

**Physical setting:** Flat area with some outcrops, dark brown soils, gravel, and grass.
Vegetation includes guaya, papaya, *jabin*, lemon, orange, and cedar trees, henequen and hibiscus plants

**Date and sequence of construction:** House built in 1977, owner moved to a new house and the lot remained unoccupied until a week before our interview

**Public Utilities:** power and water

**Fence type and kaanche:** *Albarrada*, no kaanche

**Knowledge and care of garden:** Male resident takes care of garden

**Cleaning patterns, refuse disposal, reuse, and recycling practices:** N/A

**Main structure shape and construction materials:** Apsidal stone foundation, cement floor, *kolopche* exterior walls covered with grass and mud in the interior, palm and tin roof

**Length, width, wall height, and orientation main axis:** 7.50 m by 4.00 m, 1.70 m wall height, east-west main axis

**Domestic activities described by residents:** N/A

**Other activities observed:** Storage

**Furniture:** N/A

**Kitchen shape and construction materials:** No kitchen, cooking is done at an open three stone hearth located in back of main house

**Length, width, orientation main axis:** N/A

**Cooking fuel:** Wood

**Domestic activities described by residents:** N/A

**Other activities observed:** N/A

**Furniture:** Aluminum pots and pans, wooden crate, broom, three-stone hearth with
metal grate, plastic bottle

**Figure:** A.6

![Figure A.6. Chicxulub Pueblo solar 6.](image)

**Chicxulub Pueblo Solar 7**

**Number of residents:** None, the lot is abandoned and only the house and kitchen foundation remains. Grandson bought the land and is going to rebuild and move in

**Family type:** N/A

**Family originated from:** Chicxulub Pueblo

**Number of Mayan speakers:** N/A

**Religion:** N/A

**Economic activity:** N/A
Real Estate: N/A

Agricultural production and location of plot: N/A

Valuables and Investments: N/A

Grocery, utilities, and health expenses: N/A

Lot shape: Rectangular

Number of structures: Three including main house, kitchen, modern pig pen, and well

Total roof and non-roof areas: 49.96 square meters roof, 1229.84 non-roof

Physical setting: Flat area with outcrops, dark brown soil, gravel and grass. Vegetation includes cedar and guaya trees, and henequen plants

Date and sequence of construction: House and kitchen were built in 1902. The lot was abandoned in 1986 because the structures were in bad shape. Grandson plans to move in and build a chapel where the remains of the houses are located

Public Utilities: N/A

Fence type and kaanche: Albarrada, no kaanche

Knowledge and care of garden: Grandson

Cleaning patterns, refuse disposal, reuse, and recycling practices: N/A

Main structure shape and construction materials: Apsidal stone foundation, no floor, no walls, and no roof (it used to have grass and palm roof)

Length, width, wall height, and orientation main axis: 7.70 m by 4.60 m, 2.20 m wall height, north-south main axis

Domestic activities described by residents: N/A

Other activities observed: N/A

Furniture: N/A
Kitchen shape and construction materials: Rectangular foundation with no floor, no walls standing, and no roof

Length, width, wall height, and orientation main axis: 3.70m by 3.60 m, no walls, east-west main axis

Cooking fuel: N/A

Domestic activities described by residents: N/A

Other activities observed: N/A

Furniture: N/A

Figure: A.7

Chicxulub Pueblo Solar 8

Number of residents: Four (Three adults: two males, one female; one teen: male

Family type: Nuclear (father, mother, two sons)

Family originated from: Chicxulub Pueblo

Number of Mayan speakers: None

Religion: Roman Catholic

Economic activity: Both father and eldest son work as kitchen chefs at a hotel in Merida. Wife cleans houses at Merida. Combined monthly salary is $640.00

Real Estate: Lot (846.5 square meters)

Agricultural production and location of plot: None

Valuables and Investments: Refrigerator, television set, radio, gas stove, jewelry, bicycles, one pig, chicken and turkeys
**Grocery, utilities, and health expenses:** Groceries $200.00, utilities 13.50, health $180.00

![Diagram of Chicxulub Pueblo solar 7.](image)

**Lot shape:** Rectangular

**Number of structures:** Five including main house, kitchen, *palapa*, toilet, and pig pen; there is also a non-roof laundry area (*batea*)

**Total roof and non-roof areas:** 87.13 square meters roof, 759.37 square meters non-roof

**Physical setting:** Flat area with dark brown soil, some sand and grass. Vegetation includes tamarindo, lemon, oranges, sour oranges, guayaba, and caimito trees.

**Date and sequence of construction:** House built in 1942. Family lives in the lot since 1982.

**Public Utilities:** Water, cable television, and power
Fence type and kaanche: Albarrada, no kaanche

Knowledge and care of garden: Husband takes care and knows about the garden trees

Cleaning patterns, refuse disposal, reuse, and recycling practices: Living areas cleaned twice daily, lot cleaned once a week. Refuse is separated and located in the back of the lot before being burned or transported to the town landfill

Main structure shape and construction materials: Apsidal shape with concrete block and cement foundation and walls, cement floor, and palm and cardboard roof

Length, width, wall height, orientation main axis: 7.00 m by 3.50 m, 2.00 m wall height, east-west main axis

Domestic activities described by residents: Resting, entertainment, ritual, storage, disposal

Other activities observed: None

Furniture: Family portraits, wooden cross, flower pot, ceramic dishes, plastic trunk, Virgin of Guadalupe portrait, wooden pegs, hammocks, toiletries, clothing items, newspapers, two fans, television set, stuffed toys, lamp and shade, chairs, wall calendar, wall clock, iron board, wooden box to store tapes, bench

Kitchen shape and construction materials: Rectangular cement foundation, cement floor, horizontal wood planks as exterior walls, plastic bags in the interior, and cardboard roof

Length, width, wall height, and orientation main axis: 8.00 m by 4.00 m, 1.80 m wall height, north-south main axis
**Cooking fuel:** Gas and firewood (42 kg). Family either purchase or collect them from the forest nearby

**Domestic activities described by residents:** Resting, food preparation and consumption

**Other activities observed:** Storage

**Furniture:** Wooden table, large wardrobe, two bicycles, stove, pots and pans, cardboard boxes and plastic bags storing diverse items, plastic hangers, broom, grocery items.

**Figure:** A.8

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*Figure A.8. Chicxulub Pueblo solar 8.*

**Municipio of Tinum**

**Piste Solar 1**

**Number of residents:** Eight (one female and two male adults; three male teenagers,
two female children)

**Family type:** Nuclear (husband, wife, and children)

**Family originated from:** Piste

**Number of Mayan speakers:** Eight

**Religion:** Roman Catholic

**Economic activity:** Husband is a farmer and also is an independent worker at Piste. Wife sells stone from the lot. Combined monthly income is $150.00

**Real Estate:** Lot (2037.6 square meters), *ejido* land (1 hectare)

**Agricultural production and location of plot:** Corn and beans. Plot located 4.5 kilometers from *solar*

**Valuables and Investments:** Chickens, television set, radio, jewelry

**Grocery, utilities, and health expenses:** $80.00 groceries, $5.60 utilities, health care provided by community hospital and paid with weekly voluntary work (*fajina*)

**Lot shape:** Polygonal

**Number of structures:** Eight including main house, kitchen, storage room, toilet, palapa, chicken pen, and foundation for new house; we also identified a laundry area (*batea*), and well

**Total roof and non-roof areas:** 70.83 square meters roof, 1966.77 non-roof

**Physical setting:** Irregular filled area with multiple outcrops, dark brown soil, gravel and stone. Vegetation includes almond, zapote, guaya, lemon and sour orange trees

**Date and sequence of construction:** Main house built in 1972 and family has been living in the lot since then
Public Utilities: Water, power, cable

Fence type and kaanche: Albarrada, no kaanche

Knowledge and care of garden: Both husband and wife take care of the garden, however, husband knows more about plant care

Cleaning patterns, refuse disposal, reuse, and recycling practices: Living spaces cleaned twice daily, lot cleaned once weekly. Refuse is not separated and either burned or transported to the town landfill. Stones are reused as ground fill

Main structure shape and construction materials: Flat-end stone foundation with cement floor, kolopche as exterior walls covered with cardboard in the interior, and palm roof

Length, width, wall height, and orientation main axis: 8.50 m by 4.40 m, 1.87 m wall height, east-west main axis

Domestic activities described by residents: Resting, entertainment, food consumption, storage, disposal

Other activities observed: Ritual

Furniture: Plastic trunk to store clothing, fumigation tank, metal table with television set, wooden table with medicines, toiletries, clothing items, and blankets; Virgin of Guadalupe frame, cardboard boxes, wooden shelves, hammocks, banqueta, and chair,

Kitchen shape and construction materials: Apsidal shape foundation with dirt floor, no walls, and palm roof

Length, width, wall height, and orientation main axis: 4.40 m by 2.40 m, 2.40 wall height, and north-south main axis

Cooking fuel: Firewood (60 kg/week), collected by sons at husband’s ejido plot
Domestic activities described by residents: Entertainment, food preparation and consumption, storage, and disposal

Other activities observed: None

Furniture: Plastic buckets used to store water, calabash (luch) and gourds (leks), plastic containers, cups, and bottles; metal display unit to store containers, concrete blocks supporting a stone wash sink, wooden shelves and banqueta, aluminum buckets, comal, and pans; three-stone hearth

Figure: A.9

Piste Solar 2

Number of residents: Four (Two males: one adult and one children; two females: one adult and one children)

Family type: Nuclear (husband, wife, and children)

Family originated from: Piste (wife) and San Felipe Nuevo (husband, he is the son of founder family from household 3 at San Felipe Nuevo)

Number of Mayan speakers: Three

Religion: Roman Catholic

Economic activity: Wood crafter. Monthly income is $180.00

Real Estate: Lot (298.3 square meters)

Agricultural production and location of plot: N/A

Valuables and Investments: Gas stove, television set, stereo set, and jewelry

Grocery, utilities, and health expenses: $160.00 groceries, $17.50 utilities, health care provided by community hospital and paid with weekly voluntary work (fajina)
Lot shape: Rectangular

Number of structures: Four, including main house, kitchen, storage area, foundation, and laundry area (batea)

Total roof and non-roof areas: 53.97 square meters roof, 244.33 square meters non-roof

Physical setting: Located on top of a large outcrop, lot has an irregular filled area with dark brown soil and loose gravel. Vegetation includes orange trees and chaya plants

Date and sequence of construction: House built in 1998

Public Utilities: Water, cable television, power

Fence type and kaanche: Albarrada, no kaanche

Knowledge and care of garden: Husband takes care and knows about garden plants

Cleaning patterns, refuse disposal, reuse, and recycling practices: Living spaces cleaned three times daily, lot cleaned three times a week. Refuse is separated and
located at the back of the lot before burning or transported to the town landfill

**Main structure shape and construction materials:** Rectangular cement and concrete block foundation, with cement floor, concrete block walls, and palm roof

**Length, width, wall height, orientation main axis:** 8.75 m by 4.50 m, 2.05 m wall height, east-west main axis

**Domestic activities described by residents:** Resting, entertainment, ritual, food preparation and consumption, cleaning, storage, and disposal

**Other activities observed:** None

**Furniture:** Gas stove, aluminum chairs and table, clothing, plastic containers, pots and pans, large wardrobe, wooden shelve unit, plastic toys, stereo unit, music Compact discs, wall clock, wooden table with Television set, bed, hammock, drawers cabinet

**Kitchen shape and construction materials:** Rectangular stone foundation with dirt floor, *kolopche* exterior walls covered with plastic bags in the interior, and palm roof

**Length, width, wall height, orientation main axis:** 4.00 m by 1.67 m, 2.05 m wall height, east-west main axis

**Cooking fuel:** Firewood (15 kg/week) and gas

**Domestic activities described by residents:** Entertainment, food preparation and consumption, storage, disposal, wood crafting

**Other activities observed:** Resting, cleaning

**Furniture:** Hammock, plastic bin for water storage, plastic containers, cups, and dishes; *banqueta*, aluminum pots and pans, clothing, towels, concrete blocks, cement bag, *kaanche*, carving tools, and wooden shelve
Figure: A.10

