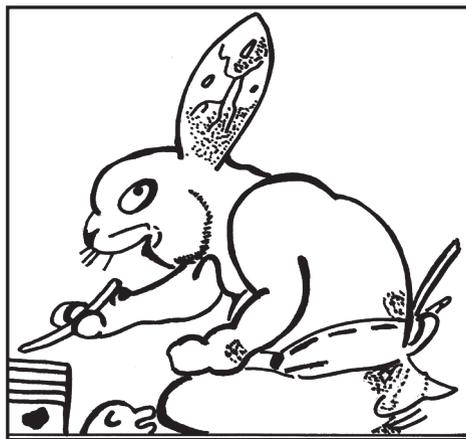


The Population of Tikal

Implications for Maya Demography

David Webster



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*I made many of the figures and photos listed above myself, either from scratch or by modifying standard images. Several colleagues generously contributed others, and I acknowledge them in the captions. Still other images, especially scenes in the Copan Valley, were project photos made in the field many years ago and I cannot tell who took them. Apologies to anyone who sees an unattributed photo of theirs in the manuscript.

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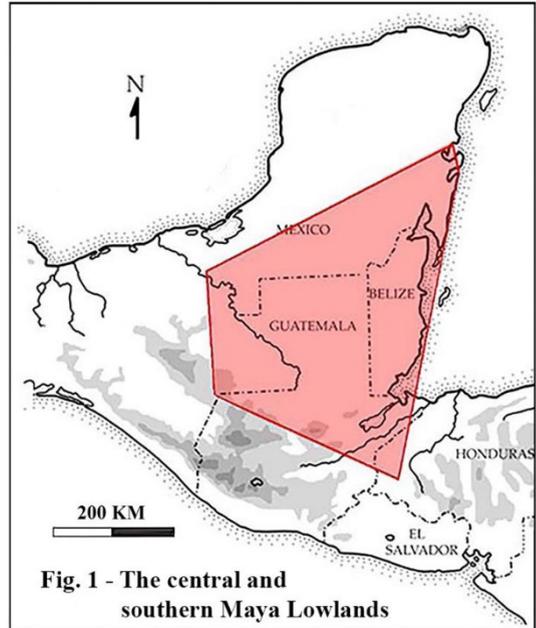
People believe unbelievable things because it's self-flattering to think that you are intellectually daring enough to accept what others find preposterous (Christopher Buckley 2003: 124).

INTRODUCTION

Tikal has long been central to our conceptions of Classic Maya demography, so I jumped at David Stuart's invitation to write an overview of its settlement and population for his 2014 symposium in Guatemala. Bad weather and hapless airlines precluded my participation, but the manuscript has since mushroomed into this much longer rumination, partly stimulated by my conviction that many Maya population estimates are overblown and sometimes preposterous. It consists of several main parts: a brief history and critique of population estimates (especially high ones), a section on the comparative demography of some ancient non-Maya civilizations, and finally a review of Tikal itself and the implications of research there for the demographic history of the central and southern Maya Lowlands. Three issues are conceptually separate. The first is the scale of the core populations that sustained Tikal and other Maya centers at their height

in the eighth century, the second is the distribution of people on their landscapes, and the third is how farmers made a living.¹ With regard to the first, there has long been agreement that the core supporting population of the mature Tikal kingdom was in the range of 45,000 to 62,000 people distributed over an area of about 120 sq. km. Because Tikal is widely identified as a Classic Maya "supersite" (Morley 1946: 318, Culbert 1973), this estimate, if plausible, provides a good benchmark for estimating populations on the wider Late Classic landscape, as well as those of earlier times. I am mainly concerned with the area shown in Fig. 1, which includes the Rio Bec/Chenes regions. B. L. Turner (1990) did an excellent review of three sub-regions in what he calls the central Maya zone, which pretty much equates with the territory discussed here, except that I include Coba in the north and Copan and Quirigua on the southeastern Maya frontier.²

That population size, density, and dynamics are essential to understanding the Maya was a common archaeological presumption of the 1960s and early 1970s. Research at that time usually focused on the Late Classic because important revelations about earlier periods, and especially the Preclassic, were still in the future, despite some promising starts at Uaxactun and Tikal. Since then, our knowledge of the early Maya has exploded, even as the pulse of large-scale settlement research has unfortunately waned and fallen out of fashion, with some notable exceptions in the Rio Bec/southern Campeche region (Šprajc 2014; Nondédéo *et al.* 2013). Literature on the pre-AD 700 Maya often fails to consider the demographic contexts of early processes and events, or presents them in perfunctory and unconvincing ways. I went through the recent overview volume *The Origins of Maya States* (Traxler and Sharer 2016) and found it paid practically no attention to population scale, although there was much talk of related issues such as monumental construction and intensive agriculture. As a more specific example, I have never seen a good analysis of Tikal's population during the famous intrusion of "foreigners" in AD 378, which is surely relevant to our understanding of these events. Reconstructing pre-Late Classic populations is



admittedly difficult. Below, I use Late Classic Tikal as a benchmark to extrapolate back in time, which leads to some unexpected conclusions, especially with respect to what some see as the first big Maya collapse at the end of the Late Preclassic.

