Economies and Polities in the Aztec Realm

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Rural Economy in Late Postclassic Morelos

An Archaeological Study

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What was life like in the rural communities of Central Mexico in the Late Postclassic period? How were these communities affected by their conquest and incorporation into the Aztec empire? Our recent archaeological fieldwork in the modern Mexican state of Morelos, Mexico, provides new information on the nature of peasant households and communities in a provincial area of the Aztec empire. We recovered evidence for a densely settled, socially complex rural landscape. Elites lived at both rural and urban sites; craft production and intensive agriculture were prominent activities, and marketplace exchange with near and distant areas was commonplace. In this paper we explore these and other economic issues as documented by the Postclassic Morelos Archaeological Project,an excavation-based study of socioeconomic conditions among rural[1] households at the sites of Cuexcomate and Capilco in western Morelos. After presenting information on householdeconomy, we explore the implications of these data for some of the important issues in the analysis of Aztec economics, including the role of population growth, the effects of imperial conquest, and the degree of centralized political control over economic activities.

EXCAVATIONS AT CAPILCO AND CUEXCOMATE

The Postclassic Morelos Archaeological Project excavations at Capilco and Cuexcomate were conducted in part to investigate the possibility of rural social complexity in this region. Ethnohistoric documents and prior archaeological research suggested that western Morelos had dense rural populations that were well integrated into Aztec-period exchange networks (see Smith, chap. 12). Capilco and Cuexcomate, located about 20 km southwest of the large urban center of Quauhnahuac (Cuauhnahuac; see chap. 1, fig. 1.2), were first investigated by Kenneth G. Hirth's (1994) Xochicalco Mapping Project. This preliminary research revealed a high surface visibility of Late Postclassic residential architecture and significant variability in structure-based artifact collections.

Capilco and Cuexcomate were excavated in 1986 with a research design intended to gather data on household social and economic conditions, residential architecture, and community organization (fig. 13.1). Among the specific topics of investigation were the presence and role of rural elites, the nature of socioeconomic variation among households, the nature of economic activities and conditions, and the impact of Aztec conquest on provincial society (Smith 1992). House foundations at these sites were visible on the surface, and random samples of houses were tested at each site to investigate site-wide patterns of

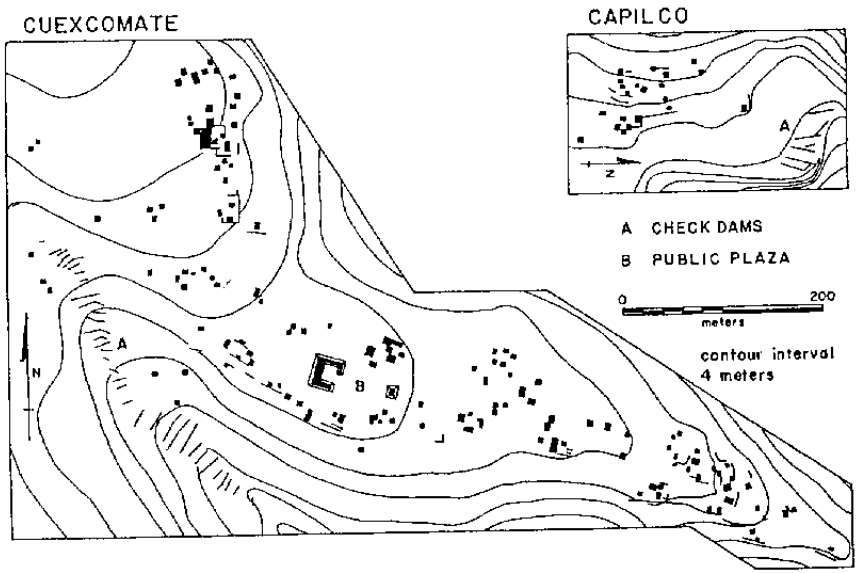

Fig. 13.1. Maps of Capilco and Cuexcomate.

variability. Selected houses were cleared completely, including large exterior areas, in order to address the issues of domestic conditions and activities in greater detail. Also, a number of nonresidential structures and features were excavated, among them a temple-platform, possible granaries, ritual deposits, and agricultural terraces. The excavations and architectural remains are described in detail in Smith (1992); preliminary discussions may also be found in Smith et al. (1989).

Three chronological periods are represented at Capilco and Cuexcomate. The Temazcalli phase (A.D. 1200-1350) is present in only two refuse deposits at Capilco. The Early Cuauhnahuac phase (abbreviated here as "EC") dates to A.D. 1350-1430, and the Late Cuauhnahuac phase ("LC") follows from A.D. 1430-1550 (see Smith and Hodge, chap. 1, fig. 1.3). Both sites were abandoned early in the Spanish Colonial period, probably in response to Spanish administrative decree. The chronology is based upon radiocarbon dates, stratigraphy, and quantitative ceramic seriation (see Smith and Doershuk 1991).

ENVIRONMENTAL AND SOCIAL CONTEXT

The Environmental Setting

Cuexcomate and Capilco are located 3 km apart near the ruins of the large Epiclassic city of Xochicalco. Today precipitation is adequate for *temporal* (nonirrigated) agriculture (900 mm per year), but the thin rocky soils around the sites limit agricultural productivity in the area. Hirth (1994) estimates the average yield of traditional nonmechanized farming in the immediate area (prior to the use of industrial fertilizers) to have been approximately 550 kg of maize per hectare. The sites are situated at the southern extreme of a large Plio-Pleistocene alluvial fan known as the Buenavista Lomas (part of the Cuernavaca Formation; see Fries 1960). Because the lomas are cut by numerous, deeply entrenched, seasonal streams, the amount of level land for cultivation is limited. Only a few very small tracts of land along the Tembembe and Cuentepec Rivers can be irrigated, in contrast to other parts of Morelos where Late Postclassic irrigation along the major rivers was extensive (Maldonado 1990; Smith, chap. 12).

During the Epiclassic period (A.D. 750-950), the agricultural heartland of Xochicalco was oriented to the south rather than north into the Buenavista Lomas (Hirth 1994). The lomas supported only a few scattered settlements throughout most of the Prehispanic epoch until the Cuauhnahuac phase, when a major colonization of this area took place. Settlement of this marginal zone became

possible with the construction of extensive systems of agricultural terraces of both the contour and cross-channel varieties. Thus, Cuexcomate and Capilco are located in a marginal environment without great agricultural potential.

Apart from agricultural production, other significant local economic resources include a low-grade chert used for tools, which occurs in nodules in the limestone of the adjacent Xochicalco Formation (Fries 1960), and abundant wild fig trees *(amate)* from which bark could be removed for the manufacture of paper (*amate* pollen was recovered, as were tools for papermaking). The vertisol soils provide suitable clays for a ceramics industry (jars and *comals* are made in the nearby village of Cuentepec today), but there is no direct evidence for ceramic manufacture at any of the Cuauhnahuac phase sites in the area (see Goodfellow 1990). Vesicular basalt for the manufacture of metates and other groundstone tools could have been obtained from Real del Puente, about 5 km east of Cuexcomate.

