Future changes in the water cycle may interact with temperature increases. For example, as mentioned in one of the lectures, Piñon Pine forests in the southwestern U.S. recently experienced a large scale drought-associated die-off that was substantially more severe than the mortality associated with a comparably strong drought in the 1950's (Breshears et al., 2005). A recent experiment in UofA’s Biosphere 2 (Adams et al., 2009) sought to investigate whether this higher drought mortality could be due to warmer temperatures that make piñon pine trees more susceptible to drought.

This assignment is similar to assignment #2, in that you will read and analyze a real scientific paper (in this case the first author, Henry Adams, is a current UofA graduate student who took Global Change a couple of years ago), and then address the questions below. Please answer each question with a short paragraph of complete sentences with correct spelling and grammar. (and also please type your assignment on a computer, rather than submit a handwritten response)

a. What is the overall question addressed by this study?
b. What methods did the authors use to address the question?
c. What are the two main categories of tree-mortality causes that the authors considered, and which of these two did they conclude was observed in the study? What was the evidence for this?
d. Imagine that you are skeptical of their conclusion about the mechanism of mortality. Can you think of one or two things you could study next to test the author’s conclusions more robustly? (e.g. if you could re-do the experiment, are there things you could measure that they did not, or are there additional factors that you might add to the experimental manipulation that would give stronger insight)?
e. Imagine that mid-range IPCC model temperature projections to 2100 turn out to be true, but that despite expectation, drought frequency and mean precipitation did not increase in the American southwest, but instead retained the same characteristics as the last century. What do you think Adams et al would say this scenario means for the future of Piñon Pine in the southwest?

REFERENCES