

Maya Agriculture Model Exercise

The purpose of this exercise is to explore the nonlinear dynamics of a population system with a carrying capacity, when the carrying capacity can be decreased as the population grows.

Instructions:

Read the Garcia exercise “Efectos de la Agricultura Intensiva”.

Using the Vensim model *Agricultura Maya.mdl*, complete the equations as presented there, including the parameter values.

Check the model for correct model (CNTL-T) and units (CNTL-U) specifications. If there are any specification errors, revise the model to eliminate them.

Run a “baseline” version of the model (named “Base”) using the initial values.

Examine the graphs for population, food production, land use and soil fertility already included in the graph. According to this simple model, what was the ultimate source of the decline of the Maya culture?

Could the Maya have persisted for much longer if they modified their decisions (that is, changed their rate equations)? Examine the following possibilities:

- 1) Increase the value of the “Intensity” variable from 1 to 2. Run the model again with the name “Intensidad=2” How does the behavior change, and why?
- 2) Modify the value of “tasa de emigración” from 0.05 to 0.25. (This implies that the emigration rate is much more response to deficits in food production than previously.) How does this change the behavior of the model, and why?
- 3) Modify the value of “tasa de incremento” from 0.0017 to 0.0012. This implies a lower rate of net births. How does this change the behavior of the model, and why?
- 4) Use the previous information to speculate how the Maya could have made their agricultural system sustainable indefinitely.