Demography

A massive population growth between the Temazcalli and EC phases in western Morelos had important effects on economic organization. There are several types of evidence for this population explosion. On a regional scale, the number of occupied sites located by Hirth's Río Chalma survey southwest of the study area jumps markedly between Temazcalli and EC times (Hirth, unpublished notes). Surface survey and mapping in the Buenavista Lomas by Osvaldo Sterpone (1988), Scott O'Mack (1991), and Michael E. Smith confirm extensive Cuauhnahuac phase occupation with few earlier sites apparent.

At the level of individual sites, demographic reconstructions for Cuexcomate and Capilco show significant population growth at this time (table 13.1). The population estimates in table 13.1 are based upon occupation patterns extrapolated from the random sample of houses at the two sites; the estimates use household size constants of 5.5 persons per house for commoners (Kolb 1985) and 11 persons per house for elite residences (see Smith [1992:335-345] for a full discussion of the demographic data and methods). Capilco was first settled in the Temazcalli phase and continued to grow throughout the final three prehispanic phases. Cuexcomate, on the other hand, was occupied initially in EC times and rapidly grew into a minor town center of 800 persons. When the phased occupation patterns at the excavated sites are applied to unphased Middle/Late Postclassic sites located by Hirth in a 6 km^2 area around Xochicalco, the reconstructed population levels for the Temazcalli, EC, and LC phases are 460, 1,690, and 4,000 persons respectively. These data suggest very rapid rates of population growth in the immediate vicinity of Cuexcomate and Capilco: 1.6% annually between the Temazcalli and EC phases, and 1.0% annually between the EC and LC phases (Smith 1992).

Table 13.1 Demographic data for Capilco and Cuexcomate

Context	Phase		
	Temazcalli	Early Cuauhnahuac	Late Cuauhnahuac
Number of Houses			
Capilco (nonelite)	5	13	21
Cuexcomate: elite	--	4	7
Cuexcomate: nonelite	--	35	132
Number of Persons			
Capilco (nonelite)	28	72	116
Cuexcomate: elite	--	44	77
Cuexcomate: nonelite	--	193	726
Cuexcomate: total	--	237	803
Settlement Area (hectares)			
Capilco	0.14	0.60	1.15
Cuexcomate	--	9.94	14.58
Population Density (persons per hectare)			
Capilco	197	121	101
Cuexcomate	--	24	55

Rural Society

At the time of Spanish conquest, western Morelos was divided into a number of small city-states, all subject to the larger conquest-state of Quauhnahuac (Maldonado 1990; Smith, chap. 12). The city-state capitals nearest to Cuexcomate and Capilco were Cohuintepec (near modern Cuentepec) to the northwest, Miacatlan to the southwest, and Acatlipac to the east. We do not know, however, to which polities the excavated sites pertained. In spite of high population densities (over 600 persons per km^2 for the region in the LC phase) the immediate area around Cuexcomate and Capilco can be considered rural in the Cuauhnahuac phase because of a lack of cities (see note 1). In fact much of western Morelos outside of the city of Quauhnahuac (estimated population of 67,000) was rural in character since the major "urban" settlements, the city-state capitals, were quite small in size (Mason 1980; Smith, chap. 12).

Capilco was a small settlement (fig. 13.1) which grew from a tiny hamlet in the Temazcalli phase to a village of around 100 persons in LC times (table 13.1). Cuexcomate was first occupied in the EC phase and from the start was a much larger and more complex settlement containing an elite residential compound, a modest temple platform, and a central public plaza (fig. 13.1). Smith suggests elsewhere (Smith 1992) that its rapid growth was due to the presence

of an elite group in EC times, which probably attracted further commoner settlement (although by what means is not clear). The elite resided in a large, distinctive compound (patio group 6) with a plan similar to the standard Aztec palace layout identified by Susan Evans (1991). The inhabitants of patio group 6 are classified as elite on several bases: the large size of their residence; the high energetic cost of its construction; the architectural distinctiveness of the compound relative to other houses and house groups (e.g., raised rooms, ample use of lime plaster); its resemblance to the Aztec palace plan; its location on the public plaza; and the distinctiveness of its artifactual inventories, which generally have higher frequencies of imported and decorated ceramics than other houses (see discussion in Smith [1992]). Patio group 6 and several other groups are illustrated in figure 13.2.

In the LC phase, population growth continued at a somewhat slower rate, and a general decline in the standard of living occurred. Patio group 6 was abandoned, and the more modest patio group 7 was built on an adjacent side of the public plaza, probably as an elite compound. Although far less imposing or distinctive than its predecessor, patio group 7 still stands out relative to contemporaneous houses in terms of its architecture and artifacts (fig. 13.2).

If we make the reasonable assumption that the Cuexcomate elite resembled the ethnohistorically documented rural nobility of Morelos (e.g., Carrasco 1976; Smith 1993a), then this class probably controlled most if not all of the land in the immediate vicinity of the sites. Commoners would have been under the control of these elite, paying them tribute in goods and services. Rural commoners were probably members of the residential units known as *calpulli*. In contrast to Zorita's (1963) well-known view of the *calpulli* as an egalitarian, land-holding kin group that was outside of noble control, the Morelos *calpulli* were controlled by nobles who owned the land and extracted tribute from the commoners (Carrasco 1976; Smith 1993a).

PRODUCTION

Agriculture

The bulk of the diet at Cuexcomate and Capilco was from agricultural crops. Faunal remains are scanty, suggesting that animal protein contributed little to the diet. The majority of the nonhuman bones are turkey, dog, and rabbit, with a minor contribution from deer and various small mammals and reptiles. Pollen studies show the presence of a number of wild economic species, but there are also traces of many domesticates in the household middens. Prominent domes-

