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Hydroarchaeology: Measuring the Ancient Human Impact on the Palenque Watershed

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Palenque, one of the best known Classic Maya centers, has what is arguably the most unique and intricate system of water management known anywhere in the Maya Lowlands. Years of archaeological research, including intensive mapping between 1997 and 2000, reveal that this major center, situated on a narrow escarpment at the base of a high mountain range in northern Chiapas, Mexico, began as a modest settlement about AD 100. Then, during the seventh and eighth centuries, Palenque experienced explosive growth, mushrooming into a dense community with an estimated population of 6000 and approximately 1500 structures — residences, palaces, and temples¬ – under a series of powerful rulers. This process of "urban" growth led to obvious changes in landcover.

In order to better understand the effects that landcover and climate change have on the availability of water for an ancient city a new approach is required. In this paper we explore a hydroarchaeological approach that utilizes simulated daily paleoclimate data, watershed modeling, and traditional archaeology to view the response of ancient human impact within the watershed surrounding Palenque. There is great potential for watershed-climate modeling in developing plausible scenarios of water use and supply, and the effect of extreme conditions (flood and drought), all of which cannot be fully represented by atmosphere-based climate and weather projections.

The first objective of the paper is to test the hypothesis that drought was a major cause for Palenque's collapse. Did the Maya abandon Palenque in search of water? Secondly, we evaluate the hydraulic design of the water management features at Palenque against extreme meteorological events. How successful was the hydraulic engineering of the Maya in coping with droughts and floods?

The archaeological implications for this non-invasive "virtual" method are many, including detecting periods of stress within a community, estimating population by developing caps based on the availability of water, understanding settlement patterns, as well as assisting present local populations in understanding the water cycle of Palenque.