Contents

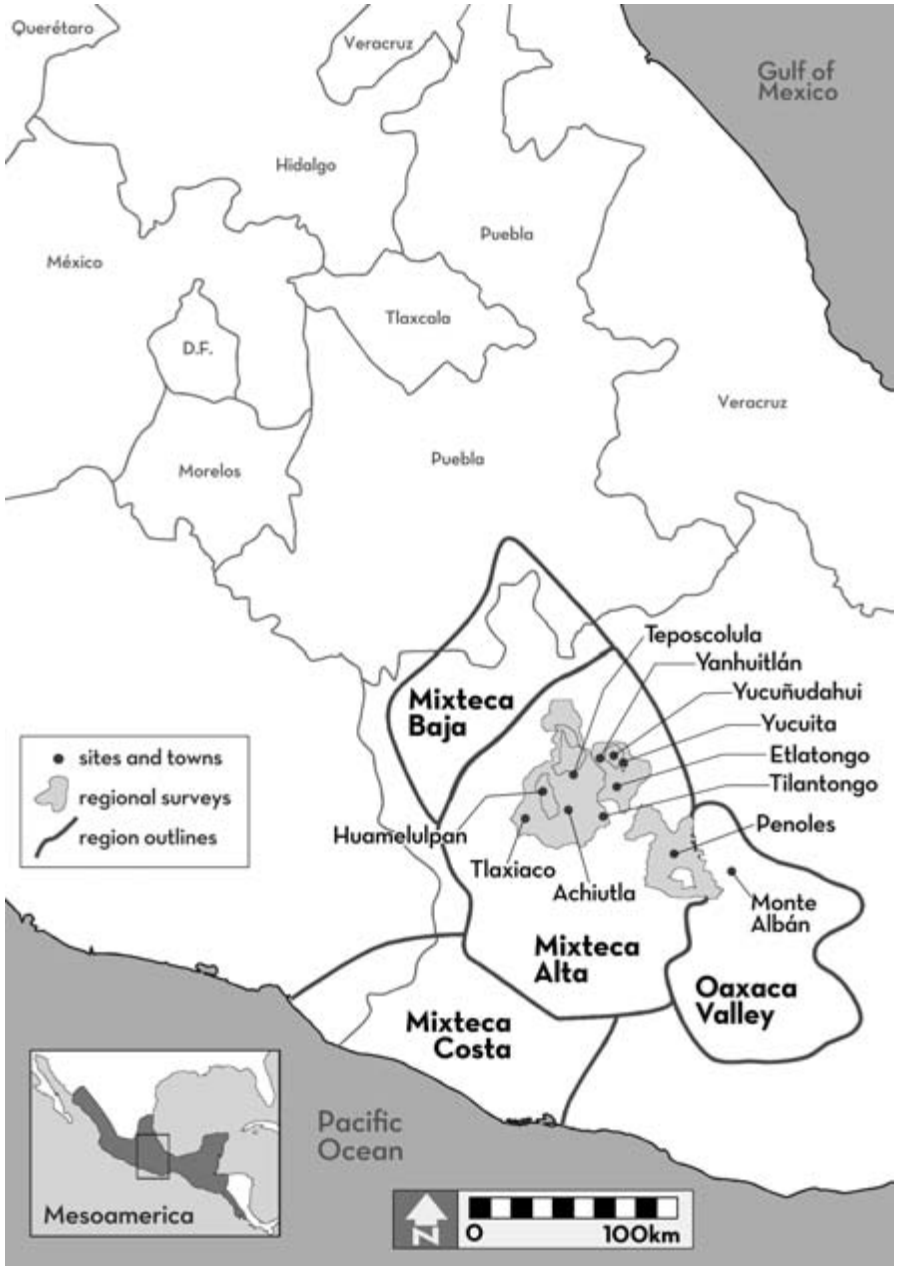
CHAPTER ONE

Regional Study of Ancient Societies in the Mixteca Alta

The Mixteca Alta in the state of Oaxaca, Mexico, was an important region in the center of Mesoamerica (Figure 1.1). But compared to the better-known Maya lowlands and the Aztec heartland, the Mixteca Alta has received much less archaeological attention. This was a magnificent land with wonderful archaeological sites. The Spanish conquerors in the sixteenth century described it as well-populated, rich, and prosperous. Today it is notoriously eroded and poor; the Mixteca's major export is its own people. This volume sheds light on what happened to the Mixteca Alta.

To do so, we consider the fundamental question: What were the prehispanic societies (the organized groups of people) of this area and how did they change over time? To address this problem, we begin with settlement patterns (where people lived and worked). Rather than concentrating on a single settlement we take a regional approach.

Since the Mixteca Alta is a place where most archaeological sites can be readily seen on the surface without excavation, we carried out fieldwork designed to find



1.1 Regions, survey areas, important sites, and modern towns.

all the visible remains of settlements and other ancient features over an area large enough to contain many autonomous societies. This was full-coverage regional surface survey. Trained crews walked systematically over the whole area (1,622 km^2) to locate, map, describe, and collect from all archaeological sites (we found 999). In the last thirty years, similar regional surveys have fundamentally altered and improved explanations about the rise of civilization and the nature of urbanism. When combined with finer-scale excavation and other data, surveys have proven to be very productive to gather new information on past civilizations and the relationships between people and environments.

The study region, which we call the Central Mixteca Alta, when added to the other survey projects in highland Oaxaca provides nearly continuous coverage of a swath 170 km in length, a total area of about 8,000 km^2. This unusually extensive coverage opens up new perspectives. Archaeologists can now move beyond debating about single places of origin or centers of influence to examining Mesoamerica or other civilizations as social systems. We can identify multiple societies and track each over time. We can also see how large-scale phenomena affected local events (and vice versa). We are beginning to understand the key processes of change at local, regional, and macroregional scales. The difference between the older culture-history approach to civilization and the developing macroregional perspective based on regional surveys is similar to that between guessing a whole picture from a few pieces of a jigsaw puzzle versus assembling all the pieces. Today we still do not have all the pieces, but we have enough to know which method offers the better chance to see the whole picture.

PLAN OF THE BOOK

The book builds from particular archaeological facts toward the bigger picture. This chapter describes the Central Mixteca Alta and our field and lab methods. Chapters 2–6 display the archaeological sites and settlement patterns, phase by phase, for the twenty-six subregions or small valleys in the large area we surveyed. The subregions fall into five groups that have much in common geographically and historically. The order of presentation is by these five groups, from east to west, beginning in Chapter 2 with the western edge of the Nochixtlán Valley, that is, the eastern flanks of the Sierra de Nochixtlán. Then we take up the major kingdom of Teposcolula and its satellites (Chapter 3). We next move to a key place in the emergence of state and urbanism in the Mixteca Alta, Huamelulpan and its dependencies (Chapter 4). Chapter 5 displays the settlement patterns of seven subregions in a rich and dynamic region we call the "inner basin." We describe the core of the major *cacicazgo* of Tlaxiaco in the southwestern part of the study area in Chapter 6. Chapters 2–6 show all the variations that allowed us to apprehend a broad pattern of development as well as showing how the ideal pattern played out on the ground in specific environmental and social contexts.

Chapters 7–10 unify all the localities to illuminate the regional patterns in the earlier Formative, later Formative, Classic, and Postclassic. These discussions bring

together the archaeology of the Mixteca Alta's petty kingdom or state—*ñuu*—and its predecessors. Chapter 11 discusses these findings in a broader anthropological context. To make our point in another way, Chapter 12 sums up in Spanish.

ORIGINS OF URBANISM AND THE STATE

How and why states and cities developed is one of the classic problems of history and the social sciences. For social scientists the state generally means a hierarchically organized bureaucratic governing institution that claims sovereignty within a territory. The common archaeological markers of states are deep settlement and civic-ceremonial hierarchies and sometimes written texts or special buildings that are the manifestations of hierarchical governance. Cities are the top-ranking places in central-place hierarchies; they have relatively high populations and notable internal differentiation.