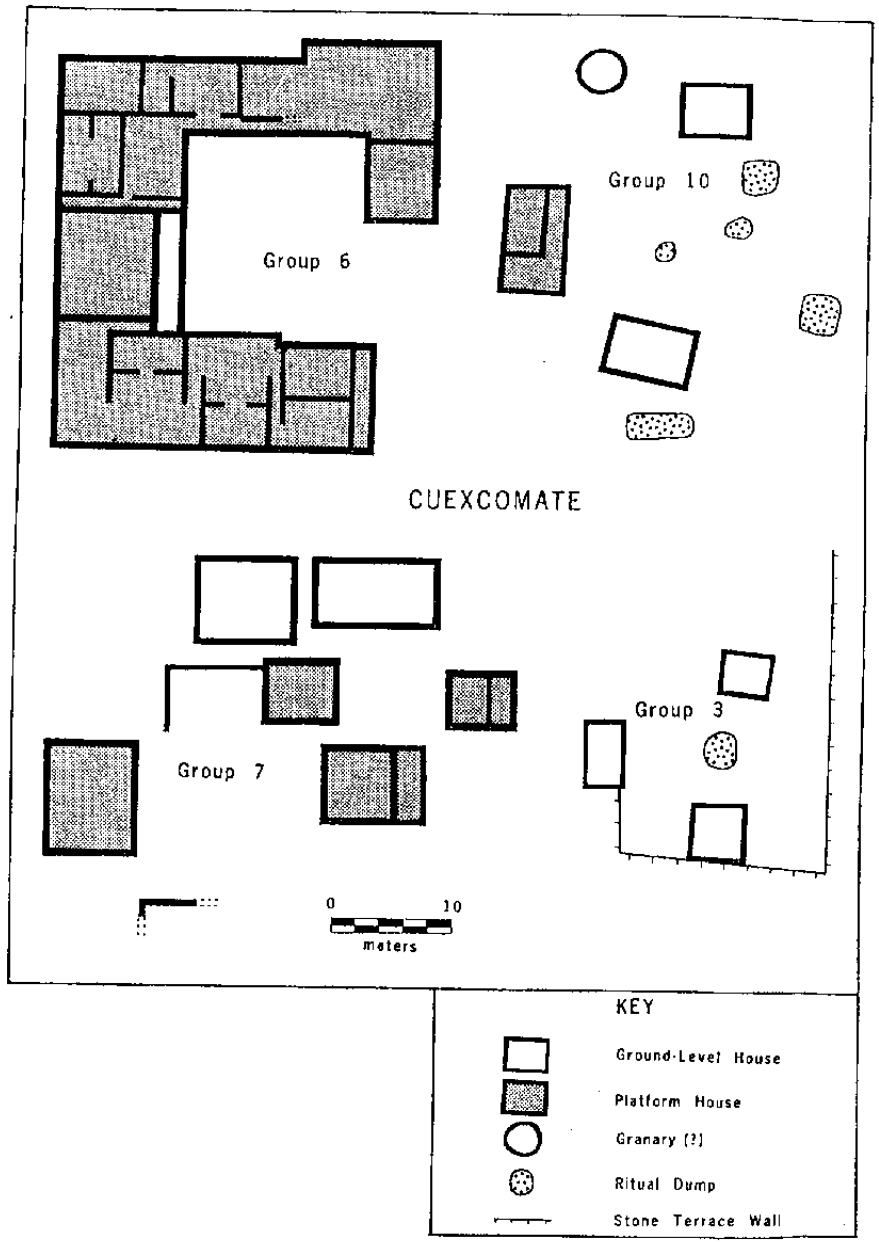

Fig. 13.2. Selected patio groups at Cuexcomate. Patio groups 6 and 7 were the elite compounds in the Early Cuauhnahuac and Late Cuauhnahuac phases respectively.

ticates include maize, tomato, squash, avocado, and several arboreal fruits (Amie Limón, personal communication). Although no cotton pollen was recovered, the cultivation of cotton can be inferred from the abundance of cotton spinning artifacts at the sites (see below). Extensive flotation of midden sediments yielded only a few beans and maize kernels due to poor conditions of preservation (Virginia Popper, personal communication).

Both excavated sites are associated with areas of stone agricultural terrace walls (Price 1988). There is a small area of alluvial fields created by cross-channel terraces (also known as check-dams) just north of Capilco, and a small drainage on the southwest side of Cuexcomate is crossed by over 30 of these terraces (fig. 13.1). Excavations and sediment analyses show that the stone walls were built up gradually over a long period of time. In one case, a short wall was built and the terrace filled in fairly rapidly by natural transport with turbulent stream flow. The wall was breached, causing a major erosion gully that was subsequently filled in again. After this, the terrace went through a long period of gradual enlargement, leading to the expansion of the cultivated field through continuous deposition by gentle stream flow. Soil analyses reveal the presence of at least two buried topsoils with elevated concentrations of organic matter and available phosphorus, coupled with a condition of general nutrient depletion in the terrace soils relative to surrounding soils; these findings provide strong evidence that these terraces were indeed farmed in the past. Artifactual remains date the terraces to the Cuauhnahuac phase in general, and one carbon date with a calibration curve intercept of A.D. 1476 (ETH-6309) dates the period of gradual expansion to the Late Cuauhnahuac phase (see Price and Smith [1992] for further discussion and Sandor et al. 1990 for discussion of terrace archaeology).

In addition to the cross-channel terraces, there are extensive zones of contour terracing in this area. The hillslopes that surround Cuexcomate on three sides are covered with abandoned terraces, which come up to the edge of the settled area. Both types of terraces were needed by the expanding Late Postclassic populations. A preliminary reconstruction of carrying capacity in the area around Xochicalco (Price and Smith 1992) suggests that dry farming on flat areas (without terraces) could support only about 1,200 persons in a 6 km^2 area, a population level passed by EC times (see above). The productivity of terrace agriculture has yet to be modelled for this area, but it seems likely that the extensive Cuauhnahuac phase terraces (coupled with dry farming) would have been capable of producing enough maize to support the local population as well as to fulfill regional- and perhaps imperial-level tribute requirements.

Craft Production

A number of different craft products were manufactured in domestic contexts at Cuexcomate and Capilco as evidenced by production tools (ceramic spindle whorls and spinning bowls, worked sherds, basalt polishing stones and bark beaters, and copper tools), production byproducts (chert debitage), and other materials (paint stones). Quantitative data on these artifacts are listed in table 13.2, which presents mean values for various social categories by phase.[2] These social categories are Capilco houses (column A), Cuexcomate nonelite houses (column B), and Cuexcomate elite houses (column C; these are patio groups 6 and 7 in the EC and LC phases respectively).

Table 13.2 Mean values of craft production measures

Category	Temazcalli	Early Cuauhnahuac			Late Cuauhnahuac		
	(A)	(A)	(B)	(C)	(A)	(B)	(C)
No. of houses[a]	2	5	3	4	9	22	4
Ceramics (percentage of all vessels and artifacts)							
Spinning bowls	2.6	4.2	5.6	3.7	6.2	5.5	4.7
Spindle whorls	0.1	1.3	2.9	1.1	2.7	2.2	1.3
Worked sherds	0.2	0.2	0.4	0.1	0.1	0.4	0.5
Other (frequency per 1,000 sherds)							
Chert	7	3	14	9	5	13	7
Polishing stones	.22	.16	.31	.10	.22	.39	--
Bark beaters	.22	.10	--	--	.09	.08	--
Paint stones	--	.03	.10	.38	.13	.26	.53
Copper tools	.12	.10	.21	--	.03	.06	--

Note: Column headings represent types of social contexts as follows: (A) nonelite houses at Capilco, (B) nonelite houses at Cuexcomate, and (C) elite houses at Cuexcomate.

[a] Number of excavated residential middens for each social context.

By far the most widespread and intensive craft activity was *cotton spinning*. Ceramic spindle whorls and spinning bowls were found in every excavated domestic context. Frequencies of spinning artifacts among individual houses are illustrated graphically in figure 13.3. These graphs (and table 13.2) show little difference between elite and nonelite contexts in cotton spinning, although the elite means are lower than the nonelite means at Cuexcomate. The major change through time was an increase in spinning artifacts at Capilco (table 13.2). Cotton textiles were important items of trade and tribute (Berdan 1987; Smith and Hirth 1988; see Hicks, chap. 4), and much of the textile production was probably destined for export. Similar patterns of abundant whorls and spinning bowls are reported for almost all known Late Postclassic sites in western Morelos (e.g., Smith and Hirth 1988).