Few things are as boring as Maya population estimates except the varied and often confusing algorithms we use to generate them. One young Mayanist of my acquaintance dismissed all such attempts because, he complained, one could generate any numbers one wanted. I do not subscribe to his gloomy perspective, but I will only touch lightly on methods, many of which date back to the University of Pennsylvania's Tikal project of the 1950s and 60s. Turner (1990) gives a good overview of methods, as do chapters in Ashmore (1981). Instead, I emphasize the population estimates made for Tikal during the last 50 years, the strengths and weaknesses of research there, especially in comparison with Copan, and my own conclusions about reasonable population scale at the polity's peak in the eighth century and during its Preclassic/Early Classic florescence. My review of all the Tikal material, along with our recent Penn State work at the site, has led me to rethink basic issues of Classic Maya demography. My colleagues and I recently finished an NSF-funded project focused on Tikal's landscape, soils, and hydrology.³ I am indebted to Timothy Murtha, director of our project, for some of the data discussed and displayed below. Parts of this paper derive from a chapter that Murtha and I published in a 2015 book on Tikal edited by David Lentz, Nicholas Dunning and Vernon Scarborough. I cite other parts of their book, but my paper was largely finished long before I read the final version. Human adaptation to a tropical forest environment is the basic theme of the 2015 volume, but only one chapter besides our own (Chapter 8 on agroforestry) pays much critical attention to population estimates.

Five major patterns in the demographic history of the central and southern Maya Lowlands require explanation:

- 1) The very long period of low population size and density extending from 2000 BC or earlier up through the Early Classic in most sub-regions.
- 2) The population dynamics of some sub-regions, such as the Mirador Uplands and the northeastern Peten, which experienced Preclassic peaks and then (apparently) sudden declines.
- 3) The major spurt of population growth that began around AD 500-550 and that lasted for several centuries.
- 4) The widespread demographic decline (or as some would have it collapse) that began around the eighth century, preceded by another possible decline at the end of the Preclassic.
- 5) The failure of Terminal or Postclassic populations to recover to anything like their eighth-ninth century peak.

Of these, the Terminal Classic collapse/decline phenomenon has consumed by far the most attention, and we are only beginning to understand Middle and Late Preclassic population dynamics. I discuss all of these patterns below, less to explain them than to place them in firmer demographic contexts. My main concerns are population size and density, and their relationship to food supply. These are only subsets of the wider field of human demography that includes age and sex structure, fertility and mortality regimes, relationships among kinship, inheritance, wealth, and fertility, demographic impacts on health and fitness consequences, and a host of others. I briefly touch on some of these subjects, but we know too little about the ancient Maya to analyze them in detail. Lurking behind what follows is the perennial anthropological debate about whether pre-modern humans effectively controlled fertility and population growth to sustain some reasonable balance with resources.

Demography is linked to several background issues and concepts. I discuss these in seven long appendices, essentially mini-essays, in order not to clutter up the main narrative. In many respects, these appendices, along with the numerous endnotes, are the heart of this paper and were the most satisfying parts to write. Population density is a slippery term. It is often used in the literature in varying, imprecise, and non-comparable ways. Readers are challenged to figure out what published estimates mean, and so sometimes were the archaeologists who purveyed them. Archaeologists usually generate Maya populations using data from small survey areas contiguous with impressive epicentral architecture, and it is often unclear to which parts of a landscape or political unit they refer. Recurrent problems are 1) surveys are sufficiently localized so that outlying populations attached to the densely-settled cores are poorly known, 2) extrapolations are often made carelessly from surveyed to un-surveyed regions, and 3) reconstructed densities are in excess of any plausible systems of staple food production.⁴ I try to be consistent by using the density definitions presented in Appendix A. Appendix B examines the proposition that large populations were necessary for Maya construction efforts. I review agricultural intensification in Appendix C, and Appendix D assesses the feasibility of supplying food to a kingdom such as Tikal should it experience local subsistence shortfalls. Appendix E addresses the thorny problems of agrarian land tenure, inheritance, and agency. Appendix F discusses sociopolitical implications of my population reconstructions, and the final Appendix G reviews the models of Thomas Malthus and Ester Boserup, whose purportedly disparate views have long framed theoretical perspectives on Maya demographic history.

The Classic Maya (and to an extent their Preclassic predecessors) are famous, or notorious, among ancient civilizations, as exemplars of two conflicting views of human adaptation. The first and oldest is that overpopulation and its associated anthropogenic landscape effects were major causes of the Classic Maya political and demographic “collapse.” The more recent view is that the Maya were canny tropical ecologists who managed their environments in ways that supported dense populations and still guaranteed resilience and sustainability.⁵ The first perspective is Malthusian (or neo-Malthusian) and the second reflects the alternative model of Ester Boserup (1965: 21). These seemingly opposing positions have in common the presumption of population growth, population pressure, and high population densities, and they resonate strongly with our current concerns about the human role in ecosystem change and resilience. Best that I stake out my own position right away, based on my experience at Becan, Copan, Piedras Negras and Tikal: *by overestimating Classic Maya populations, we have created problems that do not exist.* These include:

- 1) Why were Maya populations so large and dense compared to those of other early civilizations?
- 2) How did Late Classic landscapes support so many people?
- 3) What accounts for the huge population decline of the Late and Terminal Classic?