San Felipe Nuevo Solar 1

**Number of residents:** Two (one female and one male adults)

**Family type:** Nuclear (husband and wife)

![Diagram of San Felipe Nuevo Solar 1]

**Family originated from:** San Felipe Viejo

**Number of Mayan speakers:** Two

**Religion:** Roman Catholic

**Economic activity:** Husband is a farmer. Monthly income is $120.00

**Real Estate:** Lot (1620.6 square meters), *ejido* land (2 hectares) rented

**Agricultural production and location of plot:** Corn, beans, squash, lima beans. Plot located 2.00 kilometers from lot

**Valuables and Investments:** Television set, stereo set, two sewing machines, electric fan, jewelry, radio, jewelry, pigs, chickens, and turkeys
**Grocery, utilities, and health expenses:** $30.00 groceries, $37.00 utilities, $25.00 health care

**Lot shape:** Square

**Number of structures:** Five structures including main house, kitchen, two chicken pens, one pigpen, laundry area, and enclosed garden area

**Total roof and non-roof areas:** 108.88 square meters roof, 1511.72 square meters non-roof

**Physical setting:** Located on top of both a natural outcrop and a prehistoric platform, the area has reddish brown soil with loose gravel and remnants of mounds. Vegetation includes oranges, sour oranges, guaya, palms, oak, and cedar trees; rose and bugambilia bushes

**Date and sequence of construction:** Current family built Houses in 1990

**Public Utilities:** Water, power, and cable television

**Fence type and kaanche:** *Albarrada*, five *kaanches* (herbs: mint, chilies, and chives)

**Knowledge and care of garden:** Wife takes care of the garden; husband knows more about plant care

**Cleaning patterns, refuse disposal, reuse, and recycling practices:** Roof areas cleaned twice daily, lot cleaned once monthly. Once separated, refuse is located in the back of the lot and finally burned. Metal and plastic buckets and cans were reused as planters, female clothing reused to dress a scarecrow; thin boards were recycled to build a *kaanche*, prehistoric *metates* reused as water containers for pigs

**Main structure shape and construction materials:** Flat-end stone foundation with
cement floor, *kolopche* exterior walls covered inside with plastic bags and fabric, and palm roof

**Length, width, wall height, and orientation main axis:** 8.90 m by 4.80 m, 1.80 m wall height, east-west main axis

**Domestic activities described by residents:** Resting, entertainment, ritual, storage, disposal

**Other activities observed:** Sewing

**Furniture:** Wooden chair, hammocks, large wooden wardrobe, sewing machines, television set, stereo set, radio, bed, wooden trunk, table with religious figures and pictures, plastic bags with seeds and corn kernels, clothing hanging from laundry lines, plastic bags and cardboard boxes with diverse items and clothing hanging from walls or stacked on top of roof beams, paper calendars, picture frames, *peten* (hanging basket used to store food away), tied bundle of plastic bags hanging from ceiling,

**Kitchen shape and construction materials:** Flat-end stone foundation with dirt floor, *kolopche* exterior walls, and palm roof

**Length, width, wall height, and orientation main axis:** 6.00 m by 2.90 m, 1.80 m wall height, and north-south main axis

**Cooking fuel:** Firewood (60 kg/week). Wife collects wood from forest nearby

**Domestic activities described by residents:** Food preparation and consumption, storage, and disposal

**Other activities observed:** Resting

**Furniture:** Hammock, electric fan, cement hearth, plastic and metal containers with water, aluminum pots and pans, calabash (*luch*) and gourds (*leks*), *banqueta,*
kaanches, wooden table, wooden laundry sink with plastic containers, cups and dishes, fan screen replacement, wooden shelves and crates, plastic bags with corn kernels stacked on top of roof beams

**Figure:** A.11

![Figure A.11. San Felipe Nuevo solar 1.](image)

**San Felipe Nuevo Solar 2**

**Number of residents:** Eight (adults: three males, two females; one female teen; two female children)

**Family type:** Extended (family 1 husband, wife, children; family 2 oldest son, wife, and children)

**Family originated from:** San Felipe Viejo
**Number of Mayan speakers:** Seven

**Religion:** Roman Catholic

**Economic activity:** Husband and oldest son work as farmer. Husband also works in Piste as night watcher. Combined monthly income is $140.00

**Real Estate:** Lot (1522.8 square meters) *ejido* land (2 hectares) rented

**Agricultural production and location of plot:** Corn, beans, squash, and lima beans. Plot located 1.5 kilometers from *solar*

**Valuables and Investments:** Television and stereo set, sewing machine, bicycle, jewelry, refrigerator, chickens and pigs

**Grocery, utilities, and health expenses:** $30.00 groceries, $10.80 utilities, $25.00 health expenses

**Lot shape:** Polygonal

**Number of structures:** Family 1 has a main house, kitchen, three pig pens, one chicken pen, laundry area, and water tank; family 2 has modern construction (two rooms: kitchen, main house; patio), laundry area, and water tank

**Total roof and non-roof areas:** 118.82 square meters roof, 1403.98 square meters non-roof

**Physical setting:** Located on top of both a natural outcrop and a prehistoric platform, the area has reddish brown soil with loose gravel and remnants of mounds. Family 1 lives on top of the outcrop whereas family 2 lives on the deepest section of the lot facing the municipal park. Vegetation includes oranges, sour oranges, tangerines, oak, and cedar trees

**Date and sequence of construction:** First family built main house and kitchen in 1988;
second family built modern construction in 2000

**Public Utilities:** Water, power, cable television

**Fence type and kaanche:** *Albarrada*, three *kaanches* (chives)

**Knowledge and care of garden:** Wife takes care of the garden; husband knows more about plant care

**Cleaning patterns, refuse disposal, reuse, and recycling practices:** Roof areas cleaned three times daily, lot cleaned once daily. Refuse located outside the lot and in the front area before burning or transporting to the municipal landfill. They separated glass bottle and pile them up near one of the *kaanches*. Refuse is reused as ground fill, plastic and metal buckets as well as cans are reused as plant containers

**Main structure shape and construction materials:** Rectangular stone and cement foundation with cement floor, *kolopche* exterior walls with grass and mud covering the interior, and palm roof

**Length, width, wall height, orientation main axis:** 7.30 m by 4.10 m, 1.80 m wall height, north south main axis

**Domestic activities described by residents:** Resting, entertaining, ritual, food preparation and consumption, cleaning, storage, and disposal

**Other activities observed:** None

**Furniture:** Plastic, wood, and metal chairs, large wooden wardrobe, clothing items stashed on the walls; one wooden shelve with toiletries and another one with religious figurines; wooden table with television and stereo sets, plastic cups, pencils, and cans; wooden open shelve unit with clothing, toiletries, and diverse items; soda plastic crate,
hammocks, pumpkins and folded cardboard boxes, blankets; plastic table, two large ceramic water jars, metal and plastic buckets, plastic containers with water; *kaanche*, sewing machine, plastic container with corn kernels, candles, soap, oranges; metal table with plastic cups and containers, toiletries, pantry items, aluminum pots and pans; and calabash (*luch*)

**Kitchen shape and construction materials:** Rectangular shape foundation with dirt floor, *kolopche* as exterior walls, and palm roof

**Length, width, wall height, and orientation main axis:** 5.60 m by 3.60 m, 1.80 m wall height, and north-south main axis

**Cooking fuel:** Firewood (42 kg/week) collected by wife and daughter in the *ejido* plot

**Domestic activities described by residents:** Food preparation

**Other activities observed:** Resting and storage

**Furniture:** Cement hearth, metal table, ceramic water jars, hammer, plastic bags and buckets with pantry items hanging from wall poles, children toys, wooden table, aluminum comal and pots, plastic cups, firewood, hammock, metal cans, and gourds (*leks*)

**Figure:** A.12

San Felipe Nuevo Solar 3

**Number of residents:** Nine (adults: two males, three females; two male teen; two female child)

**Family type:** Extended (family 1, husband, wife, two sons and one daughter; family 2, eldest daughter, son-in-law, and children). Family 1, husband is the comisario ejidal
Family originated from: San Felipe Viejo

Number of Mayan speakers: Nine

Religion: Roman Catholic

Economic activity: Husband and son are farmers. Eldest daughter works on a leather shop that belongs to her father's brother son. Son-in-law is a mason and works in Piste. Combined monthly income is $192.80

Real Estate: Lot (14945.5 square meters), two ejido plots (3 hectares)

Agricultural production and location of plot: Corn, beans, squash, lima beans. Plots located 1 and 1.5 kilometers respectively

Valuables and Investments: Television set, radio, washing machine, electric fan, three sewing machines, bicycle, jewelry, chickens, turkeys, and pigs
Grocery, utilities, and health expenses: $30.00 groceries, $10.90 utilities, $25.00 health expenses

Lot shape: Rectangular

Number of structures: Family 1 has main house/kitchen, storage room, shower/storage, modern construction (main house), pig pen, chicken pen, log storage area, laundry area, and a water tank; family 2 has modern construction (main house and kitchen), laundry area, pigpen, and water tank

Total roof and non-roof areas: 143.26 square meters roof, 1352.24 square meters non-roof

Physical setting: Located on top of both a natural outcrop and a prehistoric platform, the area has reddish brown soil with loose gravel and remnants of mounds. Family 1 lives on top of the outcrop whereas family 2 lives on the deepest section of the lot facing the municipal park. Vegetation includes sour oranges, zapote, grape fruit, coconut, avocado, banana plants, and guaya and lemon trees

Date and sequence of construction: Family 1 moved into the lot in 1979. Family 2 built their house in 1998

Public Utilities: Water, power, cable television

Fence type and kaanche: Albarrada, no kaanche but they have a wood elevated screen used to dry pumpkin seeds

Knowledge and care of garden: Family 1, wife takes care of garden but husband knows about plant care

Cleaning patterns, refuse disposal, reuse, and recycling practices: Roof areas cleaned twice daily, lot cleaned twice a week. Refuse is separated, stored on the deep
areas of the lot, and finally burned or transported to the municipal landfill. Plastic buckets and containers reused as planters, metal wheel frame recycled as peten

**Main structure shape and construction materials:** Rectangular stone foundation with cement floor, concrete block and cement s exterior walls, and palm roof. Main house has two rooms

**Length, width, wall height, and orientation main axis:** 8.20 m by 4.45 m, 2.05 m wall height, north-south main axis

**Domestic activities described by residents:** Resting, entertainment, ritual, cleaning, storage, and disposal

**Other activities observed:** Sewing

**Furniture:** Hammocks, three sewing machines, clothing items, blankets, cleaning utensils, religious and family pictures, paper calendar, folded cardboard boxes and wood sheets stacked on top of roof beams, wooden table with altar and television set, washing machine, electric fan, family and religious pictures, kaanche

**Kitchen shape and construction materials:** Rectangular stone foundation with dirt floor, kolopche as exterior walls, and palm roof

**Length, width, wall height, and orientation main axis:** 6.00 m by 3.00 m, 1.80 m wall height, and north-south main axis

**Cooking fuel:** Firewood (45 kg/week)

**Domestic activities described by residents:** Food preparation and consumption, storage, and disposal

**Other activities observed:** None
**Furniture:** Three-stones hearth, metal buckets with ears of corn, aluminum pots and pans, *banqueta*, large plastic container with water, plastic buckets and bags with pantry items hanging from walls; round wooden table with cast iron grinder, toiletries, pantry items, plastic container with corn dough; table with pantry items and plastic containers, calabash (*luch*) and gourds (*leks*), *peten* (hanging basket used to store food away), pottery water containers, plastic thermos, aluminum griddle, *kaanche*, pile of squash.

**Figure:** A.13

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Figure A.13. San Felipe Nuevo solar 3.