The problem of state and urban origins is a classic one in the sense that it is the laboratory or proving ground for major theories of social science. Class conflict, population pressure, war, long-distance trade, central-place theory, the social contract, the urban cosmovision—these and various other ideas have been promoted and then criticized using the comparative record of human history. Our study describes a sequence that runs from the first farming villages to the origins of the state and urbanism and their subsequent developments. The Mixteca Alta case is one in which new social institutions developed in situ yet with much trouble, conflict, and contingency. The transition to the state took place about 2,000 years ago within one cultural, demographic, and environmental setting but it was accomplished by an emphatic punctuation that ended one equilibrium and began another.

Our perspective differs from that of other scholars who have addressed this classic problem. In Oaxaca multiple adjoining regions have now been subjected to systematic archaeological survey. This allows us to see change in neighboring regions simultaneously over more than 3,000 years. Aside from the story of the Mixteca Alta, itself fascinating and important, our more general contribution to the problem of state and urban origins comes from our perspective of a macroregion composed of interacting regional societies. This vantage has several theoretical implications. First, the story of state origins in any one of the regions was rather different from that of its neighboring regions. Yet these varying stories are not competing or inconsistent explanations because each regional trajectory was the particular outcome of a common, overarching, macroregional process. Second, the important causal factors were different not only at the same scale (each region looks different) but also the causes of the macroregional movements were not the same as these but were of a different order. Different causal factors operate at different scales (in space and time). Third, good explanation should comprehend what went on at multiple scales. The rise of the state and urbanism can best be explained by integrating macroregional, regional, and lower-level variation. Propositions like these are similar to what the historian Braudel (1972) said about particular events and long-term structures or what ecologists sometimes refer to as "hierarchical patch dynamics" (Wu and Loucks 1995).

Having multiple regional surveys as well as smaller-scale studies means that we have instruments big enough to see multiple neighboring states and discerning enough to see a level or two below to the cities and towns within these states.

THE CENTRAL MIXTECA ALTA

Oaxaca is the mountainous tangle where Mexico's Sierra Madre del Sur and Sierra Madre Occidental intersect like ragged scissor blades. It was a multilingual, populous region in the heart of Mesoamerican civilization between the Aztecs of Central Mexico and the Maya of the east. The Mixtec languages, a branch of the Otomanguean family, predominate in western Oaxaca. The Mixteca Alta is the high country above 1,500 m asl (above sea level) (Tamayo 1950:96) at the upper reaches of the Río Balsas and the Río Verde, which run to the Pacific, and the Río Papaloapan, which flows through the deep valley called the Cañada to the Gulf of Mexico.

In the sixteenth century the Dominicans considered the area so rich and important that they established major monasteries at Yanhuitlán, Coixtlahuaca, Teposcolula, Achiutla, and Tlaxiaco. Palerm and Wolf (1957) wrote that the Mixteca Alta was one of Mesoamerica's key areas that persisted, period after period, and encompassed regions of demographic power and centers of economic networks that organized diverse environments. The Mixteca Alta is known for its codices, which are precolumbian and Colonial painted manuscripts, and for its native cacicazgos, petty kingdoms ruled by hereditary noble families. Abundant archaeological remains reveal a long tradition of complex urban culture.

The Mixteca underwent two major evolutionary transformations. Around 1300 BC the way of life shifted from hunting and gathering to sedentary agricultural villages (a Neolithic revolution). The second major change began around 300 BC and after several centuries saw the birth of urbanism and the state. Like other urban systems, those in the Mixteca Alta also underwent dramatic collapse, which happened here at the end of the Classic period. But after AD 1200 the region experienced its greatest population growth and prosperity. A few decades before the Spanish invasion the area had become tributary provinces of the expanding Aztec empire (the Aztec presence left only the slightest archaeological imprint).

Our Central Mixteca Alta study area is a portion of the whole cultural region, but it is a significant part because it contains all of several native cacicazgos, large portions of others, and many of the peripheries and boundaries in between. Our area covers all or parts of the politically and demographically important realms of Teposcolula, Yanhuitlán, Tilantongo, Achiutla, Huamelulpan, and Tlaxiaco, as well as smaller polities. This book combines three projects: Andrew Balkansky's (1998b) survey of the Huamelulpan Valley, Laura Stiver Walsh's (2001) survey of the Teposcolula Valley, and our 1999 survey, in which all of us worked together. These projects were carried out using similar procedures, which made it relatively easy to combine our data.

1.2 Planting trees to help retain soil. A portion of the mural at the palacio municipal, San Agustín Tlacotepec.

Environment

The following sections describe natural factors important in human/environmental interaction and settlement history. Local details are in Chapters 2–6. Environmental change is the product of natural processes and human action. In the Mixteca Alta the great weight was on the human side of this equation. Again and again since the origin of sedentary villages, human action changed the environment. People cleared the land of its forest and grasses. Clearing caused rapid soil loss because the best soils were also the most prone to erode (Figure 1.2). Yet by capturing soil on the move, people created verdant, moist, lush, productive, and sustainable gardens, orchards, and fields. Many places like this can be seen today alongside eroded hillsides that look like mine tailings on the moon.

The key to this paradox is human input and its opposite, lack of human input (Spores 1969). Active retention of soil creates fertile places. Unprotected by natural or cultivated vegetation, soil will depart en masse on a downhill train powered by summer thunderstorms and gravity. Retaining walls and vegetation held the soil to its station. When retaining walls were neglected or vegetation removed, erosion began and soil washed down onto valley floors. Farmers could semi-deliberately move soil from upper slopes and catch it behind retaining walls on lower slopes.

Geology

Our understanding of bedrock and soils comes from the informative Carta Geológica series (INEGI 1984; Figure 1.3) and Michael Kirkby's geomorphologi-

cal study of the Nochixtlán Valley (1972). Highland Oaxaca has several widely spaced mountain ridges of Cretaceous limestone. Between these, in the Tertiary era, were lacustrine basins, which filled with reddish beds of limestone or sandstone cobbles loosely cemented by carbonates in a fine-grained matrix. There is variation in the makeup of these beds but they are generally referred to as the Yanhuitlán and Jaltepec formations (Figure 1.4). These were the preferred soils for agriculture and the most erodible. When weathered these soils produce a calcareous (calcrete) layer that can be cut to make building blocks (*endeque*) (Kirkby 1972:14–15). Volcanic flows and dikes extruded into the basins in mid-Tertiary times, forming cones, precipices, and ridges as high as the limestone crests and breaking the terrain into small pockets surrounded by mountains.

