

# Pond Ecosystem

**Grade:** 7<sup>th</sup>

**Standards:**

Science- A. 14a, B.1, B.2 & B.3

Math- C.1 & E.3

Culture- B.3, & E.2

**Science concept:**

Students will understand that materials or substances in the environment affect ecosystems differently.

**Materials: (per group)**

- 2 fish bowls
- Microscope
- Pond water and dirt from the bottom of the pond
- Oil, sugar, light, Oxygen or other variables the students can test
- pipette or eyedroppers
- microscope slides and cover slips
- Protozoan Key

**Vocabulary:**

Organism, ecosystem, protozoan,

**Gear Up-**

Go to a local pond and make observations. Have students keep a list of all the organisms that they see. Also, keep a note of the man made materials in or around the pond. Students can also use a hand lens to take a closer look at things they see. When the students have had enough time to make observations, discuss the different things each student observed.

Process Skills: Observation, Communication

**Explore**

Have students make observations of pond water using a microscope. Students should try and identify what they see and keep a tally for how many of each organism they see. Students should be given a Protozoan key to help with identification.

Process Skills- Observation and Classify

**Generalize:**

As a class, make a graph using the student's tally for each organism. Can we make a statement about which organism(s) there are more of in the pond? How is each organism the same? Different?

Process Skills: Communication & Inference

**Experiment:**

Students will design an experiment to test the effects of different material on their pond ecosystem. They will need to have a control and a variable. Some examples of the variables are: oil, sugar, adding oxygen, 24-hour light source, snails, plants. The students can come up with their own variable that is approved by the teacher. Reminder: Only one variable should be tested at a time. This experiment can be tested in a short period of time or a long period of time. My class will be observing and collecting data for 9 weeks. A formal lab write-up and graphs are to be turned in when the experiment is complete.

Process Skills: Observation, Classification, Predicting/Hypothesizing, & Controlling Variables

**Apply/Assess**

Have students share what they tested and what they concluded after their experiment was over. Ask the class what they think the effect of other materials that weren't tested would be based on their new knowledge. For those that tested oil or other pollutants, ask what the effects of environmental pollutants would be to an ecosystem and why it would be important to clean up as much as they could as soon as they could. Some students may make reference to the Exxon Valdez Oil Spill. A formal lab write up should be completed following the lab as part of their assessment using the lab write-up guidelines.

Process Skills: Communication

**Extensions:**

- Write a report about an oil spill in their community or state.
- Have an expert from the Department of Environmental Conservation and/or Biologist from Fish and Game visit the class.

## **Pond Ecosystem Lab Write-up**

### **Abstract**

The abstract is a brief summary of the entire report. It belongs in the beginning but this should be the last part you write, so you know what to summarize. An easy way to write the abstract is to have one sentence describe what was tested, one to describe how it was tested, one to describe the results and one to describe your conclusions. The abstract should be short and to the point, 3-6 sentences.

### **Introduction**

The introduction introduces the reader to the subject and explains the importance of the experiment. The following questions should be answered by reading your introduction: What is an ecosystem, or pond ecosystem in particular? Why do scientist, or people, study them (or why should they)? What factor will you be testing will you be testing on a pond ecosystem? Why is this a useful experiment, or what is the importance of your test? (Think of this part as convincing someone to help fund your experiment. What do you think will happen? Why? (This is your hypothesis.)

The introduction is a section where you may need to be creative to come up with your reasoning. Try to make your experiment sound important, useful, and interesting. If the above questions are answered by reading your introduction, then it is probably adequate.

### **Materials and Methods**

In this section you can either list or describe in sentences what materials were used in your experiment and how you performed your test. Make sure you include your utensils, water source, organisms added if any. Exact amounts should be included, so someone reading your report could repeat your experiment exactly.

List or describe the methods used for the experiment. What was done with your materials to set up the experiment? How did you collect data (be specific)? When and how often did you collect your data? Could someone repeat the experiment by following your methods? HINT: it would be very hard to describe your methods without using the word pipette, wet mount,

microscope, power or magnification, field of view, experiment, control, and counting organisms.

### **Results**

This section should present the data you collected in the form of charts and graphs. Make sure you mention how you obtained the numbers you came up with here or in the methods section. That is, if you added together, or took the average of, the total number of organisms seen in five fields of views to obtain the number then you need to explain that. Do not discuss the results here; simply present the data in charts and graphs.

### **Discussion**

The discussion is the most in-depth portion of your report. It should describe your results of your experiment and attempt to explain them. Keep in mind you are comparing the experiment and the control. Point out similarities and differences. Were there any trends or patterns in your data? Were there any exceptions or outlying data points (things that contradict trends)? Did some organisms survive better than others? Do you think the organisms interacted with (had an effect on) each other? Why? What could explain your results? Was your hypothesis correct? Remember, it is okay if it wasn't. What are the implications of your results? What knowledge has been gained by doing this experiment? What mistakes were made? What would you do differently if you were to do this experiment again? Does your data lead you to any new hypotheses (ideas to test)? What is your overall conclusion?

### **References**

Alphabetically list any sources of information you used in your paper. Include the author, year, Title, publisher, and pages. For example:

Eberhard, C. 1998. Experiments in Biology. CBS College Publ. Pp. 401-403

## Helpful Hints

- Use sections, or sections headings. For example: use this handout.
- Organism names can be made up. Don't worry about using the scientific names.
- You and your partner should have the same materials list and data, but your reports should be different. Hypothesis and conclusions may be different.
- Do not say that you are trying to prove your hypothesis.
- You are not just testing the effects of something on a pond. You are looking at the effects of something on pond organism population.
- Better words for "bad for": toxic, detrimental, poisonous, harmful, negative.
- Better words for "good for": beneficial, positive, helpful, aid, conducive
- Spelling counts and so does grammar. Remember this is a final report.
- Scientific writing is short and to the point. *Get rid of extra words.*
- **BIG MISTAKE:** turning in a paper with our proof reading it.
- **BIGGER MISTAKE:** not asking for help if you need it before it is due.

### Pond Ecosystem Lab Rubric

Required elements	Level 1	Level 2	Level 3	Level 4
<b>Hypothesis</b>	A hypothesis was not made.	An attempt at a hypothesis was made. The hypothesis is not very clear	A thoughtful hypothesis was made.	A well thought out hypothesis was made and very clear.
<b>Abstract</b>	An abstract was not written	An attempt at an abstract was made but not very clear	Most of the required elements were in the abstract	A thorough abstract was written.
<b>Graph (data)</b>	A graph or chart of data was not made	A graph was made but missing required part and not clear	A graph was made and mostly understandable	A graph was made and understandable and clear.
<b>Lab Design</b>	The lab procedures are not written in final lab report.	An attempt to write the lab procedures is evident.	Most lab procedures are written and are understandable.	Lab procedures are well written and anyone can follow the directions.
<b>Lab Safety</b>	Safety Procedures were not followed	Lab rules were followed some of the times	Lab rules were followed most of the time	Lab rules were followed all of the time
<b>Participation</b>	Student did not participate in the lab	Student participated occasionally	Student participated most of the time	Student participated all of the time and put extra work into it