Journal of Archaeological Science 80 (2017) 83–95

Contents lists available at ScienceDirect

Journal of Archaeological Science

journal homepage: http://www.elsevier.com/locate/jas

Risk, agricultural intensification, political administration, and collapse in the classic period gulf lowlands: A view from above

Wesley D. Stoner

Department of Anthropology, University of Arkansas, 330 Old Main, Fayetteville, AR 72701, United States

ARTICLE INFO

Article history:
Received 28 October 2016
Received in revised form
14 February 2017
Accepted 23 February 2017

Keywords:
Mesoamerica
Agricultural intensification
Raised fields
Political centralization
Collapse
Labor management

ABSTRACT

Satellite imagery and a LiDAR-based DEM have enabled the identification of more area of agricultural intensification in the Gulf lowlands than anywhere else in Classic period (~300–800 CE) ancient Mesoamerica. This research helps to unravel the complex relationships among population density, settlement organization, food production, agricultural management, and level of sociopolitical complexity. The following conclusions are made: 1) Vestiges of agricultural intensification occur primarily in areas with dense concentrations of prehispanic monumental architecture, which represent nodes of political authority; 2) Nevertheless, some regions with evidence of intensification are distant from any monumental architectural complexes, indicating that at least some fields were constructed using family and corporate labor outside direct political oversight; 3) Intensified agricultural field area correlates negatively with the amount of rainfall recorded in historic times along the coast, suggesting that intensifications may have aimed either to reduce risks associated with exclusive use of rainfall (non-irrigation) agriculture or to maximize the annual growth cycle to produce a surplus; 4) Limited dating suggests that use of intensified agriculture ceased around the same time (~500–800 CE) just before a massive depopulation took place across much of the Gulf lowlands. This pattern implicates environmental and social stresses as part of the multifaceted process of Classic period collapse in the Gulf lowlands.

1. Introduction

Risk of food shortfalls has commanded the attention of agricultural groups world-wide. This preoccupation drove agrarian societies to intensify food production in many ways. Storable food surpluses provided for increasing population densities in the world's first cities, buffered against risk (Halstead and O'Shea [eds.], 1989), and underwrote the emergence of non-food-producing classes (D'Altroy and Earle, 1985). Early theorists argued that without subsistence intensification, civilization would never have been possible (Childe, 1950) or that coordination of labor for intensification kicked off a series of events that inevitably *caused* civilization (Steward, 1955; Wittfogel, 1957). While the evolution of civilization is irreducible to a single factor, the importance of agricultural intensification where it occurs should not be underestimated. Recent attention on the subject has shifted to questions of how and at what scale labor for intensification is coordinated with particular interest in how leaders and the public cooperate towards the same goal (Carballo et al., 2014). Any effort to alleviate subsistence concerns acts as a public good, making cooperative efforts to intensify agriculture and reduce risk of crop failure one of the most common foci of collective action over the past 10,000 years. Failure to feed a populace inevitably leads to complete sociopolitical collapse (Diamond, 2005; Gill et al., 2007; Yaeger and Hodell, 2008; Stark and Eschbach, n.d.).

For the Gulf lowlands of Veracruz (Fig. 1), researchers relying primarily of aerial photography have identified the remains of field-and-ditch agricultural intensification (Daneels et al., 2005; Schmidt, 1977; Siemens, 1998; Sluyter, 1994). While direct dating of the fields is scarce (see below), the Classic period (~300–800 CE) appears to have experienced the greatest investment in wetland agricultural intensification. This is also the period of greatest population density in most parts of the Gulf lowlands. In the current study, high-resolution satellite imagery and LiDAR-based digital elevation modules (DEMs) provide the means to systematically expand the identification of wetland intensifications beyond what had previously been accomplished using aerial photographs. Approximately 15,000 ha of field-and-ditch systems are identified, more than any other region in Mesoamerica. While this number

E-mail address: stoner.wesley@gmail.com.