Evidence for other types of craft production is far less visible when compared with that for cotton spinning. *Chert tools* were manufactured at

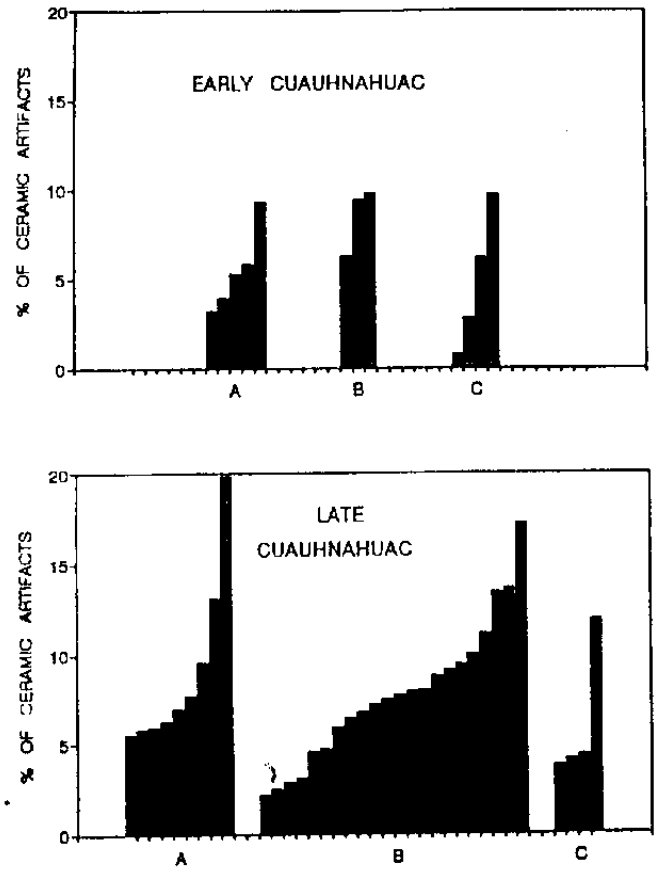

Fig. 13.3. Frequencies of cotton spinning artifacts. Data are from domestic middens for the EC and LC phases. Each bar represents a single house, and the bars are grouped in three categories: *(A)* nonelite houses at Capilco; *(B)* nonelite houses at Cuexcomate; *(C)* elite houses at Cuexcomate.

both sites from locally-available stone, but overall, frequencies of chert artifacts are low (table 13.2). The major material for lithic tools was imported obsidian (see below). Chert tool production debris is found in many deposits, which suggests scattered domestic manufacture. *Basalt polishing stones* are rare but widely distributed artifacts (table 13.2), recovered from 90% of the houses with large samples of excavated midden (over 4 m^3).[3] We do not know what function they served, but these smoothed stones were probably a

tool in some sort of craft activity. *Worked sherds* (round disks and other shapes) are rare, enigmatic artifacts that may have been used in some phase of craft production—smoothing ceramic vessels is a possibility although we have no other evidence for ceramic production (see below).

The manufacture of *paper* from the bark of the *amate* tree is indicated by the presence of grooved, rectangular, basalt tools commonly known as "bark beaters." Although these tools are quite rare (table 13.2), they do occur in 70% of the houses with large samples of excavated midden, suggesting that paper production was widespread among households. *Copper and bronze artifacts,* while not common, are broadly distributed among domestic middens (table 13.2). Most of these artifacts are tools, such as needles, chisels, and awls. Jewelry and other nonutilitarian objects are not included in calculations for table 13.2. The needles were probably used with textiles, and the chisels and awls may have been used in woodworking (Dorothy Hosler, personal communication).

Mineral paint pigments are another uncommon artifact found in midden deposits. Three colors are represented: red (hematite), yellow (limonite), and black (graphite). Of all types of evidence for craft manufacture, these items show the highest degree of spatial concentration and the strongest association with elite contexts (table 13.2). Paint stones have a minor positive association with elite contexts in both Cuauhnahuac phases. In the EC phase, four of the 12 examples of paint stones (33%) are from the elite patio group; in the LC phase, two of the 43 examples (5%) are from the elite compound and another 28 paint stones (67%) from one single house group, patio group 10. Patio group 10 is not an elite compound (based on a number of architectural and artifactual indicators), but its intensive use of paints could have been in the service of the LC elite who resided nearby. These pigments could have been used to paint manuscripts on bark paper (group 10 also has a large number of bark beaters), an activity associated with the nobility in Late Postclassic Central Mexico (Boone 1994).

Ceramic vessels and obsidian tools are the most abundant artifacts at both sites, but we have no evidence that these goods were produced at either one. Goodfellow's (1990) reconstruction of regional ceramic production and exchange suggests that multiple production centers served Cuexcomate and Capilco, but the locations of production centers have yet to be identified on the ground. Obsidian is quite abundant (we recovered over 12,000 pieces in total), but there is almost no evidence for the production of blades or other tools (Sorensen 1988). There is a production locale or workshop for prismatic blades at the nearby site of El Ciruelo from which the inhabitants of Capilco and Cuexcomate may have obtained their obsidian blades (Sorensen et al. 1989).

EXCHANGE

All three of the major Aztec-period Central Mexican exchange mechanisms—tribute, long-distance trade, and market trade—operated in Morelos. The multilevel tribute system involved payments to local lords, to *tlatoque* at one or more levels, and to the Aztec empire. Merchants from Quauhnahuac traded as far away as Xoconochco, and *pochteca* from the Basin of Mexico traded in the small towns of western Morelos. Markets were common at all levels of the political hierarchy: Quauhnahuac had a large market, many or all city-state capitals had markets, and even some smaller towns held periodic markets (see Smith, chap. 12, for the ethnohistoric evidence for this description). Given the existence of multiple exchange systems and the high rural population density, it is not surprising to find a high frequency of imported goods at the excavated houses.