Climate

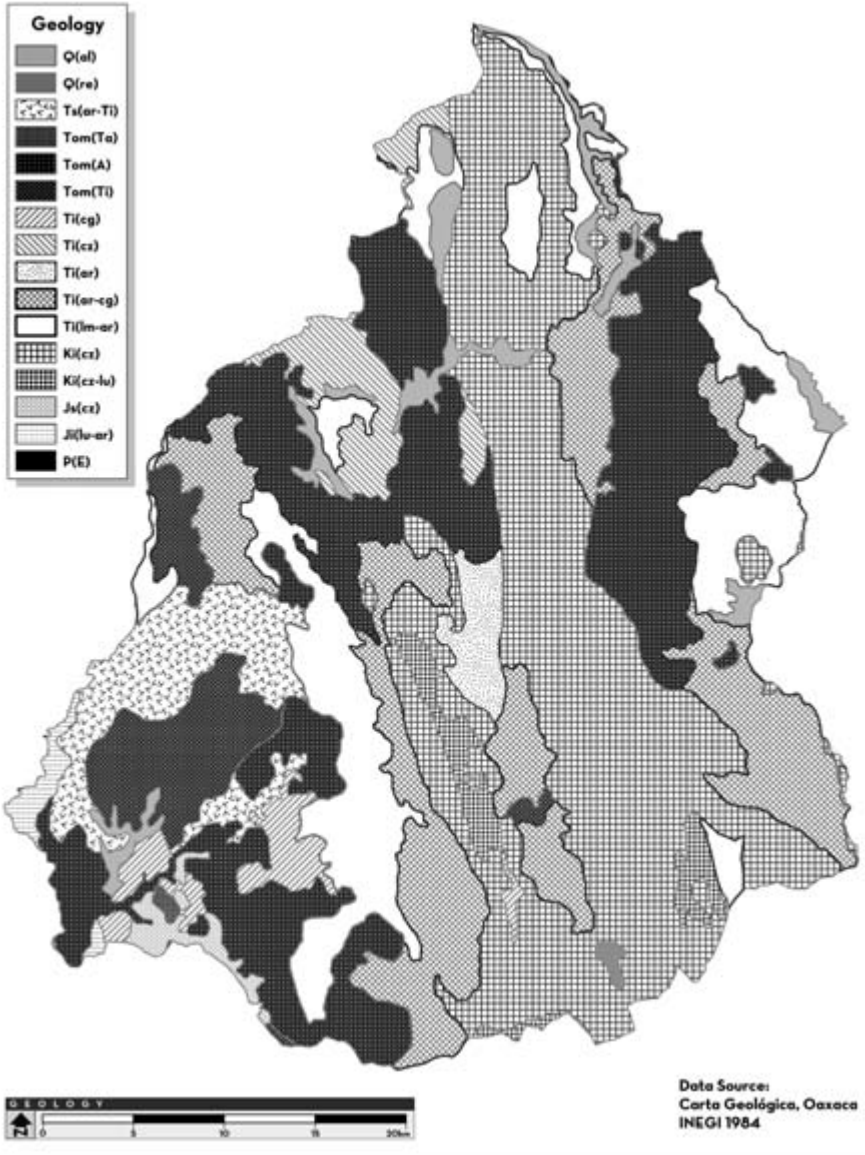
The area has a humid-temperate climate (Tamayo 1950; Carta de Climas 1970; INEGI 1988; Alvarez 1998). Measured mean annual temperatures are about 16–17°C. Annual rainfall averages over 900 mm in the south (Tlaxiaco) but the north is drier, with Teposcolula receiving about 650 mm of precipitation on average. This is a summer-dominated rainfall regime. Localized rain shadows and year-to-year and month-to-month variability in rainfall and frosts combine to produce substantial local variation. Risks to dry farming place a premium on other adaptations such as retaining moisture by terracing, irrigating, making use of altitudinal variation, and planting varied cultigens.

Garvin's (1994:21–51) compilation of data from twenty-three weather stations in the Mixteca and the Valley of Oaxaca shows no correlation between elevation and precipitation. Local variations must override general patterns. For farmers, adaptations to local rainfall and watershed conditions were most significant.

Vegetation

Today the valleys and hills are almost entirely cleared for agriculture and grazing up to about 200 m in elevation above the local valley floor. Above this level pine predominates in the mountain forests; oak and juniper are common at lower elevations. Usually there is a mix of pine and oak. Disturbance history is a major factor in forest composition and in the prevalence of grasses. The most luxuriant pine forests grow along the eastern mountain ridges but upper slopes and ridge crests throughout the area are covered with mixed pine and oak. Pine needle litter can cover the ground surface and make artifacts hard to find but in most circumstances grazing, plowing, logging, or erosion exposes artifacts, and stone architecture is visible in any case.

Hot-climate cultigens like sugarcane and bananas will grow at low elevations in the south of our study area, around San Mateo Peñasco (1,800 m asl), but not in Teposcolula where the valley floor is at 2,200 m. Xerophytic cultigens (e.g., agave, cactus, yucca) are economically important everywhere.



1.3 Surface geology of the Central Mixteca Alta.

Land Use

There is a general pattern of intensive infield cultivation in and around settlements; less intensive, sometimes dry-farmed fields at a distance from settlements; and sporadic special use of outlying uplands. Today's villages and small towns tend

1.4 Soil profile in the Yanhuitlán Formation in the Nochixtlán Valley. Note that an A-horizon has formed in the center of the picture. On top of the hill is a layer of caliche.

to have dispersed houses with fields between. Valley floors are agricultural; uplands have only a few fields. Sheep, goats, cattle, and burros graze everywhere. Uplands are for grazing and wood cutting. Historically, landed haciendas were not as important in the Mixteca Alta compared to other regions in Mexico but our area did have fixed and transhumant livestock haciendas. Sometimes herds of 10,000 or more animals were moved seasonally over long distances (Romero 1990:323–354). Today outside timber and charcoal businesses sometimes are permitted to harvest large tracts. Mines in this part of Oaxaca were always small in scale. Limestone products (cement, cal) are extracted near Teposcolula and east of Tlaxiaco and there is a salt source in the Teposcolula Valley. There is very little industry.

Present land use is only a partial clue about past land use. What today is barren badlands may have been a rich and productive agricultural terrace system in the past. Today's pine-dominated forest may have been fields or a more diverse forest in the past. Five centuries of livestock grazing have depleted grasses and contributed to unchecked erosion.

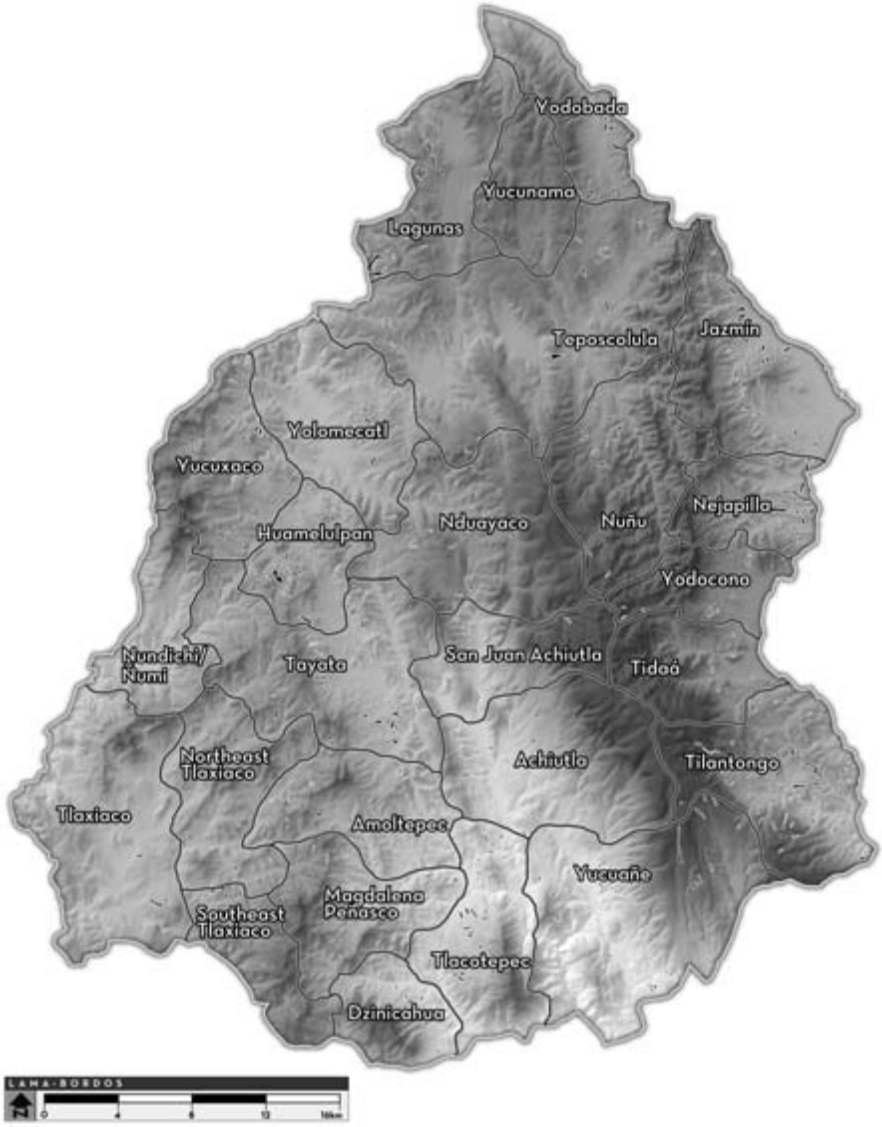
Ancient, historic, and present-day agricultural terraces are prominent features of the landscape (Figures 1.5, 1.6). *Lama-bordos* are chains of agricultural terraces built in drainages. There are also contour terraces on hillsides. Terracing dramatically increases yields and sustainability and is an important factor in cultural and demographic development.

1.5 Santo Domingo Huendio, from SDH 1 north to SDH 2. The modern settlement is in the upper end of a lama-bordo. Note the milpas on the terraces with tree-lined retaining walls.