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**San Felipe Nuevo Solar 4**

**Number of residents:** None, family lives in Piste. Owner family has three members (one male and two female adults).

**Family type:** Nuclear (husband, wife, and daughter)

**Family originated from:** San Felipe Viejo
Number of Mayan speakers: Three

Religion: Roman Catholic

Economic activity: Husband is a farmer. Monthly income is $326.40

Real Estate: Lot (1801.1 square meters), ejido land (3 hectares)

Agricultural production and location of plot: Corn, beans, squash, lima beans. Plot located 2 kilometers from lot

Valuables and Investments: Stereo unit, sewing machine, bicycle, turkeys, and pigs

Grocery, utilities, and health expenses: $30.00 groceries, $44.00 utilities, $25.00 health expenses

Lot shape: Rectangular

Number of structures: Seven structures including main structure, kitchen/leather workshop, one unfinished thatched roof house, two pigpens, one turkey pen, one abandoned beehive, and a water tank

Total roof and non-roof areas: 175.9 square meters roof, 1652.2 square meters non-roof

Physical setting: Located on an outcrop, the lot has reddish brown soil and loose gravel around it. Vegetation includes oranges, sour oranges, lemon, grapefruit, guanabana, chaka and jabin trees

Date and sequence of construction: Family built the houses in 1979. They moved to Piste in 2001

Public Utilities: Water and power

Fence type and kaanche: Albarrada, no kaanche but they have a wood elevated
screen used to dry pumpkin seeds

**Knowledge and care of garden:** Husband takes knows about plant care and takes care of the garden

**Cleaning patterns, refuse disposal, reuse, and recycling practices:** N/A

**Main structure shape and construction materials:** Apsidal cement foundation with cement floor, *kolopche* exterior walls, palm and cardboard roof

**Length, width, wall height, and orientation main axis:** 7.40 m by 5.50 m, 1.74 m wall height, and north-south main axis

**Domestic activities described by residents:** House is currently used to store personal items, farm utensils, and corn ears

**Other activities observed:** Food consumption

**Furniture:** Large wooden wardrobe, bicycle, blankets, open bookshelves unit with cardboard boxes storing diverse items, plastic bags and container, cans of spray, balance, small suitcase, books; shotgun, plastic and metal buckets, paper calendars in the walls, screens used to dry squash seeds, plastic containers with honey, tools, wooden crates; wooden chair and palm leaves stacked on top of roof beams; toiletries, clothing items, plastic bags with ears of corn; corner wooden shelve unit with toiletries, plastic containers, knife, and brass candle holders; hammock, plastic cooler; wooden shelve unit with screen doors used to store clothes and other items; fan grid replacement, large wooden table, with styrofoam cooler, plastic jug, cardboard box, radio, music tapes, toiletries, calabash (*luch*) and gourds (*leks*), broom, newspaper bundle stacked underneath the table; plastic tray with citrus fruits, *kaanche*, plastic crate with corn kernels; corner table with cardboard boxes and squash stacked underneath,
portable fumigation unit

**Kitchen shape and construction materials:** Apsidal cement foundation with cement floor, *kolopche* exterior walls covered inside with cardboard, palm and cardboard roof

**Length, width, wall height, and orientation main axis:** 7.70 m by 4.20 m, 1.66 m wall height, and north-south main axis

**Cooking fuel:** N/A

**Domestic activities described by residents:** The owner's brother's son currently uses Kitchen as a leather crafts workshop

**Other activities observed:** Storage, food consumption, disposal

**Furniture:** Wood planks, cardboard boxes, clothing items, and palm leaves stacked on top of roof beams; three wooden shelve units with books, stereo unit, dusting item, music tapes, plastic bags, stucco figurines, and cardboard boxes; ceramic toilet, two *kaanches*, aluminum pot, transit tripod, bear and soda bottles with paint; stucco figurine; three wooden tables, one with leather sheets, markers, cushion, towel, and dish; tablet with papers on the wall; another used as altar with large wooden hand painted cross and rebozo, painting supplies, alcohol, dishes and glasses, and plastic crates with supplies underneath it; the last table has a mat, engraving tools, ruler, blankets, and leather sheets

**Figure:** A.14

**San Felipe Nuevo Solar 5**

**Number of residents:** Six adults (three males and three females)

**Family type:** Nuclear (husband, wife, and offspring)
Family originated from: San Felipe Viejo

Number of Mayan speakers: Six

Religion: Roman Catholic

Economic activity: Husband and sons work as farmers. Oldest daughter works at a clothing factory in Valladolid. Combined monthly income is $120.0

Real Estate: Lot (2617.3 square meters), ejido land (4 hectares)

Agricultural production and location of plot: Corn, beans, squash, lima beans. Plot located 2 kilometers from lot

Valuables and Investments: Television set, refrigerator, radio, sewing machine, jewelry, chicken, turkeys, and pigs

Grocery, utilities, and health expenses: $30.00 groceries, $31.20 utilities, $25.00 health
Lot shape: Rectangular

Number of structures: Seven including main house, kitchen, modern construction (three rooms: main house, bedroom, kitchen), two turkey and chicken pens, and one pigpen; lot also has an enclosed garden area, a laundry area, and water tank

Total roof and non-roof areas: 323.44 square meters roof, 2293.86 square meters non-roof

Physical setting: Partially located on an outcrop, area has reddish brown soil and loose gravel. Vegetation includes oranges, sour oranges, lemon, tangerine, tamarindo, chukum, and plum trees, and banana plants

Date and sequence of construction: Family built first house in 1973. New construction started in 1995 and continues today

Public Utilities: Water, power, cable Television

Fence type and kaanche: Albarrada, kaanche (herbs: onion, chives, and mint)

Knowledge and care of garden: Wife takes care of garden; husband knows more about plant care

Cleaning patterns, refuse disposal, reuse, and recycling practices: Roof areas cleaned twice daily, lot cleaned once a week. Refuse is separated and stored on back of lot until burned. Soda bottles are stored on the side of the lot next to the old houses. Plastic buckets and metal buckets are reused as plant containers; prehistoric grinding stones (metates) reused ad water containers for pigs

Main structure shape and construction materials: Apsidal stone foundation with cement floor, kolopche as exterior walls covered inside with cardboard and blankets,
and palm roof

**Length, width, wall height, and orientation main axis:** 9.60 m by 4.40 m, 1.40 m wall height, east-west main axis

**Domestic activities described by residents:** Resting, entertaining, ritual, storage, and disposal

**Other activities observed:** House was a *molino* (electric corn mill)

**Furniture:** *Kaanche*, suitcase, sewing machine table, blankets, rope, plastic water jugs, plastic thermos, three cardboard boxes with beer bottles, wooden box, electric corn mill, large plastic containers, plastic cups, brush; corn kernels stacked on back of a wood plank, hammocks, laundry lines, clothing items; metal sheet on top of wooden chair and bench; plastic hangers, cable, wood planks, cardboard boxes with diverse items, all stacked on top of roof beams; portable fumigation unit, bundle of plastic sheets, plastic crates with soda bottles, washing machine, wooden trunk, bicycle frame, aluminum pots and pans, another wooden chair; plastic bags with corn kernels; porcelain toilet and lavatory, tool box, fuel plastic container, blankets, wooden frames; shower area has *kaanche* and plastic crates with soda bottles

**Kitchen shape and construction materials:** Rectangular stone foundation with dirt floor, *kolopche* as exterior walls, and palm roof

**Length, width, wall height, and orientation main axis:** 6.73 m by 5.10 m, 1.40 m wall height, and north-south main axis

**Cooking fuel:** Firewood (60 kg/week) collected by husband and sons at *ejido* plot

**Domestic activities described by residents:** Storage and disposal

**Other activities observed:** None
**Furniture:** Cement hearth, pottery water jars, plastic buckets, stack of roof palms, hat, can of spray, plastic bags, aluminum pots and lids, plastic container for fuel, wicker basket with pots and plastic dishes, mason jar with red paint, wood planks, plastic crates with soda bottles, wooden crate reused as a wall shelve unit, plastic water jugs, wooden wheel, metal construction rod, several metal hooks, mason tools, gas lamp, firewood, *banqueta*

**Figure:** A.15

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**San Felipe Nuevo Solar 6**

**Number of residents:** Three adults (two males, one female)
**Family type:** Nuclear (husband, wife, and grandson). Husband and wife are the parents of heads of *solares* 3, 4, and 5

**Family originated from:** Ebtun (husband), Tzutmuc (wife), San Felipe Viejo (grandson)

**Number of Mayan speakers:** Three

**Religion:** Roman Catholic

**Economic activity:** Husband and grandson work as farmers. Combined monthly income is $60.00

**Real Estate:** Lot (1178.9 square meters), *ejido* land (2 hectares)

**Agricultural production and location of plot:** Corn, beans, squash, lima beans. Plot located 1 kilometer from lot

**Valuables and Investments:** Radio, Television set, sewing machine, jewelry, chickens, turkeys, and pigs

**Grocery, utilities, and health expenses:** $30.00 groceries, $56.00 utilities, $25.00 health

**Lot shape:** Rectangular

**Number of structures:** Four including main house with shower area, kitchen, chicken and turkey pen, laundry area, and a water tank

**Total roof and non-roof areas:** 61.55 square meters roof, 1117.35 square meters non-roof

**Physical setting:** Located on a flat irregular filled area with reddish brown soil and loose gravel. Vegetation includes caimito, tamarindo, *chukum*, oranges, zapote, plums, anona, and chaya plants

**Date and sequence of construction:** Houses were built in 1979
**Public Utilities:** Water, cable Television, and power

**Fence type and kaanche:** *Albarrada, kaanche* (herbs: chives) and a pumpkin seed-drying screen

**Knowledge and care of garden:** Wife takes care of the garden, husband knows more about plant care

**Cleaning patterns, refuse disposal, reuse, and recycling practices:** Roof areas cleaned twice daily, lot cleaned twice weekly. Refuse located on back of the lot before burning. Prehistoric carved stones (columns) and grinding stones have been reused as supports for laundry area and water container for chickens respectively. Cardboard boxes used as insulator in the main house

**Main structure shape and construction materials:** Apsidal stone foundation with cement floor, *kolopche* as exterior walls covered inside with folded cardboard boxes, and palm roof

**Length, width, wall height, and orientation main axis:** 7.20 m by 4.20 m, 1.50 m wall height, east-west main axis

**Domestic activities described by residents:** Resting, entertainment, ritual, food consumption, storage, and disposal

**Other activities observed:** None

**Furniture:** Wooden table with plastic cover, glass dishes and cups, pantry items, ears of corn, kitchen towels, and toiletries; iron hand mill on wooden base, rope, two *kaanches* and one chair, plastic buckets and containers, plastic bags stacked with diverse items hanging from the walls; hammocks, farm tools, plastic bags with ears of
corn, laundry detergents, calabash (*luch*) and gourds (*leks*); shower area has a pile of firewood, aluminum pot hanging from metal hook, toiletries, *kaanche*, plastic bags with several items hanging from walls, fragments of concrete blocks, cardboard boxes with several items and clothing located on the floor and also stacked on top of roof beams; blankets, electric fan, plastic thermos, radio, television set

**Kitchen shape and construction materials:** Apsidal stone foundation with cement floor, *kolopche* as exterior walls, and palm roof. Kitchen is attached to the main house on the southwest corner

**Length, width, wall height, and orientation main axis:** 5.80 m by 3.40 m, 1.50 m wall height, east-west main axis

**Cooking fuel:** Firewood (30 kg/week) collected by grandson at *ejido* plot

**Domestic activities described by residents:** Resting, food preparation and consumption, storage, and disposal

**Other activities observed:** None

**Furniture:** Three-stones hearth, several plastic buckets and pottery containers with water, calabash (*luch*) and gourds (*leks*), metal buckets, plastic cups, *banquetas*, aluminum comal, pots, pans, ladle, and skimmer; *kaanche*, hammock, wooden shelve with pantry items, plastic bags and bags also with pantry items, firewood, another plastic bag with ears of corn

**Figure:** A.16

San Felipe Nuevo Solar 7

**Number of residents:** Seven (adults: one male and one female; two female teens; children: three females)
**Family type:** Nuclear (husband, wife, and children)

**Family originated from:** San Felipe Viejo and San Felipe Nuevo

**Number of Mayan speakers:** Seven

**Religion:** Roman Catholic

**Economic activity:** Farmer and temporary independent worker. Monthly income is $185.00

**Real Estate:** Lot (3968.7 square meters), ejido plot (2 hectares) rented

**Agricultural production and location of plot:** Corn, beans, squash, lima beans. *Ejido* plot located at 1.5 kilometers from *solar*
Valuables and Investments: Two refrigerators, television set, sewing machine, jewelry, chickens, one bull, and pigs

Grocery, utilities, and health expenses: $168.00 groceries, $10.20 utilities, $5.00 health expenses

Lot shape: Rectangular

Number of structures: Seven including main house, two kitchens, modern construction, cattle pen, chicken pen, corn-storage unit, laundry area, and water tank

Total roof and non-roof areas: 104.99 square meters roof, 3863.71 square meters non-roof

Physical setting: Located on both and outcrop and the remains of a prehistoric platform, the area is irregularly filled with reddish brown soil and loose gravel. Vegetation includes sour oranges, guayaba, plum, lemon, anona, and oak trees

Date and sequence of construction: Traditional houses were built in 1982. New construction was built in 1999

Public Utilities: Water, power, and cable television

Fence type and kaanche: Albarrada, no kaanche

Knowledge and care of garden: Husband takes care of garden; both husband and wife know about plant care

Cleaning patterns, refuse disposal, reuse, and recycling practices: Roof areas cleaned once daily, lot cleaned twice weekly. Refuse is separated and located on back of the lot before burning or transported to the municipal landfill. Husband sells aluminum cans for recycling

Main structure shape and construction materials: Rectangular cement foundation
with cement floor, concrete blocks and mortar as exterior walls covered inside with plywood sheets and fabric, and palm roof.

