# Suggestions for how instructors can introduce this modeling activity at the beginning of the activity period

* A very important note based on our experience: an extended lecture at the beginning of the activity period has not been very beneficial to our students. This could be because they literally do not have a good understanding of this modeling activity or its components when they arrive for the activity (even if you asked them to do some readings prior to class). It has also been our observation that the attention span for these kinds of lectures diminishes pretty quickly (we would say by about 10 minutes). This is why we would not recommend a long introduction to this activity; instead, a quick and short introduction has worked well for us, allowing students to learn as they work their way through the steps. Hopefully, instructors can know that the step-by-step guide provided in supplemental material 3 also provides sufficient explanation for what the students are doing and the products they are getting.
* Another thing for instructors to note is that the goal of this activity is not to make students “expert modelers”, which would require introducing them to a whole lot more about modeling than they get with this activity. **The goal here is to help students appreciate this basic modeling activity that can allow them to do basic manipulations of ecosystems, with the goal of getting a glimpse into how ecosystems respond to disturbances**. As such, we advise instructors not to get too lost in the details of the modeling environment, but rather focus on helping student understand what the disturbance is doing to the ecosystem and what that means for them as potential decision makers.
* For the short introduction at the beginning of the activity, we recommend that instructors look at the suggestions given in step 5 of the “structure of the activity period” section in the manuscript, doing their best to cover what State and Transition Models(STM) are and what SyncroSim is.
* Some of the things to consider pointing out during the short introductory period are:
  + STMs are frameworks that are used to describe changes in plant communities that occur at a particular ecological site as a result of normal successional changes or from the impact of a disturbance.
    - During this process, an ecosystem is represented by a set of state classes, each synonymous with successional stages such as early/mid/late stages. Each one of these state classes comprise a certain proportion of the ecosystem (e.g., early succession could be 20% of the forest while late succession could be 50% etc.).
    - Modeling allows the user to first quantify what the baseline proportions are for each state class, then subject the ecosystem to some hypothetical disturbance, and finally assess how that disturbance impacted the proportion of each state class.
    - This chain of steps is the modeling activity, which can enable the user to visualize the real-world ecological implications of a variety of disturbances (e.g., does this disturbance wipe out the late succession community and create opportunities for more of the early succession communities?).
  + SyncroSim is an open access software that provides the platform for carrying out State and Transition modeling activities (the platform in which the modeling activities are done).
  + The goal of the activity is to examine ecosystem responses to disturbances. The instructor can flesh this out if needed, based on content in the manuscript and as discussed above. They can even put one of the example graphs in supplemental material 3 or 7 on a powerpoint slide to use during the introduction, to give students a visual representation of these impacts.
  + This activity is more of a “learn as you do” process where step-by-step instructions are given (in supplemental material 3). It is important for students to follow the instructions as given to minimize hiccups and frustrations.
  + The first part will help students learn how to display the successional stages in an ecosystem. The second part will help them learn how to introduce a disturbance to that ecosystem and model its impact. The last part will require them to use the skills learned in part 1 and 2, to model the impacts of other disturbances.
  + Students need to download all materials needed for the activity, from whatever platform the instructor posted them, and be reminded what each supplemental material is for.
  + The students then need to open SyncroSim and ensure that it is ready to go.
  + Students need to remember that it is very easy to redo anything in SyncroSim in case something happens and they lose what they had worked on. Once they are familiar with the steps, it literally takes about one minute to remake a graph! Students should not “freak out” (the term most of them use) when something goes wrong during the activity.
  + When ready, students will begin this activity from slide # 1 in supplemental material 3.
* We do not recommend that instructors simply demonstrate to the students the entire modeling activity, or generate results and then only ask students to respond to the questions related to the outcomes. Being a hands-on activity, where we also hope to address potential fears of “modeling” as a term, it is important for students to work through the steps of this activity by themselves, whether they are working individually or in a group. Unless absolutely necessary, instructors should just do the short introduction at the beginning, then set the students free to get going, purposefully going around the room providing guidance or encouraging where needed.

# Notes regarding student engagement and responsiveness during the activity

* Our experience is that most students are typically intimidated by this activity before and at the start, but soon as they get going, they warm up to it and are able to just follow the step-by-step directions in supplemental material 3 and complete the assignment successfully.
* Majority of the students’ frustrations are often because **the particular students do not follow the step-by-step directions given in supplemental material 3**. They decide to skip steps and then turn around and ask instructors what they did wrong. Another variation of this issue is that **some students try to get instructors to help them do every step**, right from the start, without putting in the effort to try problem-solve. They raise their hands up for help right from the first minute of the activity. For both of these cases, instead of doing it for them, we have often taken the student back to the specific slide in supplemental material 3 that has instructions on what they are asking help for. In this way, they learn to follow directions instead of cutting short cuts, often with the intention to just get done quickly with the activity.
* Another source of frustration can be issues related to installation of the software (which we discuss in supplemental material 1 and in the manuscript), or some personal computers “crashing” in the middle of the activity (which we address above regarding how easily they can redo things).
* Overall, we have observed very positive reception for this activity from the overwhelming. majority of students, with some often saying things like “I never knew I could do this”.
  + Once example that provides us a sense for student engagement with the material is how they handle modeling a disturbance of their choice, the last item in supplemental material 4.
  + Some students end up selecting interesting and often extreme disturbances, which to us shows that they are engaged with the material, understand it to a certain extent, and are able to explore what is possible with this activity. We have seen students totally flood their ecosystems with water, burn it down to the ground with an extreme fire, introduce Sasquatch to the forest, and even subject the system to a volcanic activity!
  + They seem to have fun and are seemingly curious about the impact of various disturbances ; hopefully, they are learning in the process.
* Something else we have observed with a very small number of students is that they do not put in the effort to 1) follow the step-by-step instructions given to successfully complete the assignment, and 2) strive to understand or think critically about what it is they are doing. These students are often more focused on just doing the activity to complete it and leave. While there is not much an instructor can do to change this, it might help to go to these students individually and try see if they understand why they are doing certain things. We have found some students to be receptive to this and actually end up getting invested in what they are doing.