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Agricultural Intensification on the epiClassic northern Mesoamerican frontier: The La Quemada Terraces

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ABSTRACT

The underlying paradigms of Boserup, Chisholm and risk management theories are used as frameworks to present and interpret findings from our excavations on the La Quemada agricultural terraces in southern Zacatecas, Mexico. Boserupian models are based on population pressure; Chisholm models are based on distance, and risk management focuses on environmental challenges and the varied human responses to them. The data suggests a greater congruency to risk management, especially in terms of diversification and the cultivation of agave as a key buffer throughout the region. Distance also plays an important role, and underscores the local-level concentration of production. A distinction is shown between the La Quemada terraces and those associated with individual settlements. The former implies top-down decision making; the latter reflects bottom-up or collective group decisions. Finally, an alternative consideration to these paradigms lies in the extractive nature of the primate settlement system. Here additional subsistence requirements for large labor groups and specialists could indirectly encourage increased agricultural productivity.

1. Introduction

Agricultural intensification is one of the basic elements contributing to the development of most complex societies. For over half a century it has been the subject of intense scholarly debate, largely because of the change in perspective brought about by Boserup (1965, 1975, 1981) in the late 1960s and the strong reactions to it. The basic tenet of Boserup's theory is that population density increase is the prime cause of agricultural change. She assumed that environmental limits are flexible, depending on technology, and that when population growth occurs land scarcity results. This in turn necessitates intensification of field labor which can be reflected in shortening fallow periods, irrigation systems, terracing or any other mechanism to increase production. For many earlier anthropologists agricultural intensification simply referred to any increase in agricultural production, but a historical review of past research demonstrates the nuanced and varied ways this has been examined over the years. There are also subtle differences in the meaning of intensification (i.e., Brookfield, 1972, 1984, 1986; Morrison, 1994; Turner and Doolittle, 1978). Boserupian intensification is more restricted, being defined by increased work and greater productivity as a result of rising population and ensuing land shortages (McGuire, 1984).

The model has had sufficient support to remain viable (Netting, 1993; Stone, 1996, 2001; Stone and Downum, 1999; Turner et al., 1993; Smith and Price, 1994), but its shortcomings were revealed in certain field studies where the model did not seem to apply. Some researchers noted examples of fallow shortening or intensification without population pressure. A few classic examples include raised field agriculture in Bolivia (Erickson, 1993), environmental stress in the southwestern United States (McGuire, 1984), grain farming in southern India and Kenya (Morrison, 1996; Conelly, 1994), and rice farming in Indonesia (Conelly, 1992; Stone and Downum, 1999).

In addition to this, location of population distributions has been cited as an alternative to population-driven intensification where the underlying cause is to reduce transportation time and costs (Chisholm, 1968, 1969). Two other conditions that encourage intensification without land shortage or population pressure include market incentives (Stone, 1996; Turner and Brush, 1987; Netting et al., 1989) and agricultural risk reduction (Langlie and Arkush, 2016; Sanders and Webster, 1978; Stone and Downum, 1999; Zori and Brant, 2012) As an early example, Nichols (1987) noted the construction of intensification architecture such as terracing and hydraulic works in the northern Basin of Mexico during the formative period before subsequent population increases. As such, the study of risk management and resilience theory is now competing to match the earlier zeal shown for Boserupian models.

The purpose behind this paper is not to evaluate the merits or faults of these theories, but rather to use their underlying paradigms as frameworks to present and interpret findings from our excavations on the La Quemada agricultural terraces. With this approach the congruency

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of the data to risk, location and Boserupian models can be evaluated for an important but largely overlooked portion of Mesoamerica (see Fig. 1).

2. La Quemada

The middle Malpaso valley was dominated by the great fortress/ ceremonial center of La Quemada during late Classic and epiClassic times (*c.* 500–800 CE). It exhibits many attributes, though often attenuated, of larger Mexican centers found farther south. Some of these include ball courts, pyramids, columned structures, sunken rectangular patios, iconography and astronomical orientation (Fig. 2). The magnitude and architectural complexity of this center suggests its use as the seat of a strongly centralized government and/ or major ceremonial focus.

There is still no consensus of opinion regarding the seemingly isolated presence of La Quemada so far from comparable centers to the south. Some scholars see it, among other things, as a fully developed ceremonial center with a strong focus on ancestor veneration (i.e., Nelson et al., 1992; Nelson and Martin, 2015), the focus of a pilgrimage economy (Wells and Nelson, 2007) or (here) possibly a hypertrophied local ceremonial center with little evidence of prior external stimulus to explain its earliest development. Others saw its development directly influenced by major polities to the south (i.e., Armillas, 1964; Batres, 1903; Noguera, 1930; Weigand, 1978). Despite considerable speculation, there is still no evidence for foreign domination; nor is there an explanation for its remote location. More modern studies include the application of world systems theory and peer-polity interaction (Jimenez Betts, 1992; Jimenez Betts and Darling, 2000; Nelson, 1993; Trombold et al., 1993).