History and Ethnography

The Mixteca Alta was the subject of Woodrow Borah's and Sherburne Cook's seminal studies in historical geography that linked the region's erosion to its population history (Cook 1949; Borah and Cook 1960; Cook and Borah 1968). Good overviews of the Colonial and recent history of the Mixteca Alta have been written by Dahlgren (1954) and Spores (1967, 1984); Terraciano's (2001) and Pastor's (1987) historical studies are essential. Major ethnographic studies of villages include Butterworth's (1975) on Tilantongo in our study area, Romney and Romney's (1966) on Juxtlahuaca, and Monaghan's (1995) on Nuyoo, south of Tlaxiaco.

Before the Spanish conquest everyone in the Mixteca Alta spoke one dialect or another of the Mixtec language (the largest in number of speakers and geographical extent), Trique (southwest of Tlaxiaco), or Chocho (around Coixtlahuaca and Tamazulapan). A specifically Mixtec ethnic or political identity was never as strongly expressed as loyalty to one's home community. During Colonial times many indigenous-language speakers were drawn into new towns and they ceased to speak their local dialect in favor of Spanish. This loss of indigenous language—part of a process sometimes called "depeasantization"—continues today as labor markets pull people away from the Mixteca Alta. Yet the Mixtec language still thrives in many places. Many people are bilingual, speaking Mixtec and Spanish, and some of those who have dealings with the north are trilingual, adding English to their repertoire.



1.6 Regional distribution of lama-bordos. From our field observations and air photos.

In 1912 twenty-three-year-old José López Alavez, a native of Huajuapan in the Mixteca Baja who was studying in Mexico City, wrote the popular song "Canción Mixteca," which still brings forth tears from migrants who long for their *patria chica*:

Que lejos estoy del suelo donde he nacido!
Inmensa nostalgia invade mi pensamiento.
Y al verme tan solo y triste, cual hoja al viento.
Quisiera llorar, quisiera morir de sentimiento.

Over the past century the flow of people out of the Mixteca has been significant. With cash a necessity today it is difficult to make a living by family farming, and tens of thousands of people have migrated permanently or temporarily to Puebla, Mexico City, and the United States. Their remittances are used to embellish houses, public buildings, and churches. But even with this new money rural communities, whether Mixtec or mestizo, are poor, and with their eighteen- to forty-five-year-old men and women away, they are demographically hollow.

Mixtec-speaking villages and villages where only Spanish is spoken are not outwardly different (in our study area most but not all villages are Mixtec speaking). All are rural communities that have public schools, churches, cemeteries, basketball courts, municipal offices, small jails, a few small stores, electricity, a few paved streets, public faucets with running water, and satellite dishes for television. They have participatory local governments and an annual round of church ceremonies and festivals—the civic-ceremonial system seen in many middle-American communities. Religious beliefs and practices are a syncretic blend of indigenous and Catholic.

All rural communities here are more or less closed and corporate—they defend the land that is their means of livelihood and they do so in collective ways that tend to exclude outsiders. All adult men must provide *tequio* (labor) to the community. Ties of labor sharing, food exchange, and ritual bind households together. Yet sometimes villages are almost paralyzed by grievances and factional disputes among their members.

In Mixtec-speaking communities an intensely local, territorial ideology is still expressed in oral histories, myths, rituals, prayers, place-names, and cosmologies, all encoded in the indigenous dialect. All over the Mixteca Alta there are hundreds of tiny shrines that families use for curing and to pray for rain (the practices are syntheses of the Catholic and the indigenous). The oral traditions and place-names often match in specific detail scenes in the Mixtec codices, the painted folded-screen manuscripts of precolumbian and early Colonial times. Thus the names used by Mixtec speakers today for important archaeological sites, mountains, and caves can be an aid to reading the prehispanic codices.

In the Colonial period the Spanish authorities had a policy of *congregación*, meaning that native settlements in the hills or dispersed over the countryside were to be abandoned and their inhabitants brought down to the valley floor and concentrated in "proper" towns. In some ways the effects of congregación can be seen today but in fact the policy had quite mixed results (Spores 2005). Modern towns such as Teposcolula, Yanhuitlán, and Tlaxiaco were new centers created in the sixteenth century by resettlement. Most communities do have a central settlement with streets laid out on a grid. Yet throughout Colonial and recent times there has been a strong centrifugal tendency. Today's central settlements often have fewer

than half of a community's members—the rest of the people are dispersed in widely scattered villages, hamlets, and single houses. Tilantongo, Nduayaco, Yucuxaco, and other communities have markedly dispersed settlement, and indeed most communities are in some degree dispersed. The modern settlement pattern is not vastly different from that of late prehispanic times. In most places there are specific similarities in the pattern of settlement between the Postclassic and the present day, although as we shall see, prehispanic populations were often larger than today's.

European plants, animals, and diseases, the sixteenth-century demographic and economic collapse, and the incorporation of the Mixteca Alta into the modern world system wrought enormous change. Indigenous self-rule has been gone for 500 years. Exploitation has drained off wealth and created poverty. Natural resources have been depleted by overgrazing and erosion. Peasantization, depeasantization, and migration often broke the close links among social groups, local territory, Mixtec language, and culture. These transformations severed the transmission of knowledge and history from one generation to the next. Breaking off the past from the present had profound intellectual and practical consequences.

Yet again and again people in the Mixteca Alta have made adjustments and created institutions that resemble in some ways long-standing prehispanic adaptations. For example, popular markets, which had been important in prehispanic times, have been irrepressible. Tequio is still an important institution and people today sometimes speak of "working for the *presidente municipal*" (the elected mayor) in the same terms they used when they were rendering tribute labor to a native lord. The very local territorial community persisted or was created again in many places even as its internal organization took different forms. The urban centers of prehispanic times disappeared, but left to itself, rural settlement tended to recreate the rural aspect of Classic and Postclassic settlement systems. The cycles of erosion, soil capture, cultivation, and abandonment play out again in our lifetime. Through all of these continuities we hear the uniformitarian chorus: the processes that we see happening today occurred also in the past and shaped the land and the history of its people.

Political Divisions and Population

Our area lies at the intersection of three districts: Teposcolula, Tlaxiaco, and Nochixtlán (García 1998). In Mexico the basic municipal and territorial political unit is the *municipio*, which has a political center, the *cabecera*. Legally there are various types of places subordinate to a cabecera municipal but here we refer to them all as *agencias*. In our combined project we surveyed in twenty-nine municipios (see Table 1.1; the locations of these places are shown on the settlement pattern maps in Chapters 2–6). We surveyed only parts of some jurisdictions. This means that some of the total municipio population in Table 1.1 is not in our study area. There are also small census locations we surveyed that are not listed in the 1990 agencia population column in Table 1.1. In all, our study area had about 45,000 to 50,000 inhabitants in 1990.

The recent population is relatively sparse and dispersed. Notice the large number of small settlements in Table 1.1. Population fell over the thirty years from 1960 to 1990 in most rural places but it grew in the city of Tlaxiaco. The totals for the whole area in 1960 and 1990 are almost the same. As our results show, the population at AD 1500 and at AD 400 was much higher than that of today and there were more cities. Even in 200 BC the population may have been about the same as that of the twentieth century.

Prior Archaeological Research

This project would not have been possible without the foundational work of Ron Spores (1967, 1972, 1974). Studies of Formative sites in the Mixteca have been carried out by Jorge Acosta and Javier Romero (1992) at Monte Negro, Margarita Gaxiola (1984) at Huamelulpan, Roberto Zárate (1987) and Jeffrey Blomster (1998) at Etlatongo, and Nelly Robles (1988) and Patricia Plunket (1983) at Yucuita. These researchers describe the farming villages of Early Formative times and the growth of social differentiation and political centers in the Middle Formative (Winter et al. 1984; Winter 1994). The site of Yucuñudahui in the Nochixtlán Valley (Caso 1938, 1942; Spores 1972) has been considered the archetypical Classic center in the Mixteca Alta. Yucuita (Plunket 1983) also had substantial Classic occupation.