**Length, width, wall height, and orientation main axis:** 5.80 m by 4.60 m, 1.88 m wall height, east-west main axis

**Domestic activities described by residents:** Resting, entertainment, ritual, food preparation and consumption, cleaning, storage, disposal

**Other activities observed:** Sewing

**Furniture:** large wooden wardrobe, television set, fan, clothing items and blankets, plastic buckets and containers, wooden table used as altar with large Virgin of Guadalupe picture, pottery decorations and flower containers, two large mason jars with sand used as flower containers, toiletries, pantry items, silk flowers and paper decorations, religious pictures, plastic crates with soda bottles, hammocks, wooden shelve with radio, Christmas decorations, plastic hangers, sewing machine, framed mirror, plastic buckets with water, magazines and school notebooks, paper calendar, toys, refrigerator,

**Kitchen shape and construction materials:** Apsidal foundation with dirt floor, kolopche as exterior walls, and remains of a palm roof. New kitchen located on a palapa attached to the main house

**Length, width, wall height, and orientation main axis:** 2.00 m by 1.56 m, 1.80 m wall height, and east-west main axis

**Cooking fuel:** Firewood (30 kg/week) collected by husband at the ejido plot or forest nearby
Domestic activities described by residents: Storage and disposal

Other activities observed: None

Furniture: Cement hearth, push mower, plastic buckets with chicken food, hammock, beer and soda bottles, cardboard boxes, plastic bags with corn kernels, cast iron corn mill on wooden stand

Figure: A.17

Figure A.17. San Felipe Nuevo solar 7.

San Felipe Nuevo Solar 8

Number of residents: Five (adults: one male, one female; one male teen; children: one male and one female

Family type: Nuclear (husband, wife, and offspring)

Family originated from: San Felipe Viejo

Number of Mayan speakers: Five
**Religion:** Roman Catholic

**Economic activity:** Farmer. Monthly income is $80.00

**Real Estate:** Lot (716.5 square meters), *ejido* land (2 hectares) rented

**Agricultural production and location of plot:** Corn, beans, lima beans, squash, pumpkins

**Valuables and Investments:** N/A

**Grocery, utilities, and health expenses:** N/A

**Lot shape:** Polygonal

**Number of structures:** Three structures including main structure, kitchen, pig pen, and water tank

**Total roof and non-roof areas:** 88.11 square meters roof, 628.39 square meters non-roof

**Physical setting:** Located on top of an outcrop, lot has an irregular filled area with reddish brown soil and loose gravel. Vegetation includes oranges, lemon sour oranges and coconut plants

**Date and sequence of construction:** N/A

**Public Utilities:** Water, power, and cable television

**Fence type and *kaanche***: *Albarrada*, no *kaanche*

**Knowledge and care of garden:** N/A

**Cleaning patterns, refuse disposal, reuse, and recycling practices:** N/A

**Main structure shape and construction materials:** Rectangular cement foundation with cement floor, concrete block as exterior walls, and cement roof
Length, width, wall height, and orientation main axis: 7.90 m by 3.84, 1.82 m wall height, east-west main axis

Domestic activities described by residents: Resting, ritual, storage, and disposal

Other activities observed: None

Furniture: N/A

Kitchen shape and construction materials: Rectangular cement foundation with dirt floor, kolopche as exterior walls, and palm roof

Length, width, wall height, and orientation main axis: 6.60 m by 4.00 m, 1.60 m wall height, east-west main axis

Cooking fuel: Firewood, no data on consumption or collection practices

Domestic activities described by residents: Resting, entertainment, food preparation and consumption, cleaning, storage, disposal

Other activities observed: None

Furniture: Cement hearth, aluminum pots, pans, and ladle, clothing items hanging from walls, machete, hammock, metal bucket and plastic bags with corn kernels, iron corn mill on wooden base, cement batea on top of wooden column and concrete blocks, picture of Virgin of Guadalupe, shotgun, school books and notebooks, plastic buckets and containers, cleaning utensils, television set on top of wooden shelf, wooden trunk, blankets, metal wire, tin sink, flashlight, silk flowers, pantry items, wooden cutting board, tortillas; shower area has a kaanche, broom, toiletries, plastic buckets and pottery containers with water

Figure: A.18
San Felipe Nuevo Solar 9

**Number of residents:** Three (one male and one female adult, one male child)

**Family type:** Nuclear (husband, wife, and child). Husband is son of head of solar 10.

Husband and wife are first-degree cousins

**Family originated from:** San Felipe Nuevo

**Number of Mayan speakers:** Two

**Religion:** Roman Catholic

**Economic activity:** Farmer and independent worker. Monthly income is $100.00

**Real Estate:** Lot (2413.5 square meters), *ejido* plot (1 hectares)

**Agricultural production and location of plot:** Corn, beans, squash. Plot located 1.5 kilometers from solar
Valuables and Investments: Refrigerator, Television set, blender, radio, sewing machine, jewelry, chicken

Grocery, utilities, and health expenses: $25.00 groceries, $8.80 utilities, $20.00 health

Lot shape: Rectangular

Number of structures: Three including modern main house with kitchen, abandoned foundation, chicken pen; lot also has a water tank, and a sewer

Total roof and non-roof areas: 78.53 square meters roof, 2335.0 square meters non-roof

Physical setting: Located on an outcrop, the area is irregular with reddish brown soils and loose gravel. Vegetation includes anona and jabin trees, flower and piñuela plants

Date and sequence of construction: Modern construction was built in 1994.

Foundation has been abandoned since the

Public Utilities: Water, power, cable television

Fence type and kaanche: Albarrada, no kaanche

Knowledge and care of garden: Husband knows about plant care and takes care of garden

Cleaning patterns, refuse disposal, reuse, and recycling practices: Roof areas cleaned three times daily, lot cleaned twice daily. Refuse is deposited at the back lot and finally burned. Plastic containers reused as planters, cardboard sheets and plastic bags reused to cover walls and doors

Main structure shape and construction materials: Rectangular cement foundation
with cement floor, concrete block exterior walls covered inside with wood planks, and palm roof

**Length, width, wall height, and orientation main axis:** 7.90 m by 5.60 m, 1.82 m wall height, east-west main axis

**Domestic activities described by residents:** Resting, entertainment, ritual, cleaning, storage, disposal

**Other activities observed:** Sewing

**Furniture:** Soda company refrigeration unit, utilities cable, plastic bags, clothing items, laundry supplies, hammock; pictures of Virgin of Guadalupe, Jesus Christ, a crucifix, and wicker basket hanging from wall; refrigerator, shelve unit embedded in the wall with medicines, sewing machine, washing machine; bed with dolls, folded cardboard boxes, and stuffed toy; gourds (*leks*), table with television set, microphone, music tapes, papers, and plastic bag; *kaanche*, cardboard boxes with clothing items; laundry line with plastic hangers and clothing; plastic fuel containers, plastic crate for sodas; suitcase, folded plastic bags

**Kitchen shape and construction materials:** Rectangular cement foundation with cement floor, concrete block and *kolopche* as exterior walls covered with cardboard and plastic sheets, and palm roof

**Length, width, wall height, and orientation main axis:** 4.90 m by 2.30 m, 1.80 m wall height, east-west main axis

**Cooking fuel:** Firewood (45 kg/week) collected by husband at forest nearby

**Domestic activities described by residents:** Food preparation and consumption,
storage, and disposal

**Other activities observed:** None

**Furniture:** Cement hearth, metal hook with meat hanging on top of hearth, wooden crate reused as shelf for medicines and pantry items, plastic and metal buckets, cleaning items, soda bottles, toiletries, cardboard sheets stacked on wall; another wooden shelf with ceramic dishes, cups, glass bottles, and aluminum pot; table with electric blender, molcajete, calabash (*luch*) and gourds (*leks*), pantry items, and aluminum spoon; hammock, clothing items hanging from walls, handsaw and file, squash, *banqueta*

**Figure:** A.19

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Figure A.19. San Felipe Nuevo solar 9.
San Felipe Nuevo Solar 10

**Number of residents:** Ten (adults: one male, three females; on male teen; children: five females)

**Family type:** Extended (Husband, wife, offspring, husband’s mother)

**Family originated from:** San Felipe Viejo (husband), and Piste (wife)

**Number of Mayan speakers:** Nine

**Religion:** Roman Catholic

**Economic activity:** Husband works as a farmer; oldest daughter is an independent worker. Combined monthly income is $150.00

**Real Estate:** Lot (2445.5 square meters), ejido land (2 hectares)

**Agricultural production and location of plot:** Corn, beans, squash. Plot located 1 kilometer from solar

**Valuables and Investments:** Refrigerator, sewing machine, Television set, radio, chickens, turkeys, bees, ducks, and pigs

**Grocery, utilities, and health expenses:** $120.00 groceries, $10.30 utilities, $10.00 health expenses at Piste

**Lot shape:** Rectangular

**Number of structures:** Nine including main house, kitchen, store room, corn store unit, two pig pens, one chicken pen, beehive area, laundry area, and water tank

**Total roof and non-roof areas:** 106.78 square meters roof, 2338.72 square meters non-roof

**Physical setting:** Located on an outcrop, the area is irregular with reddish brown soils
and loose gravel. Vegetation includes oak, oranges, sour oranges, coconut, zapote anona, and chaya plants.

**Date and sequence of construction:** Houses were built in 1979.

**Public Utilities:** Water, power, and cable television.

**Fence type and kaanche:** Albarrada, kaanche (herbs: chives).

**Knowledge and care of garden:** Husband, wife, and children take care of the garden. Husband knows more about plant care.

**Cleaning patterns, refuse disposal, reuse, and recycling practices:** Roof areas cleaned three times daily, lot cleaned twice daily. Refuse is separated, deposited at the back lot and finally burned or transported to the municipal landfill. Plastic and metal buckets are reused as planters. Prehistoric columns reused to support laundry sink.

**Main structure shape and construction materials:** Apsidal cement foundation with cement floor, kolopche as exterior walls covered inside with fabric sheets, and palm roof.