Frequencies of the three major imports—ceramics, obsidian, and copper—are listed in table 13.3. Two patterns in these data stand out: the large number of imports and their extensive distribution among households. Averaged over all houses, imported ceramics constitute 11.7% of all domestic vessels in Temazcalli phase houses, 11.2% in EC phase houses and 8.3% in LC phase houses. Most of these imports come from the Basin of Mexico. Imports from other parts of Morelos, primarily from the Cuernavaca area, are also common, with some sherds from the Yauhtepec area and eastern Morelos. There are a few sherds from Cholula, the Mixteca, Guerrero, and the Toluca Valley, mainly in EC phase contexts. The decline in frequency of imported ceramics from EC to LC times

Table 13.3 Mean values of imported artifacts

Category	Temazcalli	Early Cuauhnahuac			Late Cuauhnahuac		
	(A)	(A)	(B)	(C)	(A)	(B)	(C)
Ceramics (percentage of all vessels and artifacts)							
Aztec salt vessels	2.4	2.6	3.5	3.8	2.7	4.4	4.4
Aztec III bowls	--	0.8	2.6	5.3	0.7	1.5	2.9
Aztec spinning bowls	0.5	1.7	1.9	1.3	1.6	1.6	2.7
Other Aztec types	0.1	0.3	1.1	0.3	1.2	0.2	--
Total Aztec imports	3.0	5.4	9.1	10.7	6.2	7.7	10.0
Morelos imports	8.6	3.1	0.3	3.0	1.7	0.4	0.9
Other imports	0.1	0.4	0.3	0.9	0.2	--	--
Other (frequency per 1000 sherds)							
Obsidian	15	20	32	38	21	45	24
Total copper	.22	.32	.21	.10	.20	.10	--

Note: Column headings represent types of social contexts as follows: (A) nonelite houses at Capilco, (B) nonelite houses at Cuexcomate, and (C) elite houses at Cuexcomate.

primarily occurs in types from the Cuernavaca area (table 13.3). During the LC phase, however, it is not possible to distinguish the polychromes of the Cuernavaca area from those of western Morelos (unlike the situation during earlier phases), and this "decline" in imports from other areas of Morelos (e.g., Cuernavaca) may be more apparent than real.

Nearly all of the obsidian recovered is of the green variety from the Pachuca source area. Domestic inventories average between 30 and 40 pieces per 1,000 sherds; the figures for ceramic vessels (not sherds) are closer to 20 pieces of obsidian per 100 vessels. Obsidian density in domestic middens averages between 25 and 50 pieces per m^3.

Not only were imports abundant, they were also widely distributed. Every excavated house had some Aztec (Basin of Mexico) ceramics, and all but one had obsidian. Copper artifacts (tools and ornaments), although rare, were also widely distributed—present in 80% of the houses with extensively excavated midden deposits (see note 3). Although the elite houses had higher frequencies of some imports (e.g., Morelos ceramic imports in the EC phase, and Aztec III bowls in both EC and LC phases), they did not by any means monopolize these goods.

In sum, rural households at Cuexcomate and Capilco were well integrated into regional and long-distance exchange networks. Exotic goods were normal components of domestic utilitarian inventories, and a number of goods produced by these households (textiles and bark paper at least and probably agricultural goods as well) were destined for export at either the local, regional, or long-distance levels. The lack of any apparent elite monopolies suggests that exchange was most likely independent of elite control, but this is difficult to establish securely with our data.

CONSUMPTION

Evidence for elite-commoner differences in consumption practices is surprisingly scarce. No artifact categories, apart from architecture, show an exclusively elite association. Perhaps the strongest a priori candidates for sumptuary goods are luxury items of personal adornment, but none of the 19 examples of jewelry (jade beads, obsidian lip plugs, and shell pendants) were recovered in elite contexts. A number of ceramic categories do show statistical associations with the elite residences in each phase, but these are far from exclusive associations.

Based upon the cross-cultural validity of household possessions as wealth indicators (Smith 1987a), two artifactual indices were constructed to study variability among houses in wealth levels. For the first index, the architectural distinctiveness

Table 13.4 Mean values of wealth indices and ceramic markers of wealth

Category	Temazcalli	Early Cuauhnahuac			Late Cuauhnahuac		
	(A)	(A)	(B)	(C)	(A)	(B)	(C)
Wealth indices							
Index 1	--	-1.26	-5.03	3.83	-.50	-.77	3.11
Index 2	51.4	43.3	43.0	62.5	37.2	34.5	48.3
Ceramic types (percentage of all vessels and artifacts)							
Morelos imports	8.6	**3.1**	**0.3**	**3.0**	1.7	0.4	0.9
Other decorated bowls	4.0	**2.9**	**0.3**	**3.5**	1.7	0.7	0.2
Total bowls	48.4	**46.7**	**38.4**	**50.1**	**41.1**	**39.3**	**42.5**
Aztec III bowls	--	**0.8**	**2.6**	**5.3**	**0.7**	**1.5**	**2.9**
Polished red bowls	10.8	**4.5**	**5.5**	**12.9**	**4.5**	**7.2**	**9.9**
Tlahuica polychrome	11.6	15.6	10.2	8.9	**12.5**	**6.2**	**8.7**
Incense burners	2.6	3.3	6.1	3.7	**3.1**	**3.2**	**4.7**

Notes: Column headings represent types of social contexts as follows: (A) nonelite houses at Capilco, (B) nonelite houses at Cuexcomate, and (C) elite houses at Cuexcomate.

Bold figures denote the five phase-specific wealth indicators for each phase that were used in the calculation of wealth index 1.

of patio groups 6 and 7 was inferred to signal the presence of elite groups in the EC and LC phases respectively. Five ceramic variables or types were chosen that best differentiated the elite from the nonelite houses at Cuexcomate in each phase; these are listed in table 13.4 (three types served in both phases). These five variables were used to construct wealth index 1,[4] a phase-specific index of wealth variation among households. Wealth index 2 was calculated to examine change over time since values of the first index are not directly comparable between phases. Index 2 is the simple sum of the frequency of local decorated ceramics and two times the frequency of imported ceramics, calculated for each house. This index ranges from 19.7 to 68.2; table 13.4 shows the mean values.

The wealth indices suggest a number of conclusions on consumption patterns at Cuexcomate and Capilco. First, all three social categories (Capilco, Cuexcomate nonelite, and Cuexcomate elite) manifest an overall decline in standard of living through time. Second, the elite households show distinctive patterns of ceramic usage in both phases. Third, elite-commoner differences were much reduced in the LC phase as measured by both wealth indices. The decline in the fortunes of the elite as measured by portable artifacts is matched by the architecture: the LC elite compound is far less imposing and distinctive than the EC compound, although it is still the largest residential group at the sites in LC times. Furthermore, the lack of conformity of this compound to the Aztec palace plan suggests a lower level of involvement in long-distance elite interactions at this time.

SUMMARY OF SOCIAL AND ECONOMIC CHANGES

The excavations at Cuexcomate and Capilco have allowed us to document a number of social and economic changes in the three phases of occupation—population growth, agricultural intensification, increasing textile production, changing configurations of long-distance trade partners, decline of the standard of living, and modifications of elite/commoner distinctions. We summarize these changes here for each of the phase transitions.

Temazcalli to Early Cuauhnahuac Transition

Reconstruction of the socioeconomic system during the Temazcalli phase (1200-1350) is limited by the small number of excavated deposits from this phase (two refuse deposits at Capilco). Nevertheless, the artifacts from these deposits can be compared with the more abundant Early Cuauhnahuac (1350-1430) materials to suggest patterns of change. There was clearly a major growth in population as Capilco expanded and Cuexcomate was founded; this pattern is repeated in Smith's (1992) demographic reconstruction for the area around the two sites, where the annual population growth rate was an estimated 1.6%. This population surge was accompanied by the construction of agricultural terraces in the study area. No pre-Cuauhnahuac agricultural terraces have been documented (Hirth 1994; Price and Smith 1992), and although only one of the check-dams at Cuexcomate can be unequivocally assigned to a phase on the basis of a chronometric date (LC), strong indirect evidence points to an EC origin for the terracing (Price and Smith 1992).