Excavations by Ignacio Bernal (1949) at Coixtlahuaca and Michael Lind (1977) in Nochixtlán describe social variation in major Postclassic centers. In many instances the local archaeological record can be linked securely to sixteenth-century descriptions and to codices (Byland and Pohl 1994). Spores (1967:90–104), Rodolfo Pastor (1987), Charlotte Smith (1993), and John Monaghan (1994) have described variation in the scale, internal organization, and economic activities of Postclassic kingdoms. Study of the Mixtec codices by Alfonso Caso (1977), Emily Rabin (1979), and many other modern students (see Smith 1973, 1998; Jansen and Reyes García 1997) have established the historicity of the Mixtec kingdom as the form of the state in the Postclassic period.

Balkansky's (1998a) review of all the settlement pattern surveys in the Mixteca Alta identified the major outstanding issues and controversies. We have drawn heavily on the surveys of adjoining and nearby areas: Bruce Byland (1980) in Tamazulapan/Tejupan, Spores (1972) in Nochixtlán, Plunket (1983) in Yucuita, and Byland and John Pohl (1994) in Jaltepec/Tilantongo.

Chronology

Chapter 1 of an archaeological report should always have a chronological table (Table 1.2). Appendix 1 illustrates diagnostic pottery types and outlines the ceramic sequence (see Stiver 2001 for a fuller treatment). Our chronology is derived from those of previously known regions just to the east. We owe a great deal to Spores's and Marcus Winter's superb ceramic knowledge. Plunket's work (1983) also contributed to refining the chronology. Balkansky and Stiver Walsh worked

with Huamelulpan and Teposcolula collections for several years before the 1999 project. In addition to the published literature we were helped by study of Mixteca collections at the American Museum of Natural History in New York City, ceramic workshops sponsored by the Instituto Nacional de Antropología e Historia (INAH) in Oaxaca, stratigraphic tests at selected sites carried out by INAH and Spores in the 1990s, and Spores's earlier surface collections from sites in the Mixteca Alta and Baja (Spores 1996). Through study of these collections and ceramics from the Peñoles area it is apparent that even in economically marginal areas where decorated pottery is less frequent, careful attention to surface finish and the details of vessel shape and rim profile often permit discrimination to the time scale of the archaeological periods and phases recognized in the better-documented regions of central Oaxaca (Kowalewski 2003a). Nevertheless the sequence begs for refinement, especially from the Classic through the Postclassic.

SURVEY

Our objective was to produce data on settlements and agricultural and other cultural features comparable to the full-coverage surveys in other parts of the Mesoamerican highlands. One way of conceiving objectives and methods, which we used in our research proposal, was to list the tangible research products stated in terms of systematic data sets. The data sets we proposed and produced were INAH site forms, 1:50,000 maps locating all sites, maps showing survey coverage, sketches of sites having preserved architecture, a ceramic data set listing numbers of each artifact type for each collection area, a lithic data set, measurements for each class of architectural feature (e.g., terrace, mound, plaza, walled structure), map of lama-bordos, photo list, a list of Mixtec toponyms, reports in Spanish for each community, and a final report to INAH (Kowalewski, Heredia et al. 2006).

Field Procedures

The field objectives were to locate and describe all visible archaeological sites (places having the remains of past human facilities), especially (but not limited to) habitation areas, fortifications, and agricultural features; to describe the environmental contexts of sites (topography, soils, water, vegetation, land use, special resources); to place in time sites and components thereof using existing ceramic chronologies; to measure, map, and describe architectural and agricultural features; to examine gully profiles and roadcuts for evidence of buried sites and soils; and to make collections of pottery and stone artifacts roughly and preliminarily representing the main stylistic, functional, and chronological variation present. It was also our objective to train archaeologists from the United States and Mexico in every aspect of diplomatic, field, laboratory, and analytical procedure so that they could carry out systematic regional surveys that meet the highest current standards.

The remainder of this section is a detailed description of field procedures. It will show what data were, how they were collected, and the limitations of these methods.

This section will also serve as an overview of current standards for systematic full-coverage regional settlement pattern survey in this part of the world.

We lived in Tlaxiaco on the western edge of the survey area. Tlaxiaco had more services than any other town, including the biggest, sloppiest hamburgers in Mesoamerica, sold by a man on the plaza. For a time when we were surveying on the eastern side of the area, some of us stayed at a hotel in Nochixtlán. The mountain crew sometimes camped for five days running in the Sierra de Nochixtlán. It was good that the project director was mainly absent and only visited periodically, leaving matters in the competent hands of the field director and crew.

Survey projects run up a lot of vehicle miles. We had two used Jeep Cherokees with "Universidad de Georgia—Departamento de Antropología" logos on the doors so we would not be taken for police, government officials, or *narcotraficantes*. One Jeep worked, the other's problems took us months to diagnose and fix.

Local diplomacy is time-consuming, anxiety-producing, frustrating, and sometimes fun. Permissions must be obtained well in advance of survey. The Centro INAH Oaxaca provided us with letters addressed individually to each district, municipio, and sometimes agencia, directed to the municipal authorities and the Comisariado de Bienes Comunales (in most towns both sets of authorities had to be contacted) (Figure 1.7). Permission also had to be obtained from most agencias—the municipal head town's permission was not sufficient. Diplomatic visits were best done by two people. Taking notes was essential given the number of people and places we had to visit. In this project every place eventually gave us their approval, although along the way there were some interesting misunderstandings, all resolved. We tried to keep officials informed of our schedule and progress.

Towns varied in the form of their official endorsement. We always got written approval in the form of the town's seal and its authority's signatures on a copy of the INAH letter or a letter written by the authority, stamped and sealed. Some towns asked that an official accompany us in the field, which can be good; if an official did come with us, we offered to pay the person a daily wage. Wages were not always accepted. Every crew member and the two vehicles carried copies of permissions. These were sometimes useful at police or military roadblocks.

We spent more time training crew than we had on prior projects. Untrained crew members are less than inefficient. All our crew members were experienced archaeologists but we all had to learn this project's field and lab procedures. The training was worthwhile. Most people need several field seasons to learn a ceramic sequence but basic temporal diagnostics can be learned quickly. Learning how to map component boundaries on a multicomponent site is an essential skill that takes training and experience. Crew members had to learn a common system for sketching architectural plans. Toward the end of the field season we were helped in the field and lab by experienced students from the Escuela Nacional de Antropología e Historia.

Each crew member (Figure 1.8) usually had the following items: pack, hat, sunscreen, water, work boots, pocket knife, black ball-point pens, mechanical pencil, eraser, standard 11 by 16 cm notebook, copy of the database form, list of site num-

1.7 The palacio municipal, San Agustín Tlacotepec.

bers available, photocopy of a section of the 1:50,000 INEGI topo map, letters of permission, ID, clipboard, graph paper, millimeter/centimeter scale, compass, rain gear, first-aid kit, plastic bags for collections, tags, string, and food. Binoculars were sometimes useful. Each crew or vehicle had a camera, film, book of blank receipts, GPS, extra set of truck keys, tools, and a road emergency kit for the vehicle (never the right stuff). Two-way radios rarely worked; we will try cell phones next time. In the future we will carry more digital cameras.

"And Don't Come Back Until It's Done"

Regional survey never escapes the tension between two desirable goals—to go quickly and cover a lot of ground versus to go slowly and record as much intrasite detail as possible. That tension begins in the original research proposal and it is felt every day in the field.

Daily and weekly planning and logistics were essential. Each day's work was planned to cover a contiguous block of ground. We called these one-day trips "*vueltas*." Ideally every day a crew made a loop, going out by one route and coming back by another, surveying the way out, the way back, and everything in between, leaving no uncovered area. In other words we planned to cover tracts of land, not to go to sites. We tended to have two two-person crews per vehicle. The perfect vuelta had the vehicle parked in the center and the two crews each doing a loop to completely cover a block of territory, and of course returning to the truck at precisely the

1.8 Laura Stiver Walsh taking notes and Tom Pluckhahn orienting with the topo map at LET 2, a small artifact scatter.

same time. If the topography dictated a single linear pass instead of a loop, such as a long ridge crest, crews walked out and surveyed back. Another tactic was to arrange a drop-off in the morning and a pick-up at the end of the day. In a few situations it was possible for two crews and a vehicle to leap-frog along a road.

