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The economy has been the backbone of societies since the beginning of time. While religious beliefs and political relations framed the motivations behind important human interaction, the reality is that ancient people probably were primarily preoccupied with whether they had enough food to feed their families throughout the year. Consequently, questions about the location and availability of resources and how they could be procured would have been foremost in the minds of pre-Hispanic peoples. As Mesoamerican societies grew in size, they required more resources to support their expanding populations and attendant social and political institutions. Understanding the scale and complexity of early economic systems, therefore, is indispensable for reconstructing the structure, organization, and growth of early complex societies during the Preclassic period.

This study examines economic organization of San Lorenzo and the neighboring secondary center of Loma del Zapote, which are located, together with the modern town and archaeological site of Tenochtitlán, on the geological and cultural formation referred to throughout this volume as San Lorenzo Island (figure 1.1). It also includes several hinterland sites, such as Las Camelias, located south of the island, and fourteen wetland mounds situated beyond its north end.

San Lorenzo was identified as an important Olmec center by Matthew and Marion Stirling in 1945 after they received a letter from a friend mentioning the



FIGURE 1.1. Map of southern Veracruz and Tabasco showing the location of San Lorenzo and other Preclassic sites. Map by Gerardo Jiménez.

presence of large stone monuments near the village of Tenochtitlán 30 km upriver from the town of Coatzacoalcos (Cyphers and Morales 2006; Grove 2014; Stirling 1955; Stirling Pugh 1981). Their excavations conducted in 1945 and 1946 uncovered numerous stone monuments and brought San Lorenzo to the attention of archaeologists as a major Olmec site (Stirling 1955). Large-scale research was initiated at San Lorenzo in 1967 with the Río Chiquito Project under the direction of Michael Coe. In three field seasons, this project mapped the San Lorenzo plateau and discovered a range of new monuments (Mon 18–52). In the process Michael Coe and Richard Diehl (1980) developed a Preclassic chronology of occupation for San Lorenzo spanning 1,100 years and established that San Lorenzo was the first large Olmec site to develop in the Mesoamerican Gulf Coast.

Despite its importance, large-scale research did not resume at San Lorenzo until 1990 with the initiation of the Proyecto Arqueológico San Lorenzo Tenochtitlán (PASLT) under the direction of Ann Cyphers of the Universidad Nacional Autónoma de México (UNAM) in Mexico City. The contributions of PASLT to our understanding of cultural processes at San Lorenzo during the Preclassic period are the result of systematic multidisciplinary investigations

TABLE 1.1. Chronological phases at San Lorenzo.

<i>Phase/Fase</i>	<i>Calibrated dates / Fechas calibradas</i>
Nacaste	1000–800 cal BC
San Lorenzo B	1200–1000 cal BC
San Lorenzo A	1400–1200 cal BC
Chicharras	1500–1400 cal BC
Bajío	1600–1500 cal BC
Ojochi	1800–1600 cal BC

carried out over three decades of archaeological research. Investigations by this project have transformed what is known about the Early Preclassic occupation at San Lorenzo and the Olmec horizon in the Gulf Coast. It has surveyed and mapped all of San Lorenzo Island (Cyphers et al. 2007–8; Cyphers et al. 2014), contextualized development at San Lorenzo within a broad-scale regional survey (Borstein 2008; Symonds et al. 2002), developed a comprehensive model of the Early and Middle Preclassic subsistence economy (Cyphers et al. 2013; Cyphers and Zurita-Noguera 2012), discovered eighty-one new stone monuments (Mon 67–139 at San Lorenzo, Mon 5–11 and 16 at Loma de Zapote; Cyphers 2004, 2018), and established that the San Lorenzo plateau was a large-scale, built environment (Cyphers et al. 2014).