The frequencies of cotton spinning artifacts increase dramatically from Temazcalli to EC times (table 13.2), conforming to a pattern previously documented at nearby Xochicalco and Coatetelco (Smith and Hirth 1988). This apparent growth in the textile industry was not equalled by other craft activity, most of which continued at low levels. Trade with the Basin of Mexico (as measured by imported ceramics and obsidian) increased greatly, while exchange within Morelos declined (table 13.3). Wealth index 2 declines (except for the EC elite compound), but we do not see this as indicating a drop in standards of living since the numerical decline is due almost entirely to the decline in Morelos ceramic imports (table 13.3; see note 4). Other evidence, reviewed below, points to the EC phase as a time of prosperity and expansion.

Early Cuauhnahuac to Late Cuauhnahuac Transition

The rate of population growth decreased from the Early Cuauhnahuac phase (1350-1430) to the Late Cuauhnahuac phase (1430-1550), from 1.6% to 1.0%, but it was still quite high, and the magnitude of the population increase was

impressive (table 13.1; see Smith 1992:335-345). Agricultural intensification in the form of terracing continued until nearly all available land in the Buenavista Lomas was under cultivation (O'Mack 1991; Price and Smith 1992). Although productivity studies have not been carried out, it appears that the population had exceeded the carrying capacity of the land; Smith (1992:335-345) estimates the LC population density in this area at over 600 persons per km.[2]

The frequency of cotton spinning artifacts in individual household deposits increases by 50 percent at Capilco, with little change at Cuexcomate. When increased population at these settlements is considered, however, the overall level of textile production increased dramatically. Several lines of evidence point to lowered standards of living in LC times. Wealth index 2 shows a decline in all social categories (table 13.4). There is less variability in artifactual wealth indicators, including a lower level of elite/commoner differences. This pattern is exhibited even more strongly in residential architecture, with elite abandonment of the imposing patio group 6 and construction of the more modest group 7 (fig. 13.2). The abandonment of patio group 6 between EC and LC probably signals a major social change, but we do not know its cause or significance (see discussion below).

These changes from the Temazcalli through Late Cuauhnahuac phases are all clearly documented in the archaeological record at Capilco and Cuexcomate. Their causes and consequences are discussed below under three headings: the role of the elite, Aztec conquest, and economic growth cycles.

PROCESSES OF CHANGE

The Role of the Elite

The degree of centralized political control over the economy is an important issue in Aztec economics (Smith and Hodge, chap. 1), although with archaeological data it is difficult to distinguish state control from control by elites acting independently of the state. Brumfiel and Earle (1987) describe three models of economic organization and social complexity that help frame the issue of elite control. In their *commercial development model,* production and exchange are relatively independent of elite interference. On the other hand, elites may take an active role in the organization of economic activity. In the *adaptationist model,* elites serve a managerial function, producing social benefits for everyone. In the *political model,* however, elites act in a controlling and monopolizing capacity, benefitting themselves primarily. In our view, the data from Cuexcomate and Capilco are most consistent with the *commercial development model,* with

"bottom-up" forces primary in the generation of Postclassic economic change in this area (see Blanton 1983a; Maclachlan 1987).

The expansion of terraced farming is the most visible aspect of Postclassic agricultural change in the Cuexcomate/Capilco area. Although terracing is a more intensive practice than level-field rainwater cultivation, it is not nearly as intensive as the irrigation or raised field techniques used elsewhere in Late Postclassic Central Mexico. Following Turner and Doolittle (1978), we define intensification as agricultural change that involves increased labor investment to produce higher yields per unit of land. Terracing is generally carried out on the household level (Netting 1968, 1990; Wilken 1987), and unlike the methods of irrigation or raised field cultivation, terracing does not require or stimulate collective or centralized organization (Sanders et al. 1979; Wilken 1987). Our stratigraphic evidence for an extended period of check-dam enlargement conforms with this pattern. Netting's (1990) model of intensification (as a household-level adaptation to population pressure that does not necessarily lead to political centralization or control) seems applicable to this case. It is not necessary to invoke a model of elite control of production to account for the expansion of terracing. On the other hand, attempts by elites to increase production within their territory are a common incentive to intensification cross-culturally (e.g., Brumfiel and Earle 1987; Polgar 1975), and this possibility cannot be ruled out.

With the possible exception of the use of paint stones, there was little elite control over craft production. Textiles, paper, and other goods were manufactured at the elite compounds, but not at higher levels than at nonelite houses (table 13.2; fig. 13.3). This finding surprised us, since regional ethnohistorical sources indicate that commoners went to noble compounds to spin and weave, (e.g., Cortés 1865:542; Smith, chap. 12); we had expected therefore to find evidence of more intensive textile manufacture in such contexts.

No imported artifacts have an exclusively elite association although some imported ceramic types show statistical associations with elite contexts (e.g., Morelos imports in the EC phase; Aztec III in both EC and LC phases; see table 13.4). All excavated houses had access to imported ceramics and obsidian tools, and many had copper artifacts. Moreover, exotic items of rare, valuable jewelry (jade beads, obsidian earspools, shell pendants) were found almost exclusively in nonelite contexts. Apart from architecture, our analyses found no examples of sumptuary goods to distinguish elite from commoner contexts. On this basis, we see no evidence for elite control over exchange. Imports were probably obtained through the market system where noble and commoner had equal access.

In sum, there is little evidence for elite control over production or exchange activities, and a "bottom-up" economic model appears to be most appropriate for agricultural production, craft industries, and exchange. The diminished elite/commoner distinctions in the LC phase indicate that the decline in standards of

living was not due to greater exploitation at the hands of the local Cuexcomate elite. Nevertheless, this and other changes from EC to LC could have resulted from exploitation by external elites centered in either Quauhnahuac and/or the Basin of Mexico. In other words, the actions of elites may have had important repercussions on rural conditions, but if so, the relevant elite groups were not those resident at Cuexcomate.

Aztec Conquest

The EC and LC phases correspond to the periods before and after western Morelos was conquered and incorporated into the Aztec empire (Smith 1987b; Smith and Doershuk 1991). We distinguish three types of effects that Aztec imperialism may have had on rural sites: the direct effects of conquest, the impact of Aztec tribute, and the indirect effects that derived from regional changes brought about by Aztec imperialism. Although all three may have played a role, we believe the indirect effects had the most significant influence on rural socioeconomic patterns.

The evaluation of the effects of Aztec conquest at Cuexcomate and Capilco is complicated by the earlier conquest of western Morelos by the Quauhnahuac polity in the 1420s (Smith 1986). The only likely direct effect of foreign conquest that we can identify is the abandonment of the patio group 6 elite compound at Cuexcomate. This could have been caused by the killing or destruction of the EC phase elite household by either the Quauhnahuac polity in the 1420s or by the Aztec empire in the late 1430s.