How much land does a vuelta cover? On the 1999 project we worked for five months, January to May, and tried to have the equivalent of four two-person crews in the field five days a week, totaling 800 person-days. The 1999 project surveyed 1,343 km^2 or 3.36 km^2 per two-person crew per workday. This would be far too much for survey in other circumstances, such as the Teotihuacan Valley or the U.S. Southwest, but in the Mixteca Alta much of the land surface is steep, uninhabited slope, and in those circumstances crews covered the ridge crests and not the uninhabitable slopes.

If average conditions always prevailed, planning a week's survey work would be easy, but conditions were rarely average. We did not know beforehand what archaeological, ethnographic, diplomatic, automotive, topographic, climatic, culinary, or canine events we would encounter. Local permissions came unglued, an accompanying *topil* (village policeman) did not show up, the vehicle did not start, someone came down the wrong ridge and was 2 km from where they were supposed to be, or you ran into a big complicated site at 8:00 A.M.—or worse at 3:30 P.M.—and 4 km from the truck.

There is a syndrome called "survey madness." It occurs late in the afternoon when surveyors are high up and a long way from the truck. They feel a compulsion

to cover the remaining terrain in their vuelta; they know it would be inefficient to come back the next day and walk 4 km over ground already surveyed just to complete a piece they think is no more than one knob. But often it is not just one more knob—it is another big descent and climb plus a great Early Ramos site with terraces and mounds. They almost blindly plunge ahead, the sun sinks quickly, they succumb to the compulsion: survey madness. Typically the other crew waits anxiously and impatiently for hours at the agreed meeting place, wondering what happened.

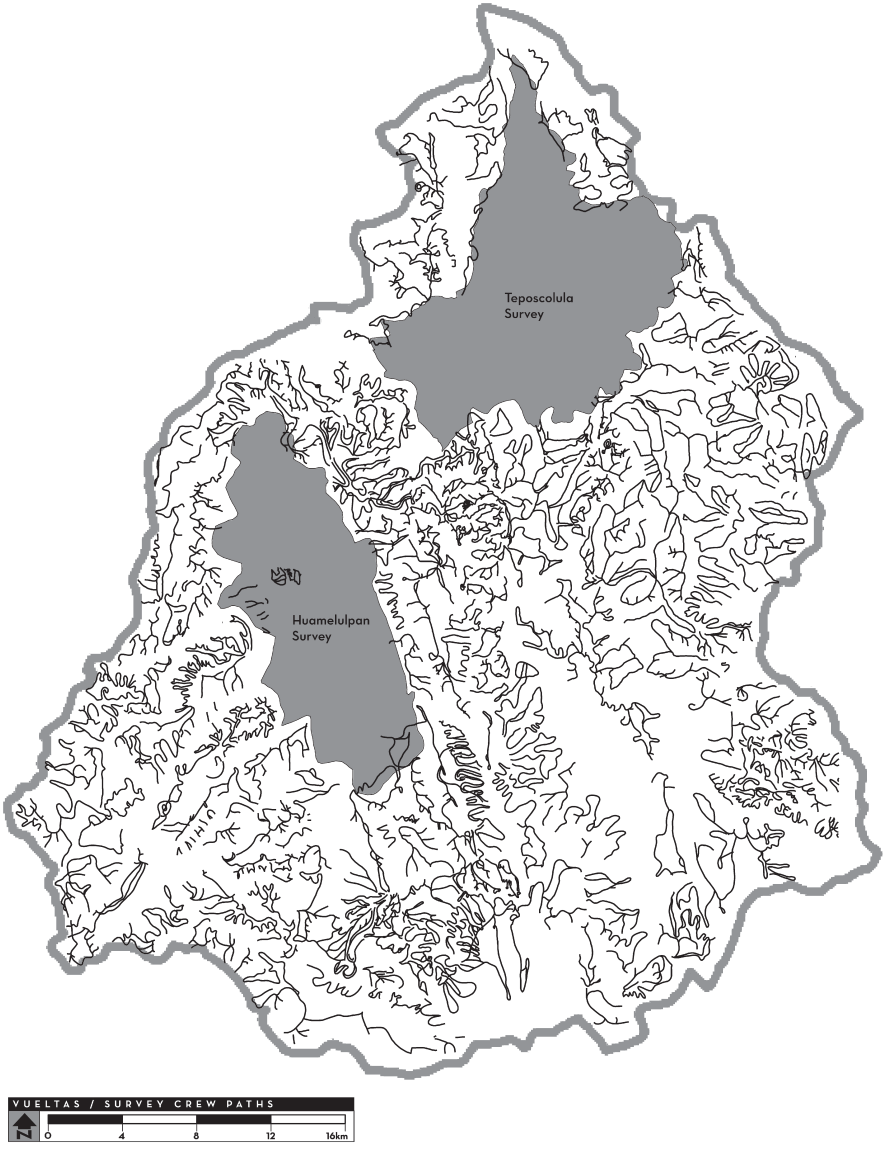
The night before each field day crews laid out their plan of work, vuelta maps, and permission letters. There was always a back-up plan with its vuelta maps and permission letters so if we could not survey in one municipio, we could go to another the same day.

We had two different survey tactics, the choice of which depended on the topography. Gently sloping or flat land called for sweeping back and forth and was best done with three or four people. Mountains required walking all the ridge crests until the slopes were too steep for habitation and walking the toe slopes and the edges of larger streams. Mountain survey was best done with two-person crews. This project had a lot of mountain survey. Knowing when to switch from mountain to valley-floor tactics was important.

Crew members plotted where they surveyed and the direction of their travel on photocopies of the topographic map. Figure 1.9 is the aggregate vuelta map for the 1999 project showing where we surveyed. Vuelta maps were also used to plot archaeological site boundaries and their site numbers, lama-bordos (LB A, B, C . . .), and other points of interest such as *mojoneras* (modern boundary markers, Figure 1.10) or caves. Notebook entries were by site numbers or points marked on the vuelta map. Notebooks and each page were labeled by surveyor's initials, volume, and page number: VYH II:38. Crew members carried a copy of the database form as a reminder of things to record. We did not use printed site forms mostly because they are bulky and often redundant.

Archaeological survey is a mental activity. You think about the land, what it is like now and what it might have looked like in the past; about where to go and look next; about what pattern there might have been to ancient walls and terraces; about sherds and lithics; about dating and component boundaries; about whether tortillas hot off the comal might be begged at the house by the next knob; about the pattern of settlement; about where your crewmates will be in the next five minutes (you always stay in contact, never lose each other); about what you will say when somebody asks if you have permission from Bienes Comunales and you forgot your permission letters; or about why anybody would have lived up on this crag with the nearest water 250 m downhill. You talk and write about what you are thinking.

Experienced survey archaeologists visually attend to the horizon, the lay of the land 20 to 100 m away, the next likely place to see artifacts, where their crewmates are, the map, and the vicious dogs over on the right. Inexperienced surveyors have their heads down looking for artifacts. This bobbing attention, this looking at everything but your feet, means you fall a lot. We do not preach straight transects. A surveyor's actual path wiggles and zigzags back and forth to check the possibilities, following



1.9 General paths (vueltas) of survey crews during the 1999 project.

curiosity. If you are not quite sure where you are on the map or if you cannot figure out a site, resist the tendency to stop; instead keep moving and circle around.

Encountering a site means changing the scale of movement; it does not mean stopping. Typically a crew divides the tasks with one person taking notes and drawing architecture and the other circling about, taking measurements, tracing com-

1.10 Mojonera on Cordón la Corona, marking the boundary between San Miguel Achiutla and San Cristóbal Amoltepec.

ponent boundaries, communicating observations to the notetaker, and plotting site limits on the topo sheet. GPS units were used only occasionally, for example when the forest made it difficult to find a location on the map.

Site boundaries were determined by zigzagging from ground with artifacts or features to sterile ground and back again (how far depended on the terrain). Component boundaries were traced in the same way, which is why surveyors must know the ceramic sequence.