San Lorenzo was the center of early Olmec culture and the capital of Mesoamerica's first large and complex society (Cyphers 1996a, 1996b, 1996c, 2012; Pool 2007). Refined chronological analysis and dating have established that it was occupied during the Early and Middle Preclassic periods between 1800 and 800 cal BC (table 1.1). That San Lorenzo was the first major center in Mesoamerica to develop a strong interregional presence is evident from the scale of construction, the number of its large public monuments, and the size of its administrative complex. The population of San Lorenzo Island is estimated at 8,000–18,000 people at the height of its development during the San Lorenzo B phase (1200–1000 cal BC) (Arieta and Cyphers 2017; Cyphers et al. 2007–8). It was at this time that its local lacustrine resources (Cyphers et al. 2013) probably could no longer support its resident population and that some food resources were mobilized from its surrounding hinterland.

The focus of this volume is a reconstruction of the Preclassic lithic economy of San Lorenzo Island. *Lithic economy* as it is used here refers to the procurement, production, distribution, and consumption of flaked stone tools within the confines of San Lorenzo and its immediately surrounding hinterland.

While a small component of economic life, the lithic economy provides a valuable perspective on early Olmec society for two reasons. First, cutting tools were used in a wide array of activities from preparing food in domestic settings, to the ritual activities carried out in institutional contexts. Second, most cutting tools at San Lorenzo were manufactured of imported obsidian. This is fortuitous because obsidian both preserves well and can be chemically characterized to identify its source of origin and to reconstruct the probable trade relations that brought it to San Lorenzo (Cobean et al. 1971). Lithics, therefore, provide an accessible entrée into the past and a logical place to begin developing a comprehensive picture of the internal structure and operation of Olmec economy.

STUDYING ANCIENT ECONOMY

The economy is a socially mediated form of economic interaction involving the production and allocation of resources among alternative ends. Several things are implied by this definition. First, *economic interaction* refers to the behaviors associated with the material provisioning of everyday life. Interaction at this level involves the interplay between resources in the natural environment and the individuals who regularly acquire and use them. From an archaeological perspective, this interplay is visible in the material remains that archaeologists regularly recover in the process of their investigations. Second, the economy is *socially mediated*. This means that the values and behaviors that individuals employ are learned behaviors specific to the society in which they live. Third, production and allocation refer to the process of *rational decision making* that individuals go through with regard to the production, distribution, and use of resources. The perspective adopted here is that the process of rational decision making is socially mediated. That is, the criteria for decision making are dictated by the values, mores, and economic constraints or incentives that are promoted or advocated within society.

Investigators typically approach the study of ancient economy using a *functional perspective* that separates behavior into production, distribution, and consumption activities (e.g., Costin 2001; Torrence 1986). This approach is productive because it permits investigators to subdivide economic behavior into different segments that can be examined independently in considerable detail. An alternative approach focuses more on the organization of economic activity. This *structural perspective* is concerned with identifying the organizational structures and primary modes of resource mobilization, production, and the distribution of goods and services across society (e.g., Wolf 1982).¹ From this structural perspective, the economy can be modeled into two broad

organizational sectors that compose the domestic and the institutional economy (Hirth 2012, 2016).

This study combines both functional and structural perspectives. It examines the production, distribution, and consumption of obsidian tools within and between both domestic and institutional contexts. These two levels are important to distinguish from one another because domestic and institutional contexts are two distinct socially mediated realms of economic interaction in which production and distribution activities occurred in ancient societies. They distinguish economic activities that individuals engaged in to support their families, from those that they engaged in for the benefit of their community, their leaders, or the broader society in which they lived. These organizational divisions can be found in most ancient complex societies and are described briefly below. They are especially important in a discussion of San Lorenzo lithic economy because they provide alternative frameworks in which specialized obsidian craft production may have been organized.

The *domestic economy* consists of the economic behaviors that families and households engage in to provision themselves with the resources that they need for their support. Households have been in business for themselves throughout antiquity. Normally governments did not support commoner households except in rare situations such as famines or instances of severe resource shortfall.² Instead, households relied on themselves, their extended families, and other households in their communities to procure the food, fiber, and other resources needed to meet subsistence needs and their social, political, and ritual obligations. Households throughout antiquity were always active economic agents innovating and intensifying production with the means they had at their disposal (Netting 1989, 1990, 1993). It is important to consider the range of entrepreneurial activities that households engaged in to supply themselves with the resources needed for their maintenance and reproduction.