**Length, width, wall height, and orientation main axis:** 7.00 m by 3.70 m, 1.84 m wall height, east-west main axis.

**Domestic activities described by residents:** Resting, entertainment, ritual, food consumption, storage, and disposal.

**Other activities observed:** None.

**Furniture:** Refrigerator, toiletries, large wooden wardrobe, clothing items stacked on top of it, hammock, plastic bag with pantry items hanging from roof beam; mirror, paper calendar, and children drawings hanging from walls, wooden shelf with school notebooks and music tapes, fluorescent light bulb replacement, wooden trunk, table with stereo unit, television set, music tapes, notebooks, school supplies, and toiletries;
cardboard boxes folded and stacked; wooden shelve used as altar with religious pictures (Virgin Guadalupe, Jesus Christ), baby Jesus figurine, ceramic containers with silk flowers, clock, and drape covering the wall behind the altar

**Kitchen shape and construction materials:** Apsidal stone foundation with dirt floor, *kolopche* as exterior walls covered with tin sheets, and palm roof

**Length, width, wall height, and orientation main axis:** 6.20 m by 2.40 m, 1.87 m wall height, east-west main axis

**Cooking fuel:** Firewood (15 kg/week) collected by husband and son at the *ejido* plot or the forest nearby

**Domestic activities described by residents:** Food preparation and consumption, cleaning, storage, and disposal

**Other activities observed:** None

**Furniture:** Plastic and ceramic containers with water, cement hearth, aluminum pots and pans, iron corn mill on wooden support, wall wire shelves with toiletries, plastic bags with pantry items hanging from roof beams, beer bottles, hammock, wooden chair with clothing items, farm tools, metal adze, wooden shelve with pantry items, ceramic dishes, clock, and aluminum ladle; wicker baskets, aluminum coffee pot, plastic containers with corn kernels, stack of squash, plastic shower curtain hanging from clothing line; wooden table; plastic crate for soda bottles, metal cage, calabash (*luch*) and gourds (*leks*)

**Figure:** A.20
San Felipe Nuevo Solar 11

**Number of residents:** Five (adults: one male, two females; one female teen, one male child)

**Family type:** Nuclear (husband, wife, and offspring)

**Family originated from:** San Felipe Viejo

**Number of Mayan speakers:** Five

**Religion:** Roman Catholic

**Economic activity:** Husband is a farmer and independent worker. Monthly income is $80.00

**Real Estate:** Lot (1800.1 square meters) ejido land (2 hectares) rented

**Agricultural production and location of plot:** Corn, beans, squash. Plot located 3 kilometers from solar

Figure A.20. San Felipe Nuevo solar 10.
Valuables and Investments: sewing machine, jewelry, chickens, and ducks

Grocery, utilities, and health expenses: $30.00 groceries, $90.00 utilities, health care provided by community hospital and paid with weekly voluntary work (fajina)

Lot shape: Rectangular

Number of structures: Six including main house, kitchen, shower and storage room, tortilla stand, corn storage unit, house foundation, and water tank

Total roof and non-roof areas: 157.85 square meters roof, 1642.25 square meters non-roof

Physical setting: Located on an outcrop and sections of a prehistoric platform, the area has reddish brown soils and loose gravel. Vegetation includes oranges, sour oranges, plum, mango, tangerine, and zapote trees

Date and sequence of construction: Houses were built in 1978

Public Utilities: Water, power, cable television

Fence type and kaanche: Albarrada, no kaanche

Knowledge and care of garden: Husband and wife take care of the garden; wife knows more about plant care

Cleaning patterns, refuse disposal, reuse, and recycling practices: Roof areas cleaned three times daily, lot cleaned twice monthly. Refuse is separated, deposited at the back lot and finally burned or transported to the municipal landfill. Prehistoric column and cut stones reused around the laundry area to support laundry basin; plastic and metal buckets reused as planters

Main structure shape and construction materials: Flat-end cement and concrete
block foundation, cement floor, *kolopche* as exterior walls covered inside with plastic bags, and palm roof

**Length, width, wall height, orientation main axis:** 7.00 m by 4.50 m, 2.00 m wall height, east-west main axis

**Domestic activities described by residents:** Resting, entertainment, ritual, food consumption, storage, and disposal

**Other activities observed:** None

**Furniture:** Two *kaanches* and two chairs; one large and one medium wardrobe, sewing machine, wooden table, open shelf unit covered with plastic sheet, ceramic decorations on the wall, cardboard boxes, music tapes, clothing items, plastic bucket, table used as altar with Virgin of Guadalupe picture and figurine with plastic crown, pictures and figurines of three holy kings, wooden crucifix, nativity figurines, candles, wooden candle holders, rosary, ceramic containers with silk flowers, Mexican flag on back of altar, Christmas garlands, ceramic mug, two live indoor plants alongside the altar, and bulb for table lamp; plastic bag with ears of corn, candles and candle holders on the floor

**Kitchen shape and construction materials:** Apsidal foundation with dirt floor, *kolopche* as exterior walls, and palm roof

**Length, width, wall height, and orientation main axis:** 4.30 m by 2.60 m, 1.68 m wall height, east-west main axis

**Cooking fuel:** Firewood (60 kg/week) collected by husband and wife from the forest nearby

**Domestic activities described by residents:** Entertainment, food preparation and consumption, storage, and disposal
Other activities observed: None

Furniture: Three-stones hearth, calabash (*luch*) and gourds (*leks*), wire shelf, aluminum pot, glass bottle with lard, plastic and ceramic containers with water, soda bottles filled with laundry detergent, plastic bags, charcoal iron, wooden pantry unit, drinking glasses, fabric sheets, and clothing items; wooden shelf with pantry items

Figure: A.21

San Felipe Nuevo Solar 12

Number of residents: Eight (adults: one male, one female; one male teen; children: three males, two females)

Family type: Nuclear (husband, wife, and offspring)

Family originated from: San Felipe Nuevo (husband), Popola (wife)

Number of Mayan speakers: Seven

Figure A.21. San Felipe Nuevo solar 11.
Religion: Roman Catholic

Economic activity: Husband is a farmer. Monthly income is $600.00

Real Estate: Lot (1423.3 square meters) ejido land (2 hectares) rented

Agricultural production and location of plot: Corn, beans, squash, lima beans. Plot located 4.5 kilometers from solar

Valuables and Investments: radio, jewelry, chickens, doves, and pigs

Grocery, utilities, and health expenses: $12.00 groceries, $10.80 utilities, health care provided by community hospital and paid with weekly voluntary work (fajina)

Lot shape: Polygonal

Number of structures: Nine including main house, kitchen, modern construction, porch, platform with corn storage area, abandoned foundation and cement floor area, thatched-roof area, chicken pen, pig pen, and water tank

Total roof and non-roof areas: 110.4 square meters roof, 1313.16 square meters non-roof

Physical setting: Located on an outcrop and sections of a prehistoric platform, the area has reddish brown soils and loose gravel. Vegetation includes sour oranges, plum, tangerine, almond, chi chi be, and palm trees

Date and sequence of construction: Traditional houses were built in 1986. Modern construction started in 1998 and continues

Public Utilities: Water and power

Fence type and kaanche: Albarrada, kaanche (herbs: chives)

Knowledge and care of garden: Husband takes care of garden and knows about plant care
Cleaning patterns, refuse disposal, reuse, and recycling practices: Roof areas cleaned three times daily, lot cleaned once a month. Refuse is separated, deposited at the town park and finally burned or transported to the municipal landfill. Aluminum sinks and plastic buckets reused as plant containers.

Main structure shape and construction materials: Apsidal stone foundation with sascab floor, kolopche as exterior walls, and palm roof.

Length, width, wall height, and orientation main axis: 6.00 m by 3.30 m, 1.83 m wall height, east-west main axis.

Domestic activities described by residents: Resting, entertaining, food consumption, cleaning, and storage.

Other activities observed: None.

Furniture: Plastic chair, open wooden shelve with stereo unit, notebooks, clothes; hammock, plastic cooler, cardboard boxes, back pack, and a paper calendar in the wall; shower area is separated by a lace curtain and plastic bags, inside it has a wooden chair, plastic buckets and containers, cleaning items, a wooden shelve with a guitar, tape recorder unit, and clothing items.

Kitchen shape and construction materials: Rectangular foundation with dirt floor, kolopche as exterior walls covered inside with cardboard, and cardboard roof.

Length, width, wall height, and orientation main axis: 4.70 m by 3.40 m, 1.90 m wall height, east-west main axis.

Cooking fuel: Firewood (45 kg/ week), collected by husband at forest nearby.

Domestic activities described by residents: Entertainment, food preparation and
consumption, storage, and disposal

**Other activities observed:** None

**Furniture:** Refrigerator, large plastic containers with water, aluminum pots and pans, three-stones hearth, metal spoon, plastic fuel containers, clothes, soda company cooler used to store clothes, *banqueta*, metal hook hanging from roof beam, *kaanche*, and wine glass

**Figure:** A.22

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**San Felipe Nuevo Solar 13**

**Number of residents:** None, the houses are still under construction

**Family type:** The owner is the son of family residing in solar 8. He is currently residing in Piste

**Family originated from:** San Felipe Nuevo
Number of Mayan speakers: N/A
Religion: N/A
Economic activity: N/A
Real Estate: Lot (944.8 square meters)
Agricultural production and location of plot: N/A
Valuables and Investments: N/A
Grocery, utilities, and health expenses: N/A
Lot shape: Polygonal
Number of structures: Three including main house, kitchen, and modern foundation; other features include water tank, and two wood-edged planters
Total roof and non-roof areas: 63.44 square meters roof, 881.36 non-roof
Physical setting: Located on top of a large outcrop, the area has reddish brown soil and loose gravel. Vegetation includes tangerine, nance, and caymilo plants
Date and sequence of construction: Still under construction during our interview
Public Utilities: Power
Fence type and kaanche: No fence or kaanche
Knowledge and care of garden: N/A
Cleaning patterns, refuse disposal, reuse, and recycling practices: N/A
Main structure shape and construction materials: Apsidal stone and cement foundation with cement floor, kolopche as exterior walls, cardboard as roof
Length, width, wall height, and orientation main axis: 7.60 m by 4.40 m, 2.10 m wall height, north-south main axis
Domestic activities described by residents: N/A

Other activities observed: Food preparation, storage

Furniture: Stacks of palm leaves used as roof material, concrete blocks, hearth and ashes

Kitchen shape and construction materials: Apsidal cement foundation with dirt floor, no walls, and no roof (stacks of palm stored in the main house are for the roof)

Length, width, wall height, and orientation main axis: 5.20 m by 3.00 m, 2.07 m wall height, north-south main axis

Cooking fuel: N/A

Domestic activities described by residents: N/A

Other activities observed: N/A

Furniture: N/A

Figure: A.23

Figure A.23. San Felipe Nuevo solar 13.
San Felipe Nuevo Solar 14

**Number of residents:** Four (adults: one male and one female; children: one male and one female)

**Family type:** Nuclear (husband, wife, and offspring)

**Family originated from:** San Felipe Nuevo (husband), San Diego, Cuncunum (wife)

**Number of Mayan speakers:** Three

**Religion:** Roman Catholic

**Economic activity:** Husband is a farmer. Monthly income is $60.00

**Real Estate:** Lot (1237.5 square meters), *ejido* land (2 hectares) rented

**Agricultural production and location of plot:** Corn, beans, squash, lima beans. Plot located 2 kilometers from plot

**Valuables and Investments:** Radio, jewelry, and pigs

**Grocery, utilities, and health expenses:** $10.00 groceries, $5.20 utilities, health care provided by community hospital and paid with weekly voluntary work (*fajina*)

**Lot shape:** Polygonal

**Number of structures:** Nine including modern main house with shower, burned kitchen, new kitchen, laundry area, two fenced garden areas, two pig pens, one chicken pen, and water tank

**Total roof and non-roof areas:** 74.96 square meters roof, 1162.54 square meters non-roof

**Physical setting:** Located partially on top of a large outcrop, the area has reddish
brown soil and loose gravel. Vegetation includes mango, nance, banana, sour orange, lemon, and jabin trees

**Date and sequence of construction:** Houses were built in 1996. Kitchen walls and roof burned in 2001 and they built a small temporary kitchen until they repair the old one

**Public Utilities:** Water and power

**Fence type and kaanche:** *Albarrada, kaanche* (herbs: chives and garlic)

**Knowledge and care of garden:** Husband takes care of garden and knows about plant care

**Cleaning patterns, refuse disposal, reuse, and recycling practices:** Roof areas cleaned three times daily, lot cleaned six times a week. Refuse is separated, deposited at the back of the lot and finally burned or transported to the municipal landfill.

