



Eutrophication Lab: Nutrients or Light

OBJECTIVES

Students will be introduced to eutrophication and its impacts on phytoplankton.

MA STATE FRAMEWORK(s)

2.B.02.05

2.B.02.06

2.B.02.07

2.I.02.04

2.I.02.13

2.J.03.01

2.K.01.01

2.K.01.02

2.L.02.01

ESSENTIAL QUESTIONS

- What environmental mechanisms lead to eutrophication?
- What role do nutrients play in water health?
- What role does light play in water health?
- What are management strategies to limit eutrophication in our waterways?

MATERIALS NEEDED

- Light or Nutrients Lab Sheet (attached)
- Three 1-liter soda bottles per group
- Local Water Sample
- Liquid Fertilizer
- Heat Lamp (Optional)
- Video: Toxic Algae Bloom (https://youtu.be/K_sLmKkC6yk)
- Video: Dead Zone of Gulf of Mexico (<https://youtu.be/5zWmdHmJMdo>)
- Article: What is Harmful Algal Bloom (<https://bit.ly/42kJ5wb>)

PROCEDURE

One week before lab: Encourage students to bring in one liter bottles from home to utilize for an upcoming lab. Collect and rinse thoroughly

Day before lab: Lead a classroom conversation on the impacts of eutrophication and HAB's. If you need support on this topic, here are resources for you to learn from. You can also choose to review these with your students.

- [Video: Toxic Algae Blooms in Florida](#)
- [Video: The "Dead Zone" of the Gulf of Mexico Ted Talk](#)
- [Article: What is a Harmful Algal Bloom?](#)

Day of lab: Set students into work groups and either assign variables, or allow students time to create their own variables. Give students three one liter bottles and have them label Experimental (Bottle ER), Control River (Bottle CR), and Control Tap (Bottle T). Make sure students have access to a local water source by either collecting enough in advance or bringing students to collect their own samples.

Monitoring Period (Day 2-10): Continue to have students track their progress over the next several weeks, and reach final conclusions as a full class.

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Lab Handout

Introduction

Let's investigate the effects of limiting factors on phytoplankton growth first-hand. We are going to perform a 2-week experiment that explores the needs of phytoplankton, our most important marine producers. Follow the lab procedures listed on your worksheet. Each group will test the effect of light or nutrients, but not both.

Materials

- three 1-liter soda bottles
- water from a local river (Fill 1 bottle)
- liquid fertilizer

Procedure

- 1) Gather your materials. Make sure to thoroughly rinse your bottles. Using two bottles, gather a sample from the river and fill your bottles approximately halfway, making sure that the water levels are equal.
- 2) Back in the classroom, fill your third bottle with tap water approximately halfway, making sure the water levels match your river samples.
- 3) Label the bottles with YOUR limiting factor. Label your tap water as Tap + limiting factor.
- 4) Describe below how your group will control the experiment to test for only one variable.
- 5) Using the table below, record your observations daily. Is there a change in your sample? Does the water appear clear, murky, cloudy, colored etc.?

Date & Time	Experimental (Bottle ER)	Control River (Bottle CR)	Control Tap (Bottle T)	Notes

Results after Week 2

What organisms are living in the water in the soda bottles? How do you know?

Describe what the groups who tested the effect of light found.

Describe what the groups who tested the effect of nutrients found.

What is the overall effect of light and fertilizers on phytoplankton?

How does the excess fertilizer affect organisms living in the water?