The direct tributary demands of the Aztec empire probably had little impact on settlements like Capilco and Cuexcomate. This area was within the territory of the Quauhnahuac conquest-state, which corresponded to the Aztec tributary province of the same name. The major tribute items paid to the Aztecs by Quauhnahuac were cotton textiles, grains, bark paper, and warrior costumes (see Smith, chap. 12). At least three of the observed archaeological changes—increased agricultural production, increased textile manufacture, and lowered standards of living—could be direct results of Aztec tributary exploitation. Smith's quantitative reconstruction of Morelos demography and tribute (chap. 12), however, suggests that on the household level, imperial tribute was quite modest (the rate for cotton textiles was under one manta or piece per household per year).

Imperial tribute alone would not cause the EC to LC archaeological changes; nevertheless, the indirect effects of Aztec imperialism could have had a greater impact. In an earlier article, Smith (1986) presents a model that shows the importance of interaction between the ruling dynasties of Quauhnahuac and Tenochtitlan as a mechanism of integration within the empire. This interaction, begun before the formation of the Aztec empire, increased in intensity after the conquest of Quauhnahuac in 1438. Smith hypothesizes that the Quauhnahuac nobility used their enhanced position within the Aztec empire to increase their own tributary exploitation of provincial commoners, augmenting tribute exactions beyond the relatively modest imperial quota for their own gain.

This model does not fit Cuexcomate elite, however, whose interaction with the Basin of Mexico declined in the LC phase (as judged by architectural styles and imports) while their economic position worsened. In fact, the EC phase elite may have been wiped out during the Aztec conquest (see above). Unlike the nobility in the capital city of Quauhnahuac, the LC Cuexcomate elite did not receive the benefits of Aztec imperial elite interaction networks. Rural populations like the inhabitants of Capilco and Cuexcomate were at the bottom of the Quauhnahuac tributary hierarchy (see Smith, chap. 12), and commoners and elite alike at these sites were probably exploited by regional elites at both city-state capitals and Quauhnahuac. The combined effects of increased tribute at the imperial and regional state levels probably contributed to the observed changes in agricultural production, textile manufacture, standard of living, and elite conditions. These indirect effects of Aztec conquest were not autonomous causes of the archaeological changes, however. Rather, they were but one component of a complex system of forces that generated economic change in Postclassic western Morelos.

An Economic Growth Cycle

The various processes of change outlined above began in Temazcalli and EC times well before the formation of the Aztec empire in 1430, a strong argument against Aztec conquest as their primary direct or indirect cause. We interpret these changes as components of a dynamic system of economic growth characterized by complex feedback relationships. This system fueled a regional agrarian cycle of boom and bust, where initial growth, expansion, and prosperity lead to contraction, decline, and crisis.

The population increase between the Middle and Late Postclassic periods was one of the more dramatic developments of the Postclassic epoch throughout Central Mexico. This demographic process has been discussed in terms of both causal population pressure models (Sanders et al. 1979) and systemic feedback models (Blanton 1983b). The rough chronological framework in the Basin of Mexico has prevented detailed analysis, however, and much of the population pressure debate proceeds more from theoretical first principles than from empirical evidence (Smith 1993b). The greater chronological control in western Morelos permits the process of population growth to be examined more closely. Based upon our admittedly limited data, it appears that the greatest regional surge occurred in the fourteenth century (Temazcalli - EC transition), with slower but still significant growth continuing through the fifteenth century

(EC - LC transition); annual regional growth rates at these two transition periods averaged 1.6% and 1.0% respectively (Smith 1992:335-345).

The fourteenth-century surge led to large-scale colonization of the Buenavista Lomas, probably by peoples from the more productive, irrigated, alluvial areas of Central Morelos. Capilco already existed at this time, but Cuexcomate was initially settled as a relatively large center of 10 hectares with over 200 inhabitants. Agricultural terracing was required by the large number of new settlers, and population pressure was a major force leading to agricultural intensification. On the other hand, the economic success of the EC phase (see below) probably served as a feedback loop that further stimulated population growth. Once a successful terracing program was established, the economy initially would have faced labor shortages rather than land shortages, a condition favorable to demographic growth (Polgar 1975). Later, local and regional tribute demands may have contributed to the forces stimulating population growth. Eventually, by LC times, economic growth slowed down as the lomas area filled up. Continued population growth became a major contributor to lowered standards of living.

The network of interactions among demography, economic forces, and household level craft production is an important component of this model. Many of the documented craft activities—chert tool manufacture and production activities that involved polishing stones, worked sherds and/or copper tools—were apparently performed at all or most houses for domestic purposes. These activities fit Peacock's (1982) category of "household production," or low-level domestic production for immediate household use. Two products—cotton textiles and bark paper—were also manufactured in domestic contexts but with some production for exchange beyond the immediate family. In the case of textiles, production was quite intensive (inferred from the high frequencies of spindle whorls and spinning bowls), and fits Peacock's "household industry" category (see Hicks, chap. 4) in which production is carried out in domestic contexts for both use and exchange, usually by part-time producers (see Nichols, chap. 7, and Otis, chap. 8, for discussions of the scale of craft production at the city of Otumba).

Part-time, rural textile manufacture conforms to Brumfiel's (1987) model of Aztec craft production in which utilitarian items were made by part-time, independent rural artisans and luxury items by full-time urban specialists attached to noble courts. We believe, however, that the economic context of rural production differs somewhat from Brumfiel's account. She proposes (Brumfiel 1987; Brumfiel and Earle 1987:5) that rural craft producers do not have sufficient, steady, aggregate demand to specialize full time, so they adopt farming as a buffer against fluctuations in supply and demand. On the other hand, ethnographic and historical accounts suggest that the opposite process may in fact be more common: rural farmers take up part-time craft production

to supplement their income. This pattern commonly occurs under conditions of growing rural population, land shortages, and poverty that lead peasant households to try to augment their declining agricultural income with cottage industries (Arnold 1985:171-196; Miller and Hatcher 1978; Thirsk 1961).

