**Developing your research question**

Coming up with the right scientific research question is difficult! The ability to ask important questions is one of the characteristics that distinguishes great scientists. It requires a solid understanding of the relevant literature, intuition regarding the functioning of ecological systems, planning to ensure feasibility, and vision as to what questions will strongly advance the field.

Of course, for this research experience, we do not expect you to master the skill of asking scientific questions at the level of a professional scientist, but we do want you to go through the process scaled to your current level of understanding (with some pushing to a higher level!). Below are the main steps:

1. Gain understanding of the relevant literature and current state of knowledge
   1. Your instructor/advisor should give you a list of ~5 papers to get you started in your understanding of the global C cycle and ForC database.
   2. As you read, note remaining uncertainties. Often these are discussed in a paper’s discussion section
   3. In Anderson-Teixeira et al (currently in prep)/ C cycle diagrams on GitHub, pay attention to variables for which there is little data. In many cases, greater understanding could be gained through synthesis of existing data in the scientific literature.
2. Generate questions of interest
   1. Think big! The ForC database is designed to ask big-scale, general questions, and this is its strength. It’s not the best tool for asking questions about just one site.
   2. Generate ideas
      1. Review notes from step 1
      2. Also, think of questions about which you might personally be curious. For example,
         1. How does C cycling in your favorite forest type compare to other forests?
         2. How does a variable that you find interesting vary with mean annual temperature (or some other climate variable)? What might be the implications under a warmer climate?
         3. How does a variable that you find interesting change as forests age?
         4. What effect does a certain type of management or treatment (ForC has data on watering, fertilization, experimental warming, CO2 elevation, and more) have on forest C cycling?
   3. Defining the question
      1. Decide the C cycle variable(s) of interest
      2. Decide on independent variable(s) of interest
      3. Define the geographic scope
      4. Define other aspects of scope
         1. What age range will you include?
         2. Will you include managed / disturbed forests?
         3. Does your question require knowing management/disturbance history?
3. Plan to ensure feasibility of question(s) of interest
   1. How much data do you need to address the question?
      1. Discuss this with your instructor/advisor
   2. How much of the needed data is in ForC?
      1. Be sure to consider not just the number of records, but whether all of the data you’ll need is included.
      2. Be sure to consider how many records are available after you control for confounding factors. For example, if you want to consider only mature forests, be sure to exclude young forests before assessing the available data.
   3. If you’ll need more data than is already in ForC, would it be feasible to get it?
      1. If there are records with some missing data, how feasible would it be to look this up?
         1. The missing data code ‘NAC’ indicates that there’s a good chance you could find the information if you access the original publication
      2. If you need to add more records, do the data exist?
         1. For some variables/ forest types, there is a lot more public data than has been added to ForC.
         2. You can start with a search on google scholar to get a sense of what additional data may be out there
         3. Discuss potential addition of new data with your instructor/advisor
4. Pick the question you’d most like to pursue
   1. After completing the above steps, you should have a good idea of 1 or more questions that would make a good project
   2. Discuss final choice with your instructor/advisor