The main purpose of artifact collections was to date components; secondary aims were to gain a preliminary understanding of economic patterns and to amass reference collections for future investigations. Our collection method was opportunistic. Several regional surveys in Oaxaca (Kowalewski 1976; Finsten 1996) have experimented with controlled collection procedures but the results were disappointing in representativeness, information quality, and efficiency. Instead for regional-scale survey in highland Mesoamerica taking numerous opportunistic collections and gathering diagnostic artifacts judged to represent variability within specified proveniences seems to be the best strategy for purposes of dating and gathering basic economic information. We took small opportunistic collections of sherds and only enough lithics (Appendix 2) to represent raw materials, tool types, and PPKs (projectile points/knives). Surveyors regularly made note of many more sherds and stone artifacts than were collected.

Prime collection areas were public architectural complexes, clusters of adjoining residential terraces and other habitation loci, refuse areas below habitation or

public construction, and other contexts affording opportunities for dating or gathering economic data. We made notes on each collection area including its size, purpose, and representativeness or target area. We also sought temporally diagnostic artifacts in exposed profiles of buried deposits and ancient construction.

Standard nomenclature and means of recording architecture were followed as best we could (see the Terminology section below). Wherever preservation permitted we made plan sketches of architectural and residential terrace complexes. These sketches were done on graph paper in pencil, usually at 1:1,000 scale, with compass orientation and contour lines impressionistically drawn using the topo maps as a base. We recorded toponyms for sites and other landscape features but not in the ethnographic depth that Byland and Pohl had done (1994). We took photographs with 35 mm film cameras. Each frame was recorded in the notebooks. Smith recorded several hours of fieldwork using a digital video camera.

Laboratory Procedures

The project's principal innovations had to do with data organization. Each of the big Oaxaca survey projects paid more attention to formal data procedures than its predecessor but the Central Mixteca Alta efforts were a giant step forward. John Chamblee built a relational database and geographic information system and everyone kept up with computer work and paperwork daily so there was little backlog.

The original database used the field-numbered site as the object to which all attributes were linked, including artifacts, architecture, photographs, and collections. In the field the three great advantages of the database were that it made us standardize information, it facilitated error checking, and it let us generate INAH site forms. Chamblee built an electronic version of the INAH site form so we were able to hand in all our completed forms before leaving Oaxaca in June 1999. In 2003 Chamblee restructured the database to make the component the central object instead of the field-numbered site. In data analysis the basic unit one tracks through time is the component, not the field-numbered site. Chamblee's revised database dramatically enhanced our ability to retrieve usable information quickly.

The GIS employed digital elevation data, our component shapes and locations, and database data. Chamblee constructed it in 1999 after the field season ended and digitized every component. The GIS topography comes from an Instituto Nacional de Estadística, Geografía, e Informática (INEGI) digital elevation model. The two main advantages of the GIS were that it gave us accurate regional settlement pattern maps (including measurements of component areas) within six months of leaving the field and it made analysis more efficient.

After each day in the field crew members entered their site, UTM, artifact, and architectural information in the database. They made photocopies of their field notes and vuelta maps. The master vuelta map was kept up. Three sets of the six 1:50,000 topo sheets were hung on the walls. One was a site map, another was for off-site features, and the last and psychologically most important showed the progress of the surveyed area—a red blob that grew steadily outward.

Each site had a file folder, filed alphanumerically. The first item in the folder was a page-size photocopied portion of the topo sheet showing the outline of the site. Each component's shape was shown in colored pencil: green for Cruz, blue for Ramos, orange for Las Flores, and red for Natividad, with different shades for phases of these periods. The color coding was not trivial because the same scheme was used in analysis and GIS work. The second page in the site folder was a site summary report from the database. Then followed copies of the field notebook pages and architectural sketches. Lithic and ceramic forms were added when those materials were tabulated. Updated forms were added to folders but the originals were kept.

Roberto Santos and Laura Stiver Walsh inked the architectural sketches to standard form. Later in Atlanta, Charlotte Smith stretched and jiggled the drawings to fit the INEGI air photos. Note that although the final drawings (as in Figures 2.10, 5.52, and similar figures) convey a good sense of the site and have a high-quality, finished appearance, they are based on rapid sketches made with compass and pacing, without the benefit of air photos in the field, and are sometimes incomplete because many architectural features are plowed or eroded away.

Artifact collections were all washed, tabulated, and repackaged for curation while we were in the field. Balkansky did the bulk of the ceramic classification but everyone participated; Stiver Walsh contributed greatly and Kowalewski looked at most of the collections. Collections were often reviewed and discussed. Field crews benefited from quick feedback on ceramics. Later Roberto Santos and Naoli Lona drew and Smith photographed selected sherds.

Projects must design procedures to catch and correct errors. Errors included missing data, bad data, duplicate numbers, failure to update information, data linked to site but not component, different entries in database and GIS, failure to use current version, and introduction of new errors when making corrections. The sooner errors are corrected the better because if they hang around they tend to multiply. Many persistent errors came from sites where there were problems with the original data recording in the field. Sites shared by two map sheets, two crews, two jurisdictions, or apparently any two entities seemed to breed errors. Survey of new areas should not be undertaken in the last few days of a field season, because the haste to finish too often leads to incomplete recording. The lesson is to catch problems the day they are born. At the lab in Athens, Georgia, we kept a lab log in an attempt to head off errors.

We went through three main bouts of error-checking in which every site was reviewed. The first was a check of the database during the fieldwork. This enforced standard entry, filled in missing information, and resolved inconsistencies at a time when all the crew was present. The second bout was in Tlaxiaco at the end of the field season. This focused on confirming that all component sizes and shapes were consistent on maps, on collection forms, in notes, and in the database. The third round of checking took place in Athens after the GIS was completed. In that phase we reviewed each site folder; assigned the intrasite population density levels for each component; reconciled component areas in field notes, database, and the GIS;

and checked all the GIS component shapes, locations, and labels. At this point the database was updated to calculate the population estimates.

Further improvements should be made. Analysis would benefit if more data were accessible by the database and GIS. We still rely on the paper folders for analysis. In the future, surveyors should type the full text of field notes each day (paper notes are still superior to digital notes while on site). Digital images should be linked to the database and GIS. We also need to define component dates and areas and assign attributes to components earlier in the process.

Population Estimates

The purposes of estimating the population of archaeological sites are to allow comparison and to permit quantitative analysis using best approximations of population sizes. We estimated past populations component by component using methods comparable to other systematic regional surveys in highland Mesoamerica (Sanders et al. 1979:38–39; Blanton et al. 1982:11; Kowalewski et al. 1989:35; Stiver 2001: 54–58). Population estimates were determined by two variables: component area and estimated habitation density. Densities were not based on sherds because surface-artifact densities are mostly determined by depositional and visibility factors. Instead we made judgments in the field based on a broad range of factors. Most sites (compact low-density villages) are assigned a density of 10 to 25 persons per ha; lowest-density scattered settlements are assigned 5 to 10 per ha. For isolated residences we use 5 to 10 persons.

Many modern villages in our study area are dispersed. We selected ten for a study of habitation density (Tidaá, Nejapilla, Nuñu, Diuxi, Anama, San Juan Achiutla, Atoyaquillo, San Miguel Achiutla, Tlatayapam, and Huendio). We measured their areas from air photos and obtained their 1970 populations from official INEGI censuses (which may be undercounted in these small places; Kowalewski 2003b). The range is 2.4 to 9.4 persons per ha with an average of 5.9. Although there may be problems with these data, it appears that modern dispersed villages in the Mixteca Alta are within the range of 5 to 10 persons per ha that is used by archaeologists for lowest-density scattered villages.

Residential terraces increased settlement densities dramatically. A sample of ten completely terraced sites from the Valley of Oaxaca where populations were estimated from house counts multiplied by 5 to 10 persons per house yields an average range of 69 to 138 persons per ha. A sample of six sites from Teposcolula has an average range of 50.25 to 100.50 persons per ha. A sample of four from the 1999 project area yields an average of 70 to 140 persons per ha. Three sites in the Valley of Oaxaca intensively mapped by Feinman and Nicholas (2004) have varying densities of terraces: El Palmillo and the Mitla Fortress were heavily terraced and have population estimates based on house counts of 46 to 92 and 54 to 107 persons per ha; Guirún, with much of its area unterraced, has a range of 24 to 49. In this report we use a range of 50 to 100 persons per ha for those portions of sites that were covered by residential terraces.

