**Supplemental File 7: Model Limitations**

This model has several limitations, those that pertain to the data used in this study are outlined in Supplemental Table 3. However, the data collected on the crops and the general methods as outlined by the ModelBuilder model serve as a foundation for the compilation of more types of data, higher resolution datasets, and more complex spatial analyses.

Spatial resolution and data availability are central limitations of this study. The use of more crop growth variables at a higher spatial resolution will improve the ability of the model to reflect the past suitability of the landscape in terms of different groupings of crops, or even individual crops. Variables such as temperature, precipitation, and waterlogging tolerance, while noted in the literature and listed in Supplemental Table 1, are not available for the study region at 250 m spatial resolution or finer based on a search of available INEGI/CONABIO data. That is, although contemporary Maya farmers recognize and utilize several microenvironments, tailoring them to specific plant species (e.g., Fedick et al. 2008), the data resolution in this region was too low to make such distinctions.

Many other variables that impact the suitability of the land for different crops are not listed in Supplemental Table 1. Soil nutrients, particularly phosphorus, are not considered here, but may have been limiting factors in the soils near Piedras Negras (Fernández et al. 2005). Furthermore, the soils in this study only present data for one depth, failing to represent the heterogeneity of soils in a vertical profile from topsoil to bedrock. The soils at different points in time, even prior to human interventions such as nutrient depletion and erosion, would have had different characteristics, making them suitable for cultivating particular species. This study also does not evaluate how proximity to ancient water sources, including canals and stagnant water, may have altered local soil moisture, and thus the suitability of the soil for different crops. Finally, it is important to remember that this model is based on modern environmental data and does not incorporate paleoenvironmental data, though an effort has been made to understand and record good farming practice at the time for the various crops investigated in terms of time of harvest.

Beyond the dataset availability, MCE WO analysis has limitations. The results of MCE WO analysis are particularly dependant on decisions made in the normalization, reclassification, and weighting of the input parameters. Further, suitability mapped by these models are ordinal, not interval. Suitability between ranks is qualitatively represented, as opposed to quantitatively, and so the model can tell us that an area is more suitable than another, but not how much more suitable. Helen Goodchild (2013), in a study that created production maps using MCE for ancient Roman agriculture, emphasizes that although the maps reflect numerical values, they were derived from categorical data. The model she produced merely suggests agricultural potential and does not reflect actual decision making or agricultural practices of past peoples (2013:63). The same is true of this study. Atran et al. (1993), for example, note that Itza Maya farmers prefer to situate milpas in loose soil and on well-drained slopes. However, the conversion of this preference into a numerical scale from best or most preferred to least preferred is difficult. The model created in this research is a simple model, though MCE analysis can incorporate more complex factors such as Fuzzy Logic (e.g., used in Buck and Sabol 2014) which scales each layer as a continuous surface, as opposed to an ordinal surface.

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