



An Aquarium-Terrarium System

INTRODUCTION

A great deal of our work in this unit will center around the observations we will make of the relationship between organisms and their environment in an aquarium-terrarium system. To initiate these investigations, the class will divide into small groups and each group will design a small aquarium and terrarium system. In addition, the entire class will help set up one system in a partitioned aquarium-terrarium tank. This activity represents an inquiry investigation designed to give you the chance to experience the “doing” of science in many of the same ways that scientists do, learning biology through inquiry.

OBJECTIVES

- Describe the various components of an ecosystem and explain how and why they interact.
- Understand various ecological terms such as growth curves, carrying capacity, equilibrium level, competition, symbiosis, predation and food webs.
- Design, build, observe, and evaluate a small-scale physical model of an ecosystem, and explain its relationship to natural ecosystems.
- Describe several different types of models used in science, explain their roles in the “doing of science,” and explain the relative advantages and disadvantages of different kinds of models.
- Develop, test, and evaluate hypotheses addressing several different variables of an ecosystem.
- Explain the nature of science and the importance of collaboration and communication in the “doing” of science.
- Work professionally and effectively with members of other sections
- Work professionally and effectively with members of your group
- Acquire and report information using various means

INDIANA SCIENCE STANDARDS: K-2.NOS.1-7, K-2.DP.1-9, LS 1.3.2, LS 1.3.3, LS 1.3.4, LS 1.3.5, LS 2.3.1, SET 1.4.2, SET 1.4.3, 3-5.NOS.1-9, 3-5.DP.1-11, LS 3.3.2, LS 4.3.3, LS 4.3.4, SET 3.4.1, 6.NOS.1-11, 6.DP.1-11, LS 6.3.1, LS 6.3.2, LS 6.3.4, LS 6.3.5, LS 6.3.6

NOTES/DAY ONE

1. What is an ecosystem?

2. What are the two components of an ecosystem?
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3. What is a hypothesis?

4. How should I write a hypothesis?

5. Four questions to ask when evaluating the validity of my hypothesis.
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NOTES/DAY TWO

1. Are the ecosystems that we are building true ecosystems? Why or why not?

2. What are some ways we assist our classroom ecosystems?

3. What are models?

4. When and how would one use models?

5. What are the benefits of using models?

6. Two types of models:

1. Physical model:

- advantages:
- disadvantages:

2. Mathematical model:

- advantages:
- disadvantages:

PRELAB

- Review lab procedures
- Read "Plant and Animal Care for Your Aquarium/Terrarium System" beginning on page 22.
- Write two hypotheses in each of four areas:
 - Animal growth
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 - Plant growth
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 - Animal interactions
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 - Physical environment
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PROCEDUREMaterials for the class:

1. One partitioned aquarium tank
2. One light source
3. Soil
4. Sand
5. Rocks/Pebbles
6. Grass seed
7. Sticks
8. Anacharis (pond weed)
9. Algae culture
10. Fast plants
11. Guppies
12. Pond snails
13. Crickets
14. Anoles
15. Frogs
16. Mealworms
17. Fiddler crabs
18. Isopods

The Design:

Each lab group should design both an aquarium and terrarium, as directed by your TA. Keep in mind the organisms which will be added to the system, and their needs. Try to make your design as detailed as possible, while also satisfying the criteria that your TAs give you. After a short period for design, each group will present their design to the class for a vote. One design will be chosen to be constructed from each section. If any modifications are made to the original design by the class, please note them carefully, and **KEEP YOUR NOTES.**

The Construction:

One representative from each lab group will work on a team to construct the chosen design. Remember to follow the design exactly as noted, including what seeds to plant and their locations.

Adding Organisms:

Organisms should be added to the completed system over a period of time, as your TA instructs.

Keeping a Notebook:

A notebook will be provided in which all your ecosystem experiment data and observations will be recorded. Your ability to arrive at reasonable conclusions which are scientifically defensible demands that you keep accurate, complete records. The following suggestions should help you in making and recording good observations during the aquarium/terrarium activity. Remember, another factor in being able to draw conclusions from your observations is the consistency and accuracy of your data. Your notebook should include **AT LEAST** the following, as well as the DATE and TIME:

Physical factors (measurements when possible):

- Temperature (air, soil, water)
- water
 - water level
 - water added
- Organisms
 - name
 - number of each type
- evidence of reproduction
- evidence of interaction
 - between organism and physical factors
 - between organism and other organisms

EVALUATION:

Observe the system carefully throughout the length of the activity. Always ensure that the soil is adequately watered. Take careful and consistent measurements. You will need to decide what variables are important to measure, and develop a protocol for measuring them. Observe long enough each time to answer the following questions:

1. Do any organisms move between the aquarium and the terrarium? If so, which ones?
2. What happens to the size of each population of organisms over the course of time?
3. Record the location of all organisms. Do they remain in one location or do they move about the whole system?
4. Describe how each type of animal gathers food, i.e., what does it eat and how does it get it?
5. What happens to dead organisms?