**Main structure shape and construction materials:** Rectangular cement foundation with dirt floor, concrete block walls, and cardboard roof

**Length, width, wall height, and orientation main axis:** 5.25 m by 4.40 m, 1.86 m wall height, north-south main axis

**Domestic activities described by residents:** Resting, entertainment, food consumption, cleaning, storage, and disposal

**Other activities observed:** None

**Furniture:** Hammocks, large plastic container with water, clothes stacked on cardboard boxes, plastic bags hanging from walls; shower area has a plastic jar and soap bar

**Kitchen shape and construction materials:** Apsidal stone foundation with cement floor, no walls, and no roof. Both burned as the result of a kitchen fire in 2001
Length, width, wall height, and orientation main axis: 6.70 m by 4.40 m, no walls, north-south main axis

Cooking fuel: Firewood (15 kg/week) collected by husband at ejido plot

Domestic activities described by residents: None

Other activities observed: None

Furniture: Cement hearth, firewood stacked on the side of the house, metal containers, wheel barrel, laundry lines used to dry clothes and blankets

Figure: A.24

San Felipe Nuevo Solar 15

Number of residents: Eight (adults: three males, one female; two male teens; two female children

Family type: Nuclear (husband, wife, and offspring). Husband is the brother of female at solar 1

Figure A.24. San Felipe Nuevo solar 14.
**Family originated from:** San Felipe Nuevo (husband), Chan Kom (wife)

**Number of Mayan speakers:** Eight

**Religion:** Roman Catholic

**Economic activity:** Husband is a farmer. Oldest son works temporarily as an independent worker. Combined monthly income is $104.00

**Real Estate:** Lot (1210.4 square meters), ejido lot (4 hectares) rented

**Agricultural production and location of plot:** Corn, beans, squash, lima beans. Plot located 2 kilometers from plot

**Valuables and Investments:** Refrigerator, television set, radio, sewing machine, jewelry, chickens, turkeys, and pigs

**Grocery, utilities, and health expenses:** $24.00 groceries, $18.10 utilities, $21.00 health at Piste

**Lot shape:** Polygonal

**Number of structures:** Five including main house with thatched bench, kitchen with shower area, modern construction, chicken pen, pigpen, and water tank

**Total roof and non-roof areas:** 126.16 square meters roof, 1084.24 square meters non-roof

**Physical setting:** Located on a flat area with some outcrops, reddish brown soil, and loose gravel. Vegetation includes oak, jabin, oranges, tangerines, grapefruit, and plum trees

**Date and sequence of construction:** Family built the perishable structures in 1987. New construction was added in 1999

**Public Utilities:** Water, power, and cable television
Fence type and *kaanche*: Albarrada, two *kaanches* (herbs: onions)

**Knowledge and care of garden:** Husband takes care of garden and knows about plant care

**Cleaning patterns, refuse disposal, reuse, and recycling practices:** Roof areas cleaned twice daily, lot cleaned twice a week. Refuse is separated, deposited outside the lot and finally burned or transported to the municipal landfill. Car tires were recycled as water container for poultry; prehistoric columns reused to support laundry basin inside kitchen

**Main structure shape and construction materials:** Rectangular cement foundation with cement floor, concrete block walls, and cement roof

**Length, width, wall height, and orientation main axis:** 8.60 m by 4.60 m, 2.60 m wall height, north-south main axis

**Domestic activities described by residents:** Resting, entertainment, ritual, food consumption, storage, and disposal

**Other activities observed:** None

**Furniture:** Hammocks, metal shelf unit with stereo set, television set, VCR, stuffed toys, shoe boxes with music tapes and compact discs, videotapes, can of spray, and clothing items; electric fan, wooden table with cardboard boxes used to store music tapes, notebooks, a hammer, and blanket; wooden chair, bicycle, mirror, plastic crate with soda bottles, plastic bag with corn kernels; wooden table with iron, blanket, clothes, and books; wall clock, paper calendar, sewing machine, paper decorations in the windows; another wooden table with glass shelf unit used to store religious pictures,
ceramic holders with silk flowers, paper decorations, three paper decorations depicting the letters G, N, and B, plastic container with pumpkin seeds, pencil, and newspaper; iron board, plastic bags hanging from walls, newspaper placed on the floor to dry seeds; plastic ball and dolls

**Kitchen shape and construction materials:** Apsidal cement foundation with cement floor, *kolopche* as exterior walls, and palm roof

**Length, width, wall height, and orientation main axis:** 8.50 m by 3.80 m, 1.80 m wall height, north-south main axis

**Cooking fuel:** Firewood (60 kg) collected by husband at *ejido* plot

**Domestic activities described by residents:** Food preparation and consumption, entertaining, cleaning, storage, and disposal

**Other activities observed:** None

**Furniture:** Cement hearth, aluminum pots and pans, *kaanche*, pantry items, plastic buckets; aluminum cooking utensils, laundry detergent stacked inside plastic bag, eggs inside plastic bag, electric fan motor, and blender hanging from wire line attached to walls; firewood, soda bottles, laundry basin (*batea*) on top of prehistoric columns, plastic container, washing machine covered with fabric, hammock, pick, bag of cement, bicycle wheel replacement; wooden crate hanging from wall used as shelf for glass dishes and cups; *banqueta*, iron hand mill on top of wooden base; wooden table with plastic containers, *molcajete*, drinking glasses, pantry items, and doll; wooden shelf with more pantry items; broom, clothing items; plastic bags with ears of corn; stack of smoked corn hanging on top of the hearth, calabash (*luch*) filled with eggs, and gourds (*leks*), wooden chair stacked on top of roof beams, cast iron juicer
San Felipe Nuevo Solar 16

Number of residents: Two (male and female adults)

Family type: Nuclear (husband and wife). Husband is the son of couple at solar 1

Family originated from: San Felipe Nuevo (husband), Acabchen (wife)

Number of Mayan speakers: Two

Religion: Roman Catholic

Economic activity: Farmer. Monthly income is $60.00

Real Estate: Lot (1834.4 square meters), ejido plot (2 hectares)

Agricultural production and location of plot: Plot located 4 kilometers from solar

Valuables and Investments: Radio, sewing machine, jewelry, chickens, and pigs
Grocery, utilities, and health expenses: $30.00 groceries, $8.80 utilities, health care provided by community hospital and paid with weekly voluntary work (fajina)

Lot shape: Rectangular

Number of structures: Six including modern main house, kitchen, thatch-roof storage area, two pig pens, one chicken pen, and water tank

Total roof and non-roof areas: 176.3 square meters roof, 1658.1 square meters non-roof

Physical setting: South section of the lot is occupied by a large prehistoric platform; the area is mostly flat with reddish brown soil and loose gravel. Vegetation includes jabin, oak, tangerines, oranges, lemon, sour oranges, and chile mash plants

Date and sequence of construction: Structures were built in 2001

Public Utilities: Water and power

Fence type and kaanche: No fence, one kaanche (herbs: onion)

Knowledge and care of garden: Both husband and wife take care of the garden and know about plant care

Cleaning patterns, refuse disposal, reuse, and recycling practices: Roof areas cleaned once daily, lot also cleaned once daily. Refuse is separated, deposited outside the lot and finally burned or transported to the municipal landfill

Main structure shape and construction materials: Rectangular cement foundation with cement floor, concrete block walls, and cement roof

Length, width, wall height, and orientation main axis: 10.60 m by 4.60 m, 1.87 m wall height, east-west main axis
Domestic activities described by residents: Resting, entertaining, ritual, storage, and disposal

Other activities observed: None

Furniture: N/A

Kitchen shape and construction materials: Apsidal cement foundation with cement floor, kolopche as exterior walls, and palm roof

Length, width, wall height, and orientation main axis: 8.50 m by 3.80 m, 1.80 m wall height, east-west main axis

Cooking fuel: Firewood (15 kg/week) collected by both husband and wife at the forest nearby

Domestic activities described by residents: Entertaining, food preparation and consumption, cleaning, storage, and disposal

Other activities observed: Resting

Furniture: Ladder, cardboard boxes, and plastic fuel containers stacked on top of roof beams, hammock, large metal container with water, plastic table and chair, wooden table and chair, banqueta, three-stones hearth, aluminum comal, pots, and pans, plastic buckets with water, stack of firewood, cleaning supplies, wooden shelf with pantry items, plastic cups, plastic bags with pantry items, bicycle; shower area is surrounded by plastic bags that work as curtains

Figure: A.26
San Felipe Nuevo Health Center and Molino (solar 17)

**Number of residents:** None, one of the structures in the lot was used as health center, the other one housed a molino (electric corn grinder). Both structures are traditional and had palm-thatched roofs

**Family type:** N/A

**Family originated from:** N/A

**Number of Mayan speakers:** N/A

**Religion:** N/A

**Economic activity:** N/A

**Real Estate:** N/A

**Agricultural production and location of plot:** N/A
Valuables and Investments: N/A

Grocery, utilities, and health expenses: N/A

Lot shape: Rectangular

Number of structures: Two, health center and corn grinder (molino)

Total roof and non-roof areas: 45.38 square meters were roof

Physical setting: Located on an outcrop, the area is surrounded by both pavement and reddish brown soil with loose gravel. Structures are part of a public area along with the building for the comisariado ejidal

Date and sequence of construction:

Public Utilities: None

Fence type and kaanche: N/A

Knowledge and care of garden: N/A

Cleaning patterns, refuse disposal, reuse, and recycling practices: N/A

Main structure shape and construction materials: Health center had an apsidal cement foundation with cement floor, kolopche exterior walls with cement columns, and palm roof; corn-grinder structure had also an apsidal cement foundation with cement floor, kolopche exterior walls, and palm roof

Length, width, wall height, orientation main axis: Health center, 6.50 m by 3.50 m, 1.84 wall height, east-west main axis; corn-grinder structure, 6.20 m by 3.65 m, no wall height data, north-south main axis

Domestic activities described by residents: N/A

Other activities observed: N/A
Furniture: N/A

Kitchen shape and construction materials: N/A

Length, width, wall height, orientation main axis: N/A

Cooking fuel: N/A

Domestic activities described by residents: N/A

Other activities observed: N/A

Furniture: N/A

Figure: A.27

Figure A.27. San Felipe Nuevo lot 17 showing health center and corn mill foundation.