The *institutional economy* consists of the economic interactions that fund formal organizations above the level of individual households. *Formal institutions* refer to the social, political, and religious organizations that integrate and operate for the society as a whole. Formal institutions require resources to operate, and they either extract them from the households that they govern or produce them within contexts that they directly control (Hirth 2016, 2020). In chiefdom and state-level societies, they represent the durable and important organizations that produce special purpose buildings, monuments, and architectural arrangements used in their respective operations. It is with the development and management of both formal and informal institutions that social differentiation can occur,³ and elite strata often appear (Hirth 1996).⁴ Informal

institutions provide the interface between individual households and the formal institutions that operate across society. *Informal institutions* are the rules, customs, expectations, workgroups, and other economic arrangements that operate on a voluntary or quasi-voluntary basis within communities to assist households in their economic pursuits. These informal arrangements operate through kinship linkages and/or community interactions to supply labor to households on a rotating or regular basis, or to support them in times of need.

The domestic and institutional realms are fundamental components of all societies from simple bands to complex states. It is easy to conceptualize formal institutions at the level of states where they produce temples, palaces, political buildings, libraries, and sports arenas. It is more difficult to archaeologically identify formal and informal institutions in small-scale societies such as bands and tribal groups. Examples of informal institutions in small-scale societies include gift-giving networks such as *hxaro* among hunters and gatherers (Mauss 1990; Wiessner 1982) and forms of communal labor, child fosterage, and emergency support at the community level (Herskovits 1965; Miller 1990; Sahlins 1972).

Figure 1.2 illustrates the relationships between the domestic and institutional economy. While formal institutions embrace all households within society, informal institutions operate on a local interhousehold basis and the networks they form vary with the initiatives of the households that construct them. Within this matrix of interactions, the procurement, production, distribution, and consumption of resources take place and resources such as obsidian tools can be examined.

THE LITHIC ECONOMY AT SAN LORENZO

Flaked stone tools provide five valuable types of information for reconstructing the pre-Hispanic economy at San Lorenzo. First, all Mesoamerican societies needed cutting edges, and chert and obsidian were the two primary materials used for this purpose from the Paleo-Indian period into the Colonial times.⁵ Second, lithic tools preserve well under a wide range of environmental conditions. This is especially important in the tropical Gulf Coast, where heavy rainfall and acidic soils create preservation problems for even durable materials such as ceramics. In this regard, stone tools can provide relatively complete assemblages for archaeological analysis without significant loss of materials that can occur from decomposition and other postdepositional processes (Schiffer 1976).

Third, flaked stone tools are produced using a reductive technology (Andrefsky 2000; Collins 1975; Crabtree 1972; Flenniken 1981). Artifacts are

