

Prescribed Practical 5: Mesocosms

For this activity, you will design and construct a “mesocosm”. Class time will be allowed for brainstorming and planning, but the actual mesocosm will be constructed outside of class. You will document your construction process and make observations over a 3-week period. The goal is to create a self-sustaining, enclosed ecosystem model.

Guiding Questions

What will these plants, and animals need to be able to survive without holes in the bottle?

How will the oxygen get in?

Activity 1 - Building a mesocosm

Practical considerations:

1. Should the sides of your vessel be transparent or opaque?
2. Define “sustainable”. Which kinds of organisms need to be included to make your mesocosm sustainable?
3. Diagram a food web of predicted interactions inside your mesocosm.
4. How can you ensure that the oxygen supply will be sufficient for all organisms in the mesocosm once it is sealed?
5. How can we prevent organisms from suffering as a result of being placed in the mesocosm?

Document your brainstorming here:

Activity 2 - Experiment with your mesocosms

Mesocosms have been used in research to test the effects of herbicides and other pesticides, to evaluate climate change effects and for many other purposes. Aquatic mesocosms are particularly common.

Use your design to perform a long-term investigation.

Here are some ideas.

I. Make identical mesocosms and put them in positions with varying conditions,

1. Increasing light levels. Is there an optimum light level?
2. Increasing temperatures. If there is more condensation - like rain clouds do the plants grow better?
3. Movement, tip or shake the bottles to see the effect of water movement.

II. Make a range of mesocosms and change one component as an independent variable.

1. Put increasing amounts of plant material in, and record the longevity of the mesocosm.
 2. Add more and more water to each mesocosm, is there a minimum amount needed.
 3. Add more species of plant, or more species of animals.
 4. Add some rotting compost to the soil. Watch to see the emergence of fruit flies or the presence of maggots
 5. Connect the water section to the plant section with string, or a piece of wood.
 6. Mix seeds with the soil, with different amounts in each bottle.
 7. Add an increasing amount of sediment / sand into the water.
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III. Measurement that may be possible

1. Test the water for pH or nitrates at the beginning and the end of the experiment.
 2. Measure the mass of plants at the beginning and end.
 3. Count the leaves, or the number of animals.
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Document your Experiment plan here:

Reporting your results.

Your project will be assessed in two phases.

Phase 1: Constructed mesocosm, and documentation of brainstorming and experimental plan, along with answered questions, due in class on 9/6.

Phase 2: A reflection journal that documents your observations over time due in class on 9/28. Your journal will include written and photographic observations of changes in your mesocosm over time. You must assess at least twice per week but you may choose to note changes more frequently depending on the nature of your experiment.

Full Rubric is posted online.

Personal engagement	Exploration	Analysis	Evaluation	Communication	Total
2 (8%)	6 (25%)	6 (25%)	6 (25%)	4 (17%)	24 (100%)

Phase 1: Personal Engagement and Exploration (due 9/6)

Phase 2: Analysis, Evaluation, Communication (due 9/28)