Data from Cuexcomate and Capilco suggest this latter process occurred in the Late Cuauhnahuac phase. The progressive decline in wealth index 2 (table 13.4) over the three phases is accompanied by increases in the frequency of cotton spinning artifacts (table 13.2), particularly at the site of Capilco. More telling is the situation in the LC phase. In EC times, no single house stands out with excessive amounts of textile artifacts, but in LC times one nonelite house at each site exceeds the phase mean by more than two standard deviations. These houses with greatly intensified cotton spinning (houses 102 and 261) are also among the lowest in values for wealth index 1, as shown in figure 13.4. Admittedly, there is little overall statistical association between cotton spinning and wealth, but it may be important that the two houses with the most intensive spinning are among the poorest houses at these sites. At Capilco in the EC phase, house 102 was involved in craft production using copper tools and had the highest wealth index at that site. In the LC phase, however, both of its

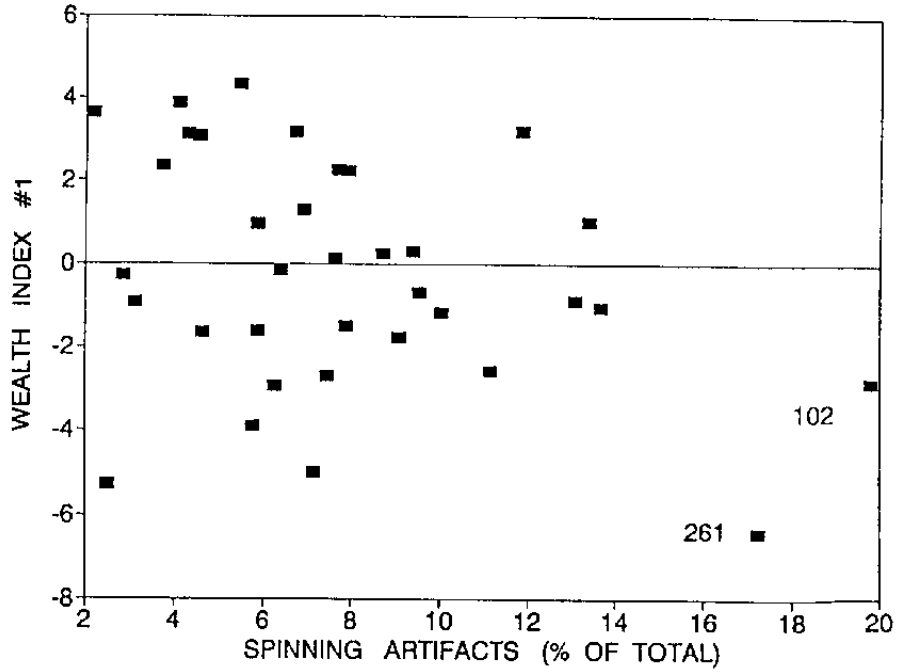

Fig. 13.4. Textile artifact frequency and wealth level. Data are from Late Cuauhnahuac households at Cuexcomate and Capilco.

wealth indices plummeted and the inhabitants of house 102 intensified both textile production and the use of copper tools.

The above observations may be summarized as follows. The EC phase was a time of economic growth and general prosperity at Cuexcomate and Capilco. Population was growing and new lands were put into production with terracing. Population levels were well within the carrying capacity of terraced agriculture. Compared to Temazcalli times, trade increased with all areas except perhaps Quauhnahuac, and textile production was carried out at higher levels. A prosperous and powerful elite group was linked architecturally and stylistically with the Central Mexican elite class, and the commoners appear to have had relatively high standards of living (to judge by the wealth indices and access to imported goods). By contrast, the LC phase showed a decline in living conditions. The extremely high population density probably taxed the limits of terrace agriculture (a study of terrace chronology and productivity is badly needed). All social sectors experienced decreases in standards of living and the relative and absolute position of the LC elite was greatly reduced. The two major forces leading to this socioeconomic downturn were the demographic/agricultural crisis and the increased tribute demands of Quauhnahuac and the Aztec empire. Aztec conquest did not create the problems, but the indirect effects of Aztec imperialism must have exacerbated local troubles, adding further to the economic difficulties of rural households.

This overall pattern of development from Temazcalli through Late Cuauhnahuac times is an example of an economic cycle common in preindustrial states with dense peasant populations. In the first half of the cycle, population grows, new lands are colonized, trade and manufacturing expand, and towns prosper. As growth continues beyond some threshold, however, the economy is transformed from a condition of excess land and a shortage of labor to one with surplus labor and a shortage of land. In this second half of the cycle, cultivable land is filled in, productivity declines, prices rise, the countryside becomes impoverished, and many peasant households take up cottage industries to supplement falling agricultural income. Two well-documented historical examples of this agrarian cycle are England in the twelfth and thirteenth centuries (Miller and Hatcher 1978) and southern France in the fifteenth and sixteenth centuries (Le Roy Ladurie 1972). In another case, Blanton et al. (1993:50-105) present archaeological evidence for similar prehispanic growth cycles in the Valley of Oaxaca. We believe that these examples are comparable to the changes observed from the excavations at Capilco and Cuexcomate.

CONCLUSIONS

The rural economy of Late Postclassic western Morelos was more complex and dynamic than ethnohistoric accounts of Aztec society would suggest. The inhabitants of Capilco and Cuexcomate were not simple peasants toiling away to support nobles and states. Instead, these people, elites and commoners, were well connected to Central Mexican exchange networks. They carried out a variety of productive activities in addition to agriculture, and their towns and villages exhibited a high level of social heterogeneity. These patterns cannot be recovered from generalized ethnohistoric accounts of sixteenth-century Central Mexico, nor are they clear from local administrative documents from Morelos. Local social and economic conditions and the ways in which they changed through time can only be understood when detailed archaeological data are gathered and analyzed within a comparative social framework that integrates local, regional, and macroregional data into a comprehensive model.

The model of change that we propose above provides a good fit to the observed archaeological changes at Capilco and Cuexcomate. This model should be viewed as an exploratory account, however, until comparable data from other areas become available. The processes we single out as important—population growth, agricultural intensification, craft production, social stratification, and external conquest—operated at regional and macroregional scales, and this description of change at two small sites can only provide a partial view of Late Postclassic rural conditions in Central Mexico. Nevertheless, this study demonstrates the value of the household archaeology approach as a method for generating useful social and economic data. As more such studies are carried out, our models will continue to improve, and earlier normative and static accounts of Aztec rural society will be replaced by a more accurate appreciation of the dynamic and diverse nature of Aztec economies and societies.

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NOTES

1. In this paper we use the concept "rural" as an attribute of regions (rather than as an attribute of individual settlements). A rural region is an area with a low level of urbanization in the sense that it contains few cities or else has a low proportion of the population living in cities.

2. All quantitative data on artifact distributions in this article describe materials from well-phased, domestic midden deposits associated with individual houses. Ceramic artifacts are quantified in terms of minimum numbers of vessels per type per context (based upon rim sherds), which are expressed as percentages for each context. Other artifacts are quantified in terms of abundance relative to ceramics; the measure used is frequency per 1,000 sherds. These measures are discussed in Smith (1992).

3. Out of a total of 56 well-phased, residential midden deposits at Capilco and Cuexcomate, 10 have excavated volumes greater than 4 m^3 (for a single phase). These 10 deposits cover all three phases and both sites. Because of the statistical problem of underrepresentation of rare categories in small collections, these 10 deposits are used to monitor the ubiquity of rare artifact types on a general level.

4. Two methods were used to select the five ceramic types for calculation of wealth index #1. Analysis of variance established the variables that most consistently differed between elite and nonelite houses, and comparisons of means revealed the magnitudes of the group differences. Combining the results of the two methods, the five most sensitive variables were selected for each phase. Percents were transformed to standardized Z-scores (within each phase separately), and the five scores summed, giving each house a value that ranged from -7.9 to +7.0; a score of 0 would be the "average" wealth level. The figures in table 13.4 are means by social category.

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