**Municipio of Dzitas, Yucatan**

*Yaxche Solar 1*

**Number of residents:** Five (two adults: male and female; one female teen, two children: one male and one female)
Family type: Nuclear (husband, wife, and children)

Family originated from: San Felipe Nuevo (wife, sister of the head of the household 3 at San Felipe Nuevo), Yaxche (husband)

Number of Mayan speakers: Five

Religion: Roman Catholic

Economic activity: Husband is a farmer and also works as a mason; wife weaves hammocks and sells them at Dzitas. Combined income is $120.00

Real Estate: Lot (2475.9 square meters), ejido land (2 hectares)

Agricultural production and location of plot: Corn, beans, lima beans, squash, plot located 1 kilometer from solar

Valuables and Investments: Chicken, turkeys, pigs, television set,

Grocery, utilities, and health expenses: $60.00 groceries, $8.70 utilities, health care provided by community hospital and paid with weekly voluntary work (fajina)

Lot shape: Rectangular

Number of structures: Five, including main house, kitchen, modern construction, chicken pen, shower area; lot also has a laundry area (batea) and a water tank

Total roof and non-roof areas: 85.99 square meters roof, 2389.91 non-roof

Physical setting: Flat area with some outcrops, reddish brown soil, and gravel. Vegetation includes lemon trees, guaya and anona plants

Date and sequence of construction: House built in 1980. Family resides in the lot since then

Public Utilities: Water, power, cable television
Fence type and *kaanche*: *Albarrada*, three *kaanches* (herbs include cilantro, epazote or wormseed, mint, chives, garlic, and chiles), and a pumpkin seeds-drying table

Knowledge and care of garden: Wife and children take care of garden. Wife knows about plant care

Cleaning patterns, refuse disposal, reuse, and recycling practices: Living areas cleaned twice daily, lot cleaned twice weekly. Refuse is separated and stashed in the back of the lot to be burned or transported to the town landfill

Main structure shape and construction materials: Apsidal cement and concrete block foundation with cement floor, *kolopche* as exterior walls, cardboard used in the interior walls, and palm roof

Length, width, wall height, and orientation main axis: 7.20 m by 3.80 m, 1.80 m wall height, east-west main axis

Domestic activities described by residents: Resting, entertainment, ritual, storage, disposal

Other activities observed: Children work in their homework in this room

Furniture: Hammocks, plastic bags provide storage for clothing, hammock thread, and other items, clothes and shoes, religious drawings on paper adorn the door and walls, wooden shelve with textbooks, planter, and toiletries; picture of Jesus Christ, metal table as altar with wooden cross, religious pictures (Virgin and son, Three Kings), calabash (*luch*) and gourds (*leks*) plastic cups, bag of beans, cardboard box with clothing; tin water can, farm tools, candles, plastic toys, pencils, aluminum pot with corn kernels, Coke bottles

Kitchen shape and construction materials: Apsidal shape stone foundation with
cement floor, kolopche walls in the exterior, cardboard covering the interior walls, and cardboard roof

Length, width, wall height, and orientation main axis: 5.40 m by 3.30 m, 1.70 m wall height, and north-south main axis

Cooking fuel: Firewood (90 kg/week), husband, eldest daughter and son collect fire logs from the ejido land

Domestic activities described by residents: Entertaining, food preparation and consumption, storage, disposal

Other activities observed: Cleaning

Furniture: Plastic buckets used to store water, wall shelves for plastic cups and glasses, plastic bottles, aluminum ladle, plastic bag with aluminum pots and pans, banqueta, knives and forks, three-stones hearth, metal hooks used to hang meat from the roof and smoke it, aluminum hand mill on wooden bench, ears of corn, kaanches, farm tools, plastic container, towels, toothbrushes, corn flour, soda bottles, aluminum comal

Figure: A.28

Yaxche Solar 2

Number of residents: Nine (adults: four male adults, four females; one male teen).

Family type: Extended (Family 1 consists of husband, wife, and three children; family 2, father and stepmother of head of family 1; family 3, stepbrother of head of family 1 and his wife. Most of the data gathered from family 1 because the other two families were absent during our visit
Family originated from: Family 1, Xocenpich (wife), Yaxche (husband); family 2, Yaxche; family 3, Yaxche (husband), Piste (wife)

Number of Mayan speakers: Nine

Religion: Roman Catholic

Economic activity: Male adults in the three families work as farmers. Husband from family 1 is also an independent worker. His wife, stepmother, and wife of stepbrother weave hammocks and sell them at Dzitas. Family 1 combined income is $100.00

Real Estate: Father is the owner of lot (1951.6 square meters). Three families shared the ejido land (2 hectares)

Agricultural production and location of plot: Corn, beans, lima beans, squash. Plot located 2 kilometers from solar

Valuables and Investments: Family 1 has television set, sewing machine, refrigerator,
blender, turkeys, one horse, and jewelry; family 2 has pigs, chickens, washing machine, gas stove, and jewelry; no data for family 3

**Grocery, utilities, and health expenses:** Family 1, $40.00 groceries, $30.00 utilities, health care $85.00. No data for family 2 and 3

**Lot shape:** Polygonal

**Number of structures:** Family 1 has six structures including main house, kitchen, shower/storage room, an empty house, two pig pens; a laundry area, garden area, two planters, and a well also belong to the family; family 2 has eight structures including main house, kitchen, storage room, three pig pens, shower, and *palapa*; family 3 has one main house, an open kitchen, and water tank

**Total roof and non-roof areas:** 231.67 square meters roof, 1719.93 square meters non-roof

**Physical setting:** Flat area with some outcrops, reddish brown soil and loose gravel. Vegetation includes lemon, sour orange, and plums trees; guaya, and anona plants

**Date and sequence of construction:** Father built his house in the lot in 1942. Family 1 built their house in 1982. Stepbrother built his house also in 1982

**Public Utilities:** Water, power, and cable Television

**Fence type and kaanche:** Whole lot surrounded by *albarrada*, family 1 has one *kaanche* (herbs: chives and garlic)

**Knowledge and care of garden:** Wife, stepmother, and stepbrother take care of each garden area

**Cleaning patterns, refuse disposal, reuse, and recycling practices:** Family 1 living
spaces cleaned twice daily, lot cleaned once daily. Informant said that the other families followed similar cleaning patterns. Refuse is separated, located on the back of the lot until burned or transported to the town landfill. Family 1 reused tin basins and wheel barrel as planters; tires were reused to support plants. Family 2 also reused tires as support for the washing machine

**Main structure shape and construction materials:** Family 1, apsidal cement foundation with cement floor, *kolopche* as exterior walls, cardboard covering the interior, and cardboard roof; family 2, rectangular cement foundation with cement floor, *kolopche* in both the exterior and interior walls, and palm roof; family 3, apsidal cement foundation with cement floor, *kolopche* as exterior walls and cardboard covering the interior, cardboard roof.

**Length, width, wall height, orientation main axis:** Family 1, 5.90 m by 3.70 m, 1.65 m wall height, north-south main axis; family 2, 5.30 m by 3.80 m, 1.80 m wall height, east-west main axis; family 3, 6.20 m by 4.10 m, 1.70 m wall height, north-south main axis

**Domestic activities described by residents:** Family 1, resting, entertaining, ritual, storage, disposal, hammock weaving; family 2, resting, entertaining, ritual, cleaning, storage, disposal; family 3, no data

**Other activities observed:** Family 1, food consumption

**Furniture:** Family 1, refrigerator, table with television set, farming tools, sewing machine, clothing items, wooden chairs, Coke bottles and crates, hammocks, hammock-weaving frames, floral and religious motif pictures, Mexican flag, altar (wooden table with statue of Virgin of Guadalupe), plastic bucket with ground corn
(masa), *kaanche*; family 2, large and small *kaanches*, hammocks, altar (wooden table with religious statue), wall shelve with Virgin of Guadalupe frame, clock, small paper box, plastic bags used to store clothing and other items, wooden trunk, toiletries, magazine, candles, clock, plastic buckets used to store water; family 3, no data

**Kitchen shape and construction materials:** Family 1, flat-end cement foundation with cement floor, *kolopche* as both interior and exterior walls, and palm roof; family 2, rectangular cement foundation with *kolopche* as both interior and exterior walls, and palm roof; family 3, rectangular cement foundation with *kolopche* as both interior and exterior walls, and cardboard roof

**Length, width, wall height, orientation main axis:** Family 1, 4.80 m by 2.60 m, 1.68 wall height, north-south main axis; family 2, 3.80 m by 3.20 m, 1.63 m wall height, east-west main axis; family 3, 5.60 m by 3.80 m, 1.75 m wall height, north-south main axis

**Cooking fuel:** Family 1, firewood (90 kg/week); family 2: gas and firewood (n/d); no data for family 3

**Domestic activities described by residents:** Family 1, resting, entertaining, food preparation and consumption, storage, and disposal; family 2 and 3, no data

**Other activities observed:** None

**Furniture:** Family 1, aluminum pots and pans, calabash (*luch*) and gourds (*leks*), hammocks, cardboard boxes, wooden table and *kaanche*, storage frame over table with pantry items, plastic and metal containers, cement hearth, plastic bags used to store corn, bicycle wheel, towels and clothing items, glass containers, wooden crate, children toys, metal buckets with water
Yaxche Solar 3

**Number of residents:** Seven (adults: one male, two females; teens: one female, one male; children: two females)

**Family type:** Extended (husband, wife, children, husband’s mother)

**Family originated from:** Yaxche (husband), Dzitas (wife)

**Number of Mayan speakers:** Seven

**Religion:** Roman Catholic

**Economic activity:** Husband is a farmer and independent worker; both wife and female teen weave hammocks and sell them at Dzitas. Combined income is $120.00

**Real Estate:** Lot (1636 square meters), *ejido* land (2 hectares)

**Agricultural production and location of plot:** Corn, beans, squash, lima beans, plot
located 0.5 kilometers from solar

Valuables and Investments: Television set, stereo, washing machine, jewelry, pigs, chickens, and turkeys

Grocery, utilities, and health expenses: $100.00 groceries, $12.55 utilities, health care provided by community hospital and paid with weekly voluntary work (fajina)

Lot shape: Polygonal

Number of structures: Ten including main house, kitchen, shower and storage room, two enclosed gardens, toilet, two pig pens, one chicken pen, a palapa; lot also has a laundry area (batea) and a water tank

Total roof and non-roof areas: 104.84 square meters roof, 1531.16 square meters non-roof

Physical setting: Flat area with some areas filled, reddish brown soil and loose gravel
Vegetation includes cedar, oak, plum, guaya trees, banana, tangerine, and flower plants

Date and sequence of construction: Main house built in 1947. Current inhabitants occupied the lot in 1985

Public Utilities: Water, power, and cable Television

Fence type and kaanche: Albarrada, kaanche (herbs include chives, mint, garlic, chili peppers, basil)

Knowledge and care of garden: Husband and wife, both share knowledge of plant care

Cleaning patterns, refuse disposal, reuse, and recycling practices: Roof areas cleaned three times daily, lot cleaned one monthly. Refuse is separated, placed in the
back of the lot, and finally burned or transported to the town landfill. Aluminum buckets and pots were reused as planters, stone container reused for watering pigs, wooden bench reused as *kaanche*

**Main structure shape and construction materials:** Apsidal cement foundation with cement floor, *kolopche* and plastic bags as exterior walls covered inside with cardboard, and cardboard also used for the roof

**Length, width, wall height, and orientation main axis:** 6.60 m by 3.30 m, 1.80 m wall height, north-south main axis

**Domestic activities described by residents:** Resting, entertaining, ritual, food consumption, storage, disposal, hammock weaving

**Other activities observed:** None

**Furniture:** Hammocks, wooden trunk, crate with plastic and aluminum containers, clothing items, plastic bags containing clothing, ears of corn, photographs, eggs; paper calendar, hammock weaving-frame, weaving thread, blankets and *rebozo* stored on the roof beams, wooden shelve with school books and notebooks, plastic container, empty plastic buckets, *kaanche*, wooden table with television set, family altar (religious pictures, wooden standing cross), stuffed toys, ceramic figurines, plastic cup, drinking glass, school notebooks, pencils, music tapes, food items, cardboard box with clothes, wooden shelve holding stereo set, religious pictures, music tapes, toiletries, and baseball cap

**Kitchen shape and construction materials:** Flat-end stone foundation with dirt floor, *kolopche* as exterior walls, and palm roof
Length, width, wall height, and orientation main axis: 6.27 m by 3.80 m, 1.80 m wall height, north-east main axis

Cooking fuel: Firewood (30 kg/week), husband, daughter and son collect the wood from the forest nearby

Domestic activities described by residents: Resting, entertaining, food preparation and consumption, storage, and disposal

Other activities observed: None

Furniture: Three-stones hearth, aluminum pots and pans, banqueta and several kaanches, plastic buckets to store water, washing machine, wooden table with threat, cleaning products, plastic bags with corn and seeds, bicycle wheel, wooden chair, plastic containers, metal shelfe with glasses, calabash (luch) and gourds (leks), cardboard box with clothing items, water bottle, firewood

Figure: A.30

Yaxche Solar 4

Number of residents: Six (adults: one female, two males; children: two males, one female)

Family type: Nuclear (mother and children. Father died seven months before our interview)

Family originated from: Yaxche

Number of Mayan speakers: Six

Religion: Roman Catholic
**Economic activity:** Mother and oldest daughter weave hammocks and sell them in Dzitas; older sons are farmers and also are masons in Piste. Combined income is $100.00