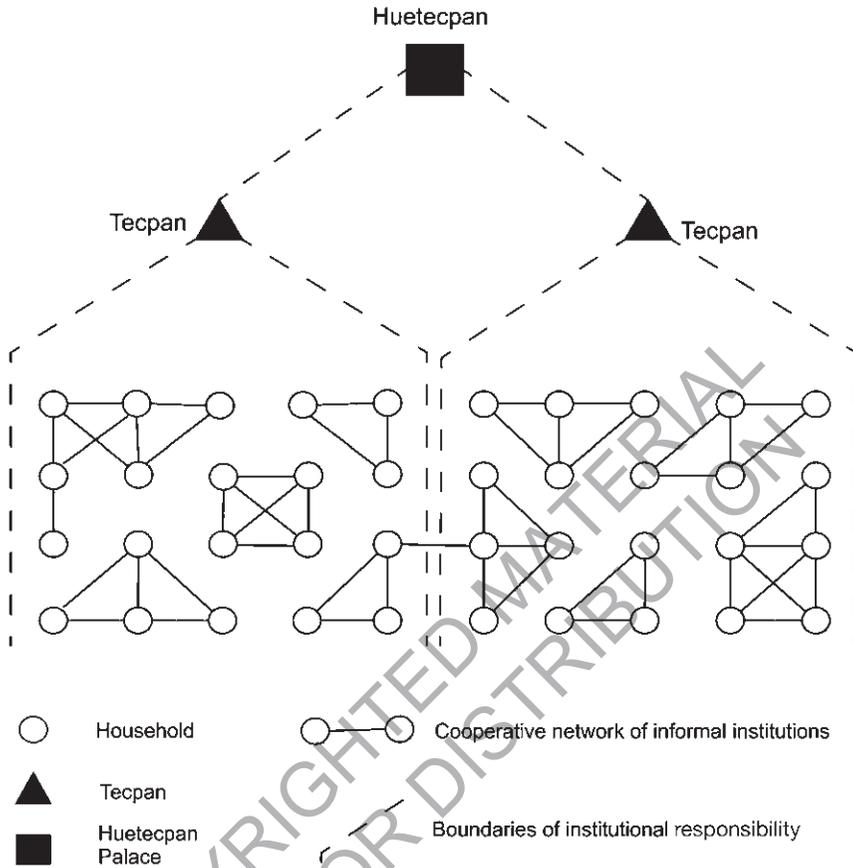


FIGURE 1.2. *The relationships between domestic and institutional economy. Illustration by Kenneth Hirth.*

produced sequentially, with later outcomes dependent upon preceding shaping behaviors. The result is that flaked stone tool manufacture produces a range of waste flakes that are discarded during production when they are too small for alternative use. Because this waste also preserves, it is possible to reconstruct the exact steps of manufacture using the lithic technology approach (Clark 1988; Collins 1975; Flenniken 1981; Hirth 2003b; Inizan et al. 1999). This reconstruction enables archaeologists to identify how tool production took place, where it occurred, and whether the production process was a single event or subdivided into a series of production steps carried out by different craftsmen

in different locales across the landscape. At the time of European contact all specialized obsidian blade makers in Mesoamerica were male (Clark 1989b), and for that reason the gender-specific term of *craftsmen* is used throughout this study to refer to them. This terminology is intended to enhance gender accuracy in this form of specialized production but recognizes that the ad hoc manufacture of percussion flakes used as cutting tools (see below) almost certainly were produced by both women and men of all ages.

Fourth, obsidian was used to make flaked stone tools at San Lorenzo, and its source location can be determined with a high degree of precision through geochemical characterization studies (Cobean 2002; Cobean et al. 1971). This determination enables archaeologists to identify both pre-Hispanic trade in obsidian (Golitzko and Feinman 2015; Hirth et al. 2013) and to reconstruct the form of organization by which it moved (Hirth 1978, 1998, 2010). Obsidian was widely traded throughout the Preclassic period (Golitzko et al. 2012; Pires-Ferreira 1975, 1976) and while it moved in relatively small quantities,⁶ its movement helped to structure early networks of interregional interaction through which a wide array of other products also moved.

Fifth and finally, the ad hoc production of obsidian-cutting tools using percussion techniques gradually gave way to a pressure blade technology produced by craft specialists. Ad hoc production refers to production activities that went on within every household to supply tools, food, and craft goods that were regularly consumed. The appearance of craft specialization was an important step in development of cultural complexity. It reflects a decline in domestic self-sufficiency and an increase in economic interdependence as households increasingly relied on craft specialists for products that they used in daily life (Durkheim 1933). This is an important topic in Mesoamerican archaeology because the appearance of specialized craftsmen producing obsidian blades has been linked to the development of prestige goods economies in early chiefdom societies (Clark 1987). Understanding whether early craft specialization developed in domestic or institutional contexts is significant for examining how elite did or did not shape the emerging social hierarchy through the production and control of material goods. Obsidian crafting is one case in point for examining this question.

THE VOLUME'S ORGANIZATION

This volume explores the structure and organization of lithic economy at San Lorenzo Island from 1800 to 800 cal BC. Its goal is a comprehensive understanding of the organization and development of stone tool production,

distribution, and consumption in both domestic and institutional contexts. The model that emerges provides a general understanding for how the economy operated for the production and distribution of stone tools that may be useful for considering how other perishable materials also circulated.