http://dx.doi.org/10.1016/j.jas.2017.02.002
0305-4403/

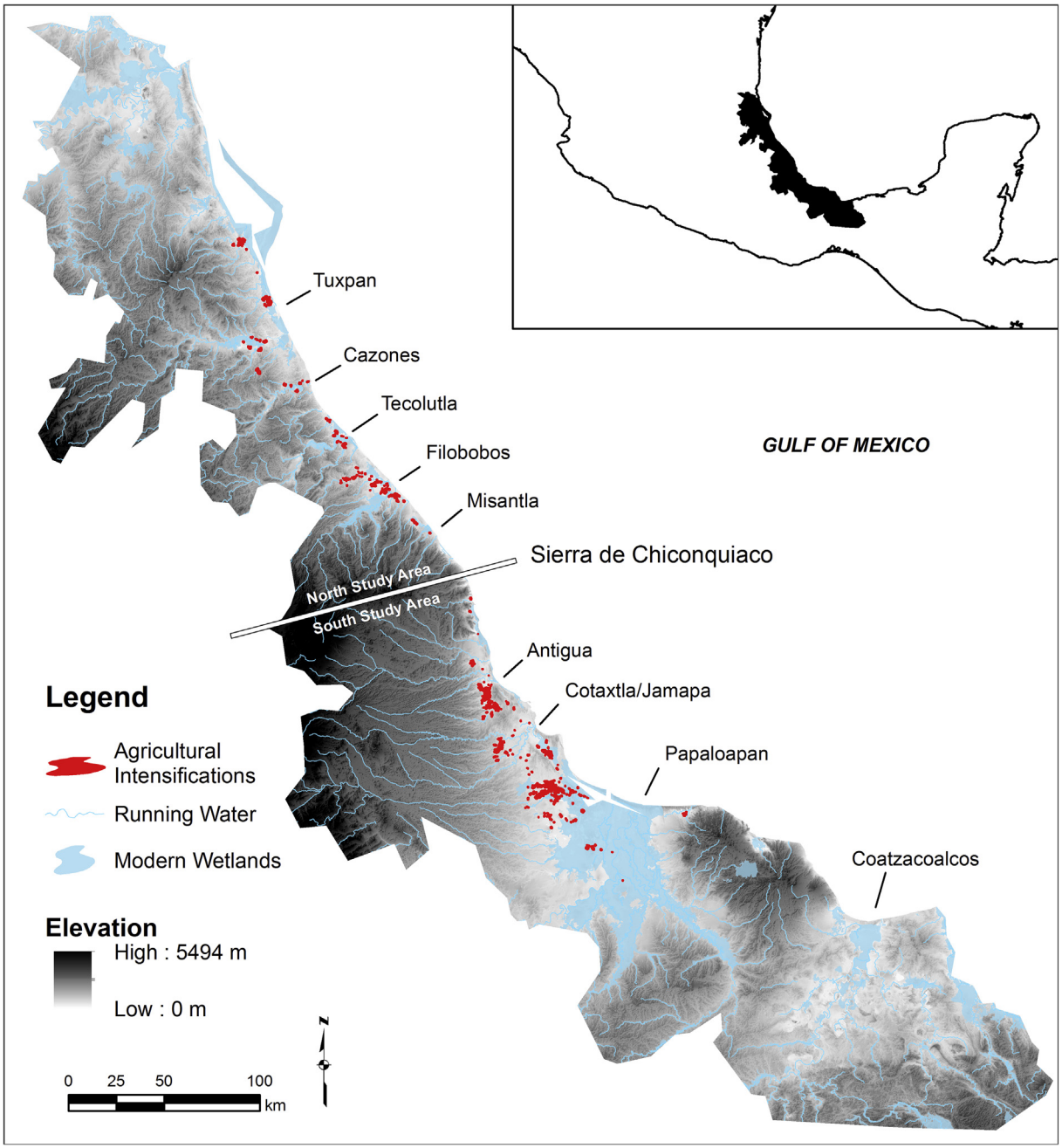

Fig. 1. The study region, showing areas of agricultural intensifications identified by this study. Terms "north" and "south" refer to a geographic division at the Sierra de Chiconquiaco.

itself represents an impressive labor investment, its distribution across space in relation to nodes of politico-religious authority is the focus of this article. In the Classic Gulf lowlands of Veracruz, political authority was focused at formal architectural complexes (henceforth FACs) – clusters of monumental buildings arranged around a central plaza. A limited number of modes of architectural configurations are repeated across the length of the Gulf lowlands, showing broad-based cooperation among corporate groups (Stark, 2016). The same labor cooperatives that built monumental architecture likely also built and maintained the agricultural intensifications. It is no accident that subsistence intensification and widespread construction of elite architecture generally coincided. The public rituals undertaken within these monumental centers often expressed themes of agricultural fertility, reinforcing the goal of agricultural-based collective action in the world-views of all citizens.

The spatial relation between field-and-ditch agricultural systems and monumental nodes of authority provides data to evaluate links among intensification of food production, the nature of labor organization, and degree of political centralization. I show that there is a strong spatial correlation between political nodes and intensified fields, reinforcing the idea of collective action among elites and commoners. But this pattern does not occur everywhere. One of the densest clusters of fields was relatively distant from any FACs. The San Juan cluster raises the possibility that labor coordination to intensify agriculture was undertaken at