**Real Estate:** Lot (1158.8 square meters), *ejido* land (2 hectares)

**Agricultural production and location of plot:** Corn, beans, squash, lima beans. Plot located 0.2 kilometers from solar

**Valuables and Investments:** Television set, stereo, jewelry, turkeys, chickens, and ducks

**Grocery, utilities, and health expenses:** $40.00 groceries, $5.10 utilities, health care provided by community hospital and paid with weekly voluntary work (*fajina*)

**Lot shape:** Rectangular
**Number of structures:** Nine, including main house, kitchen, shower, two roofed and one open toilet, pig pen, turkey and ducks pens, water tank, laundry area (*batea*), and well

**Total roof and non-roof areas:** 79.55 square meters roof, 1078.95 non-roof

**Physical setting:** Flat area with some areas filled, reddish brown soil and loose gravel. Vegetation includes lemon, plum, and coconut trees

**Date and sequence of construction:** Current family built the houses in 1987

**Public Utilities:** Water, power, cable television

**Fence type and *kaanche***: *Albarrada, kaanche* (herbs: basil; some flower plants)

**Knowledge and care of garden:** Mother and children take care of the plants. Mother knows more about plant care

**Cleaning patterns, refuse disposal, reuse, and recycling practices:** Roof areas cleaned three times a day; lot cleaned one a week. Refuse is separated and stored at the back of the lot before being burned or transported to the town landfill. Metal wheel rings reused as support for hanging baskets (*petenes*),

**Main structure shape and construction materials:** Rectangular cement foundation with cement floor, *kolopche* exterior walls covered inside with cardboard, and cardboard roof

**Length, width, wall height, and orientation main axis:** 7.30 m by 3.40 m, 1.83 m wall height, and east-west axis

**Domestic activities described by residents:** Resting, entertainment, ritual, food consumption, storage, disposal
Other activities observed: Hammock weaving

Furniture: Wooden chair, hammock weaving-frame, hammock, cardboard boxes with clothing items, farmer tools, wooden shelves with weaving thread, plastic bags with ears of corn and clothing, concrete blocks used to raise boxes from floor, wall altar with religious picture frames, family photographs, and candle; calabash (luch) and gourds (leks), and plastic and fabric bags

Kitchen shape and construction materials: Rectangular stone foundation with dirt floor, kolopche exterior walls, and palm roof

Length, width, wall height, and orientation main axis: 6.40 m by 3.90 m, 1.80 m wall height, and north-south main axis

Cooking fuel: Firewood (150 kg/week), collected by mother and sons at the ejido plot

Domestic activities described by residents: Resting, food preparation and consumption, and storage

Other activities observed: None

Furniture: Three-stones hearth, comal, iron hook used to smoke meat over the hearth, concrete blocks supporting wooden table, plastic buckets and pottery jars containing water, calabash (luch) and gourds (leks), plastic and aluminum cups, wooden shelve with plastic containers, pantry items, ladle, and cardboard box; peten (hanging basket used to store food away), firewood stacked on a corner, wooden shelves with diverse items, metal cage with parrots, and stone grinder (cylindrical shape)

Figure: A.31
Figure A.31. Yaxche solar 4.
APPENDIX B
ADDITIONAL PHOTOGRAPHIC MATERIAL

Figure B.1. Chicxulub Pueblo solar 1.

Figure B.2. Chicxulub Pueblo solar 2.
Figure B.3. Chicxulub Pueblo solar 3.

Figure B.4. Chicxulub Pueblo solar 4.
Figure B.5. Chicxulub Pueblo solar 5.

Figure B.6. Chicxulub Pueblo solar 6.
Figure B.7. Chicxulub Pueblo solar 7.

Figure B.8. Chicxulub Pueblo solar 8.
Figure B.9. Piste solar 1.

Figure B.10. Piste solar 2.
Figure B.11. San Felipe Nuevo solar 1.

Figure B.12. San Felipe Nuevo solar 2.
Figure B.13. San Felipe Nuevo solar 3.

Figure B.14. San Felipe Nuevo solar 4.
Figure B.15. San Felipe Nuevo solar 5.

Figure B.16. San Felipe Nuevo solar 6.
Figure B.17. San Felipe Nuevo solar 7.

Figure B.18. San Felipe Nuevo solar 8.
Figure B.19. San Felipe Nuevo solar 9.

Figure B.20. San Felipe Nuevo solar 10.
Figure B.21. San Felipe Nuevo solar 11.

Figure B.22. San Felipe Nuevo solar 12.
Figure B.23. San Felipe Nuevo solar 13.

Figure B.24. San Felipe Nuevo solar 14.
Figure B.25. San Felipe Nuevo solar 15.

Figure B.26. San Felipe Nuevo solar 16.
Figure B.27. San Felipe Nuevo lot 17: corn mill foundation.

Figure B.28. San Felipe Nuevo lot 17: Rural clinic building.
Figure B.29. Yaxche solar 1.

Figure B.30. Yaxche solar 2.
Figure B.31. Yaxche solar 3.

Figure B.32. Yaxche solar 4.
APPENDIX C
FIELD QUESTIONNAIRE

TRADITIONAL MAYA HOUSING PROJECT 2002

1. Town: ______________  2. State: __________  3. Date: ______________
4. Solar No: ______________  5. GPS: ____________________________________

FAMILY DATA

6. Name/last name informant: _____________________________________________
7. No. Inhabitants in solar: _______________________________________________
8. Name(s) | Affinity | Age | Sex | Mayan?
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9. Family type: extended (  ) nuclear (  ) other (  )

10. Family origins: _______________________________________________________

11. Parents residency: _____________________________________________________
12. Other family members:
    Who: _______________ Residency: ________________________________
    Who: _______________ Residency: ________________________________
    Who: _______________ Residency: ________________________________
15. Dress: __________________________________________________________________
16. Education: parents: ____________________________________________
    Offspring: ____________________________________________
    Grandparents: ____________________________________________
17. Religion: ___________________________________________________________
18. Economic activity: ___________________________________________________
19. Num. Individuals working: _____________________________________________
20. Who works in the *milpa*: wife ( ) Husband ( ) offspring ( )
    workers ( ) other ( )
21. Monthly income: *milpa*:___________ wage:___________
    family source:___________ other:_______________________________
22. Real estate: land (has):_________ *milpa*:_________ *solar*:_________
    community:_________ total:________________
23. Type of property:___________________________________________________
24. Production land/*milpa*:

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<thead>
<tr>
<th>Crop(s)</th>
<th>Hectares</th>
<th>Harvest</th>
<th>good/bad</th>
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<th>2002</th>
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25. Distance from *milpa*/terreno to:
   *solar*: distance_________ time_________ Num. weekly trips______
   Market: distance_________ time_________ Num. weekly trips______
26. Domestic animals/others: cattle ( ) chicken/turkeys ( )
    horses/donkeys/mules ( ) goats ( ) other:_______________________
27. Who collects firewood for *solar*?____________________________________
28. Where do you collect firewood_________________________________________
29. How much firewood do you use weekly?_________________________________
30. Have you cut other wood this year?___________ from where?___________
    how much?______________________________________________________
31. Other forest products:
    What:_______________ from where:_____________ Quantity:_________
    What:_______________ from where:_____________ Quantity:_________
    What:_______________ from where:_____________ Quantity:_________
32. Production solar/orchard:

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33. Daily working hours:

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<th>Solar/hrs</th>
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34. Monthly expenses: groceries: ____________ clothing: ________________
   health: ________________ household items: ________________
   work tools: ________________ celebrations: ________________
   other: ________________

35. Investments: jewelry ( ) refrigerator ( ) stove ( ) sewing machine ( )
   TV ( ) radio/stereo ( ) other: ________________________________
SOLAR/LOT DATA

36. Size solar:_______________ 37. Shape:___________________________
38. Construction area:___________ 39. Non-construction area:_____________
40. Location: flat area ( ) outcrop ( ) fill area ( )
41. Soil and vegetation:_________________________________________________
42. Age and type of oldest trees:__________________________________________
43. Who takes care of solar plants?________________________________________
44. Who knows more about plant care?____________________________________
45. Plants frequently used?________________________________________________
                                      Plants for consumption_________________________
46. Plants year seasonality_______________________________________________
47. Domestic animals
   Specie:____________________ No.____ Food___________________________
   Specie:____________________ No.____ Food___________________________
   Specie:____________________ No.____ Food___________________________
   Specie:____________________ No.____ Food___________________________
   Specie:____________________ No.____ Food___________________________
48. Time of residency:___________ 49. Construction date:_____________________
50. Public utilities in solar: electricity ( ) potable water ( )
51. Monthly payment: power____________ wate r____________
52. Cooking fuel: Wood ( ) gas ( ) both ( )
53. Areas identified in solar: structural nucleus/construction ( )
   patio ( ) intermedia area( ) garden/orchard ( )
   provisional discard ( ) intensive discard( ) shrub area ( )
   transitional areas ( ) residential area ( )
54. Walls around solar: albarrada ( ) wood fence ( ) blocks ( )
   other:____________________ Height:______________ Width:______________
55. Kaanché ( ) width:_________ length________ height:_________
   Plants: _______________________________________________________________
56. Cleaning: structure sweeping ( ) times daily ( )
   solar sweeping ( ) times daily ( )
57. Garbage location:_____________________________________________________
58. Garbage separation ( ) location in different areas ( )
59. Refuse management: fill( ) burning ( ) reuse ( )
   recycling ( ) transportation to landfill ( )
60. Materials reused:_______________________________________________________
61. Materials recycled:______________________________________________________
62. Number of houses and construction materials:

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63. Structure function (from interview):

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65. Observed Function(s):

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66. Photos ( )
67. Croquis ( )
68. Other ( )

Comments______________________________________________________________
_________________________________________________________________
_________________________________________________________________
GLOSSARY

Albarrada= low dry-rubble wall used to demarcate the solar boundary

Banco= large narrow table used to support a metate

Banqueta= low round wooden table

Batea= oval laundry basin

Comal= flat earthenware or tin pan used to cook tortillas

Enguila= bundle of grass tied up in sheaves and used as roofing material

Fajina= weekly voluntary work requested by public health services to provide care without charge.

Kaanche= small bench, a piece of furniture made of a block of wood hollowed out from beneath. It is also a word used in Mayan to describe elevated gardens, an exterior tray garden supported by hollowed logs to keep it from domestic animals

Kolopche= wall made of vertical or horizontal wood poles, lashed together, and usually braced by stringers. The base of the pole rest directly on the ground but sometimes it sets on a foundation of rocks.

Lek= gourd

Luch= calabash

Masa= ground corn meal used to prepare tortillas

Metate= stone grinder

Molcajete= small, portable, bowl-shaped stone grinder

Molino= manual or electric corn mill

Palapa= structure with perishable roof but no walls

Pakluum= Mud daubing. The mud is mixed with a combination of shredded guano palm
leaves, grass, or corn husks. While moist it is tossed against the wall and hold together with long stringers fastened to the interior wall surface.

*Peten*= hanging basket used to store food away

*Rebozo*= woman's shawl

*Reuse*= to use something again often for a different purpose and as an alternative to discarding it.

*Recycle*= to process used or waste material so that it can be used again. It involves changing the original material by adapting or converting it into something new.
VITA

Virginia Josefina Ochoa-Winemiller was born in Yucatan, Mexico and spent most of her life in the state of Tabasco, México. She graduated from Centro Universitario de Tabasco High School in 1983. In 1995, Virginia graduated from Universidad Autonoma de Yucatan, in Merida, with a major in anthropological sciences. She has developed extensive field research in several Maya sites including Dzibilchaltún, Uxmal, Chichen Itzá, Labna, and Acanceh, Yucatan, and Chau Hiix, Belize. Her research interests involved spatial analysis of cultural material at household contexts and applications of geographic information systems to create models for the understanding of cultural behavior. Other research includes ethnoarchaeology of domestic domains, Mesoamerican settlement patterns, social stratification, and origins of urbanism of the Maya. Virginia pursued graduate studies in anthropology at Louisiana State University and earned the degree of Master of Arts in December 1999.