Chapter 2 begins with a brief examination of Olmec society at San Lorenzo. It provides a discussion of the geomorphology of San Lorenzo Island, its major internal divisions, the areas explored by the San Lorenzo Tenochtitlán Archaeological Project (PASLT), the development and organization of the regional population, and the subsistence practices that supported it. The discussion then shifts to the question of craft production and the types of activities envisioned as having taken place within the site based on the types of material goods recovered in archaeological contexts and depicted on the site's carved stone monuments. This initial survey of San Lorenzo culture concludes with a brief deliberation of transportation networks and the waterways that would have moved people and goods into and out of San Lorenzo Island. Noteworthy is the site of Puerto Malpica located at the southern end of San Lorenzo Island. In addition to being located along a tributary of the Coatzacoalcos River and the main nexus onto San Lorenzo Island by both riverine and overland transportation routes, Puerto Malpica was the location of specialized obsidian blade production at the site's apogee during the San Lorenzo B phase (1200–1000 cal BC).

This discussion is followed by two chapters that discuss the two important flaked stone lithic industries found at San Lorenzo.⁷ The first of these (chapter 3) explores the obsidian percussion flake industry, which was the dominant technological system used to produce the majority of cutting tools used at San Lorenzo over the length of its occupation. This industry involved the removal of sharp flakes using percussion from small obsidian nodules that were procured by trade by each individual household. Besides being the oldest manner of producing cutting tools, the obsidian percussion industry is an unspecialized and expedient form of production used on an ad hoc basis by the individuals who needed cutting edge. Percussion flake technology is gradually supplemented over time at San Lorenzo by the acquisition of obsidian pressure blades produced by craft specialists. It is only during the Nacaste phase (1000–800 BC) that obsidian pressure blades (figure 1.3) became especially prevalent and provided as much cutting edge for its resident population as percussion flakes.

The local production of obsidian pressure blades is discussed in chapter 4. Archaeological excavations identified the production of obsidian blades by craft specialists at Puerto Malpica located on the southern end and at the entrance onto San Lorenzo Island.

This craft production occurred during the San Lorenzo B phase (1200–1000 cal BC). It is important because it represents the earliest obsidian blade workshop identified thus far in Mesoamerica (Cyphers and Hirth 2016), as well as being one of the earliest known areas where craft specialists manufactured utilitarian goods for exchange. The production technology employed at Puerto Malpica is described and compared to better-known production sequences from sites during later periods. The core-blade technology used at Puerto Malpica is unique because it employs a *progressive* core shaping technology that prior to this research had not been recognized or discussed elsewhere in Mesoamerica for the Preclassic period (Hirth 2018). Understanding this technology provides insight into who the craftsmen were and how they learned and transmitted their craft.

Resource provisioning is an important topic in any economic discussion because it provides insight about the distances over which items moved and the possible paths they took. The results of two geochemical source analyses are presented in the next two chapters that provide distinct, but compatible insights into obsidian procurement at the site. Chapter 5 explores the procurement of obsidian for the site of San Lorenzo as a whole. The sitewide study of resource procurement reveals that obsidian entered San Lorenzo from thirteen different sources over the length of its occupation. In the process, obsidian was transported over distances of 300–670 km both in nodular and finished blade form.

Chapter 6 examines obsidian provisioning for craft specialists producing obsidian pressure blades at Puerto Malpica. Here geochemical analysis of manufacturing debris from the Malpica workshop depicts a different story of

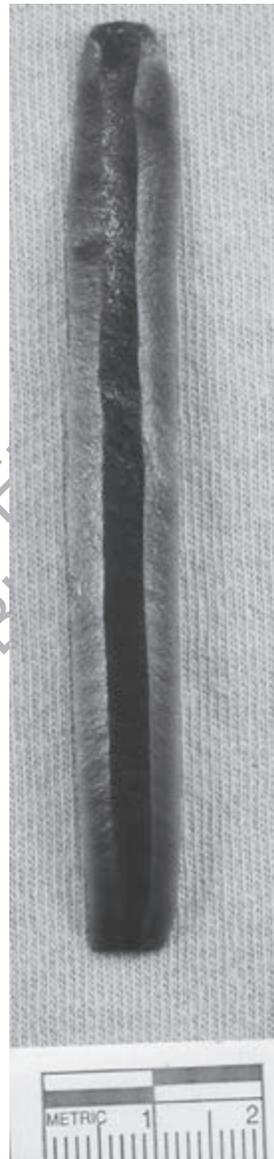


FIGURE 1.3. *A complete parallel-sided obsidian pressure blade from San Lorenzo. Photograph by Kenneth Hirth.*