Sometimes different places within site components may have different densities. If so, we apportioned the total component area into fractions. These subareas were multiplied by one of three density ranges. The component population estimate is the sum of the high and low ranges for the subareas. For example, a settlement of 21 ha might have consisted of 3 ha with residential terraces, a compact low-density area of 8 ha, and a scattered lowest-density area of 10 ha. For the low end of the range the calculation would be (3 ha × 50 persons/ha) + (8 ha × 10 persons/ha) + (10 ha × 5 persons/ha) = 280 persons. The result for the high end would be 600 persons. The average estimate, a figure we often use for convenience in comparisons, is (280 + 600)/2 = 440 persons. We occasionally assigned other densities depending on specific circumstances.

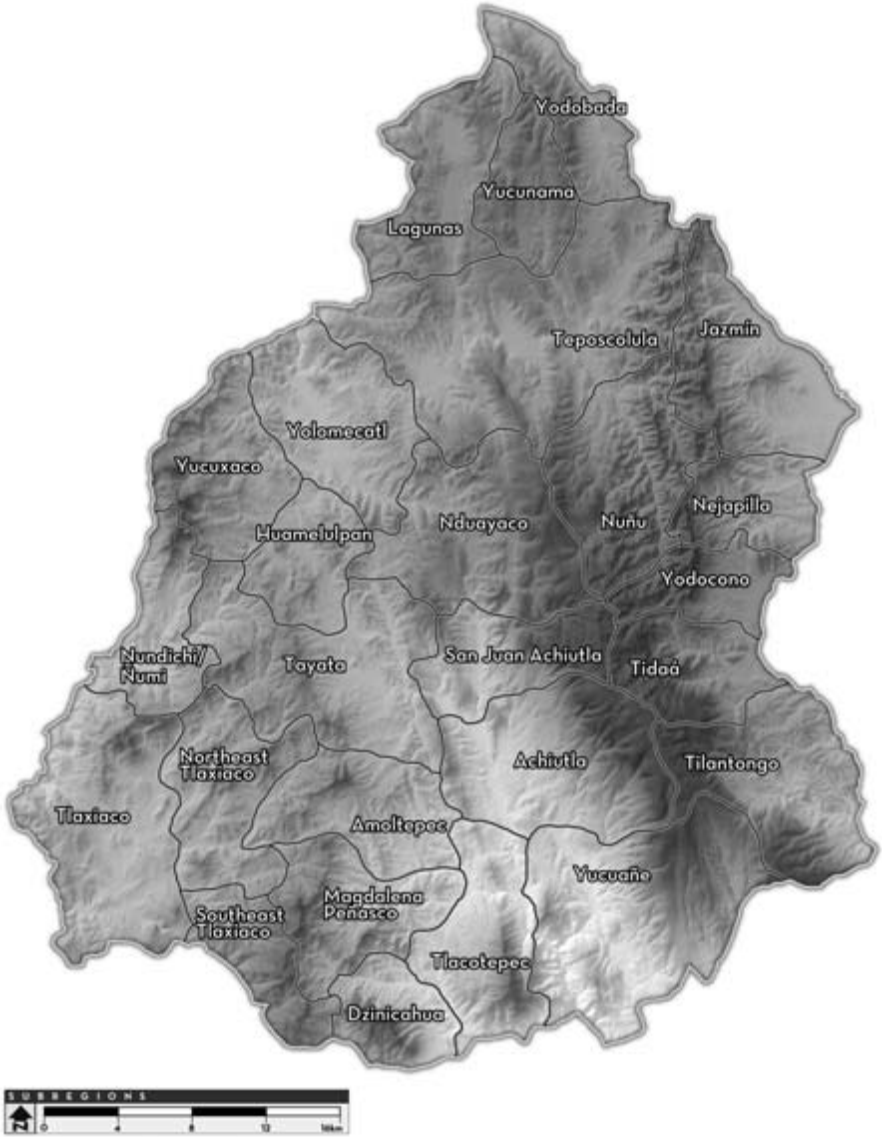
Terminology

In this book "macroregion" refers to multiregional areas and their social systems up to the scale of Mesoamerica. We use "region" to refer to physical or social phenomena covering thousands of km^2, such as the Valley of Oaxaca or the Mixteca Alta. "Subregions" are smaller behavioral and physiographic regions. These subregions reflect the fragmented Mixteca Alta landscape. Most are small valleys partially enclosed by mountains and definable by watersheds or drainages. They are multicommunity places and the smallest unit that encompassed a potentially autonomous polity, the ñuu. They often correspond to today's municipios. Subregions are our descriptive units in Chapters 2–6. Our combined study area, the Central Mixteca Alta (Huamelulpan, Teposcolula, and the 1999 project area), is made up of twenty-six subregions (Figure 1.11).

"Localities" as physiographic places are small enough (a few km^2) to be fairly homogeneous environments such as a small tributary valley; socially they might be the places of a single nucleated settlement and its immediate catchment or a small cluster of dispersed settlement.

A "site" is a place that has evidence of past human use. A "component" is the phase-specific use of a site. In highland Mesoamerica sites are bounded. We use the 100-meter rule for separating sites and components: an unoccupied space of more than 100 m between contemporary prehispanic occupations means two components.

Site designations have letters indicating district, municipio, and agencia (see Table 1.1). These we call "field-numbered sites." (This scheme was mandated by INAH in the 1970s, and highland Oaxaca survey projects have followed it ever since.) Within each agencia, site numbers only roughly follow the order of their discovery as we often had several crews working independently in the same jurisdiction on the same day. There are unused numbers—this is meaningless. We made sure that the last three letters (the agencia prefixes) were unique with no duplicates. Sites can be referred to just by the agencia and number, so GPE 1 is the same as TLA-PMY-GPE 1. Lowercase Roman numerals, as in Late Ramos SAT 9ii, refer to components of the same phase separated by a distance of more than 100 m in the same field-numbered site.



1.11 The subregions of the Central Mixteca Alta study area.

We use "hamlet" (roughly 10–100 inhabitants) and "small village" and "large village" (100–500, 500–1,000) as convenient terms to describe settlement size with no technical or culturally specific meaning implied. Likewise a "town" had more than 1,000 people and usually some diversity in central place functions. "*Ranchería*"

is a good term for dispersed settlement, either multiple isolated residences or low-density hamlets or villages.

Certain architectural terms have meanings that must be made explicit. A "structure" (Str.) is a stone or earthen mound that was a platform for a building. A "stone foundation" (S.F.) is the remains of a building at or above ground level in the form of stone walls or floors. "Plazas" (P.) are architecturally defined, flat, open public spaces. A "terrace" (T.) is a flat or gently sloping space created on a slope by filling behind a retaining wall or cutting into the slope. We distinguish between these and agricultural terraces, which may be contour terraces on a hillside or terraces built across a drainage (lama-bordos).

In practice, keeping to these innocent definitions was not always straightforward. Terraces could blend into platforms or structures. Plazas were not always distinguishable from terraces and some open spaces no longer architecturally defined might have been plazas. Distinguishing rock piles, structures, and stone foundations with consistency could keep a tired sherd dog awake at night.

Limitations

This project is a regional surface survey and is subject to the advantages and the limitations of studies at that scale. The grain of the data is coarser than that of single-site studies or excavations but the aim is broad regional and broad temporal coverage, which other methods cannot provide.

Chronological precision is rougher than we would like. Most surveys and many excavations in Mesoamerica deal with change on the ca. 300-year scale. We have difficulty dividing the Postclassic period, which is perhaps 700 years long, into phases that can be distinguished with surface collections. Ceramic dating in more remote areas may not achieve chronological distinctions even to that scale because pottery in marginal areas tends to be undecorated and sometimes the sample sizes are small.

Our information does not cover all of culture. We are not in a position to write a full social history of the Mixteca Alta. Our contribution is based in settlement patterns, a fundamental starting point. We can add a few things about economy, political institutions, social organization, warfare, and ceremonial observances. The interpretations in this volume are often hypotheses that push the data to or beyond their limits. They require further testing with other kinds of information.