The big advantage of my heresy, as many colleagues will no doubt regard it, is that it eliminates or simplifies these demographic and agrarian issues. I believe that low populations for Tikal and other Classic kingdoms are still consistent with monumental construction, environmental deterioration and the Classic collapse. They also place the Maya more in line with what we know about other ancient civilizations. William Haviland, a veteran of the old Tikal project who shares my concerns about inflated population figures, kindly read drafts of this paper and provided many comments, some of which are included below. He also sent me his most recent (and very extensive) compilations of Tikal household data (Haviland 2014a and b, 2015). Although much of the Tikal information is now more than 50 years old, it is still relevant both for the Classic Maya and for their forebears.

Two caveats are necessary before going further: first, I have never seen the recent LiDAR imagery for Tikal and adjacent regions that is guarded like some old treasure map. What follows is a pre-LiDAR product that might need considerable change in the near future. I predict that the new LiDAR imagery for Tikal

and other regions, when widely available, will stimulate another pulse of even more unlikely population estimates. Second, much of analysis and data discussed below derives from Dennis Puleston's superb work at Tikal. Puleston's widow, Olga Stavrakis Puleston (2015), has edited and revised her husband's archives and notes, some previously unpublished, in a recent BAR volume. I did not have access to her update while writing this paper and none of its contents is included. Whatever new revelations derive from the BAR volume are in any case irrelevant to my review of the historical significance of the Tikal Sustaining Area Project.

A SHORT HISTORY OF MAYA DEMOGRAPHIC ESTIMATES AND THEIR IMPLICATIONS

Assertions of Classic Maya exceptionalism have a venerable history.⁶ The Maya were variously claimed to be the inventors of Mesoamerican writing, of complex calendars (particularly the Long Count), of innovations in art and architecture, and to have been inordinately peaceful. Archaeological research has long since deflated these claims and/or assigned these innovations to other cultures. One such extravagant assertion stubbornly persists, however: that the Maya achieved and maintained unprecedentedly high population densities on their tropical landscapes, especially during Late Classic times. These are often expressed as *overall densities*, either for the Lowlands as a whole or for large segments of them. Densities are usually said to peak during the eighth and early ninth centuries just before the collapse, even though by that time the foodscapes of the Maya Lowlands, anthropogenically constructed and inherited niches, had been utilized by farmers for at least 2000 years. A problem with overall densities and especially their correlate, the absolute numbers of people attached to particular polities, is that warfare was a conspicuous process on the Maya landscape by Late Classic times. Long-standing enmity and outright conflict resulted in the establishment of lightly used buffer zones, thus skewing carrying capacity estimates.⁷ We shall see below that the large corpus of Classic Maya toponyms is not much help in understanding population distributions and territorial scales.

The high density perspective partly derives from the fond conception, shared by many of my colleagues, that the Classic Maya effectively managed their agricultural resources to minimize risk and degradation and to ensure resilience in the face of uncontrollable stresses such as droughts, at least until the last really big ones hit them (see Ford 2008; McNeil, Burney and Burney 2009; Ford and Nigh 2014, 2015). Mayanists have struggled for decades to reconcile putatively high populations and ecological savvy with patchy evidence for agricultural intensification, with obvious signs of environmental wear and tear, and with the big fact of Classic Maya culture history, the dramatic political and demographic collapse that began in the eighth century. We are increasingly aware of earlier and more localized ones as early as Preclassic times – see Webster (2002), Houston (2007) and Estrada Belli (2011, 2016). Demographic dimensions of the Classic collapse (as opposed to earlier ones) have preoccupied Mayanists since the mid-nineteenth century.⁸

The widespread conviction that there were (or must have been) lots of Maya has several sources. One is the sheer volume of infrastructure -- temples, tombs, palaces, ball courts, *sacbes* and monuments -- that the Maya left behind in their site cores beginning in Middle Preclassic times. I call this the Big Stuff argument. Surely, so the logic goes, there had to be very large populations to supply the labor for these constructions. Remember that J.E.S. Thompson (1954) made excessive labor demands central to his conception of the collapse, although as we shall see shortly his population estimates were sober and reasonable. Franz Termer (1951: 101), anticipating my skeptical colleague, understood long ago how subjective extrapolation from architectural mass to population could be:

“It is assumed that such undertakings could have been carried out only by organized groups of multitudes of men. This line of reasoning leads to variable results in estimating former population density. It becomes a matter of the inclination of the particular scholar, as well as of his appreciation