source provisioning. The majority of the obsidian used in core-blade production came from two primary sources: Ucareo, Michoacán, and El Chayal, Guatemala, located 580–670 km from San Lorenzo. The important questions examined here are *how* was this obsidian procured, and *what* were the socioeconomic mechanics involved in obtaining it? Did craftsmen go directly to the obsidian sources themselves, procure raw material through established interregional trade networks, or depend on elite to obtain preformed obsidian cores for them to use in production? Understanding where obsidian came from and how it reached the Malpica workshop provides the structure for understanding the transfer of obsidian technology across Mesoamerica during the Preclassic period.

The issue of obsidian consumption across San Lorenzo Island is examined in chapter 7. The question explored is whether all areas of the site had access to the same type and quantity of obsidian or were some areas privileged in their access to blades over percussion flakes. Consumption contexts represent the end point in the distribution system, so this discussion also addresses whether the obsidian nodules used to produce percussion flakes and the cores for obsidian blades moved through the same or different forms of exchange. Obsidian consumption is examined from the perspective of where it occurs within the site in relation to its distance from the site's administrative-ceremonial core. A comparison of obsidian percussion flakes and blades provides complementary views of how different types of durable remains were procured and circulated during the Early Preclassic period.

Reliance on the Ucareo and El Chayal obsidian for the manufacture of obsidian blades makes it possible to examine on-site distribution patterns and to track the movement of finished products from the Malpica workshop to consumers during the San Lorenzo B phase. Five alternative models of workshop distribution are presented and evaluated in chapter 8 based on a geochemical analysis of obsidian blades recovered in twenty-two consumption contexts across San Lorenzo Island. While somewhat hypothetical, this study represents a first attempt to reconstruct the internal distribution of finished products from a workshop locale to their final, on-site place of consumption.

Important questions in any discussion of early craft production are who innovates and how did technological innovation spread within ancient society? The ways in which blade technology was adopted at San Lorenzo are evaluated in chapter 9 using two alternative innovation models. The first is the *elite production and control model* proposed for Olmec political economy (Blanton et al. 1996: 8; Clark 1987). According to this model, the spread of obsidian blade technology across Mesoamerica was sponsored by elites who

obtained obsidian, supported craftsmen, and controlled the distribution of finished blades in an effort to expand their individual political clientages (Clark 1987). The second is the *independent crafting model*, in which obsidian blade technology was spread without elite involvement by commoner craftsmen who met the demand for blades and distributed finished goods to the segments of the society who needed and wanted them. The available data support the second of these two models.

The concluding chapter explores what the study of lithic economy at San Lorenzo can contribute to a better understanding of development at the site and the broader social processes operating across the southern Gulf Coast during the Early Preclassic period. How complex society evolved over time is one of the most challenging and stimulating research questions that archaeology seeks to answer. As societies grew in size, so too did their economies. These societies required and consumed more resources to support their expanding populations and the attendant social and political institutions. The appearance of complex society, therefore, is dependent on the development of equally complex economic systems to produce and distribute the food and other goods needed to support the increased levels of resource consumption.

Understanding how the domestic economy of San Lorenzo operated and was integrated into producing goods and services for the institutional economy is vital for understanding how early economic systems developed. San Lorenzo has the earliest-known craft production loci in Mesoamerica, both for utilitarian items such as obsidian blades discussed here, and items of elite and ritual use (Cyphers 2012). Understanding how the San Lorenzo lithic economy was structured and organized is an important first step in this process. It could be argued that modeling the structure of the economy from the production and circulation of a single commodity is flawed because of the narrowness of scope. Nevertheless, the precision that a lithic perspective employs makes this focus a good place to begin. It provides insight into the structure of a portion of the ancient economy and is useful in comparative studies.