Abstract: It has long been recognized in anthropology and archaeology that there is a complex relation between culture, demography and climate. This issue has been of central importance in the Neolithic archaeology in Europe, especially for the related questions of the spread of Neolithic and the Neolithic demographic transition. We present a critical review of the previous research along with new contributions based on the results of paleodemographic reconstruction of population dynamics for the parts of Southeast Europe during the 7th and 6th millennia BCE. The summed radiocarbon calibrated probability distributions method was applied on published datasets from Serbia, Bulgaria and Hungary, and the resulting curves were compared with the climate proxy data. We conclude that there are some clues that climate patterns were correlated with changes in culture and demography at various scales, but at present, there is no sufficient data to establish causal links.