The conceptual counterbalance to La Quemada is its surrounding hinterland. The core hinterland contains no fewer than 220 satellite settlements spread unevenly over a 200 km^2 area surrounding La Quemada. These settlements tend to cluster in aggregates along the major streams and their larger tributaries. Many of these hamlets were connected by a sophisticated causeway system, and often contain combined habitation and ceremonial architecture. One survey beyond the core area tended to show that northern settlements generally become more dispersed and fewer in number (Neill, 2001). The overall settlement configuration is primate with La Quemada being nearly 16 times larger in size and architectural complexity than the largest hinterland site (Los Pilarillos).[1] But La Quemada was not a city in the commonly used sense in that its resident population was small. As such, the hinterland settlements account for almost the entire population of the valley.

Most important for this particular study is that La Quemada together with its supporting population provides a natural laboratory that has physiographically defined boundaries[2] and functioned largely as a self-contained system. Its major occupation between c. 500–800 CE appears to have been terminated prematurely and perhaps abruptly, with the details an ongoing question. As such, the La Quemada region provides a unique vantage by which to understand environmental stress responses, mechanisms of abandonment, and the ultimate failure of a complex society.

3. Variability in terrace construction

A formal 100 per cent block survey was conducted of La Quemada and its immediate core hinterland by the author in 1974. This was a comprehensive field-by-field reconnaissance covering approximately 200 square kilometers to register and surface collect all visible cultural landscape features such as settlements, isolated ceremonial architecture, causeway remnants and agricultural terraces (see Trombold, 1985a: 211, 2005: 237). Informal surveys after 1974 extended the initial survey perimeters considerably. The project design drew inspiration primarily from the Texcoco regional survey by Parsons (1971), the cultural landscape studies of Denevan (1966) in the Llanos de Mojos region of lowland Bolivia and the survey by Ekholm (1939) of Sonora and northern Sinaloa. The 1974 survey resulted in the (re)discovery of 235 sites, numerous causeway remnants, three primary and approximately 16 minor terracing systems. The information obtained from this survey formed the basis for most subsequent hinterland studies.

Individual 'communal' terracing systems in varying degrees of preservation were distinguished within proximity of each of the three hinterland settlement aggregates. Smaller systems were occasionally encountered in association with individual settlements. Initially it was assumed that all terrace systems in the valley were the simple contour type described by Donkin (1979) and Denevan (1980). Subsequently in 2000 the major La Quemada terrace system was chosen for mapping, sampling and small test excavations (Fig. 3). No artifacts were recovered at that time, making dating problematical. It was only during more thorough excavations in 2008 and 2009 that we realized that there existed not one but at least three varieties of terrace construction in the valley.

The most common are sloping dry-field terraces (Spencer and Hale, 1961:8; Treacy and Denevan, 1994:97). These are also widespread throughout other arid regions of prehispanic northern Mexico, including the Guadiana basin of southern Durango (Donkin, 1979; Zavala and Punzo Diaz, 2006). The better known terraces of Sonora (Cerro de Trincheras) and Chihuahua (Cerro Juanaqueña) also appear to fall in this category. However in relative terms the La Quemada terraces covering only around 9 ha are miniscule compared to these. Cerro de Trincheras, for example, contains over 900 terraces and covers an area of around 100 ha (McGuire and Villapando, 1997; O'Donovan, 2002). The Chihuahua terraces represented by Cerro Juanaqueño are also larger than those of La Quemada. These contain nearly 500 terraces and cover a much larger area. (Hard and Roney, 1998; Hard et al., 1999). They also differ from the La Quemada terraces in that they contain habitation architecture.

The most extensive system of dry-field terracing in the Malpaso valley is located on the eastern slope of Cerro Coyotes within two kilometers west of Los Pilarillos (Fig. 4). They were constructed by mounding single rows of loose rocks that face the slope contours. This type is also occasionally found in reduced scale associated with smaller individual habitation sites throughout the valley. It is invested with the least amount of labor in that the natural hillside is minimally altered. Their construction served several purposes simultaneously by trapping moisture, removing and re-allocating rocks to create greater soil depth for planting and deterring soil erosion.

More specific to the terraces nearer La Quemada, we found not only the simpler dry-field terraces represented near certain individual sites, but two other varieties. One consists of single rows of closely spaced boulders placed perpendicular to the hill slope (Fig. 5). This, like the simpler variety, is self-accretional. These terraces were only found in the immediate vicinity of a small settlement (La Jabonera, MV-266), which itself is near the major La Quemada terraces discussed below. Somewhat more labor might be required for these because of the necessity of moving and placing heavy rocks into proper position. Nevertheless, they possibly required only minimally greater organizational skills than for the former.

4. The La Quemada terraces

The third terrace type is completely different from anything yet encountered in this valley or elsewhere in northern Mexico. These are found only in the immediate vicinity of La Quemada. They were first

[1] Los Pilarillos, the largest hinterland site, measures somewhat over 3 ha; La Quemada is estimated to contain 50 ha.

[2] The boundaries are defined by the Malpaso valley watershed as generated by GIS simulations of INEGI digital elevation models.