

Oh Diatom!

Adapted from Oh Deer! Project Wild Activity Guide, Western Regional Environmental Education Council, Inc., Boulder, CO, 1992.

Science Content Standard: The interdependence of Organisms, Limiting Factors
Living Organisms have the capacity to produce populations of infinite size, but environments and resources are finite. This fundamental tension has profound effects on the interactions between organisms.

Description

This activity will offer an opportunity for students to identify and describe the abiotic factors that limit phytoplankton populations and to describe the population growth cycles that naturally result from variations in resources. It can easily be done in a classroom with the desks pushed aside and gives kids a chance to move around a little.

Materials

Somewhat large open area, indoors or out. Chalkboard or flip chart.

Procedure

- A) With students, brainstorm and categorize the abiotic factors necessary for primary production and phytoplankton growth. End up with something like this:**
1. Ingredients for photosynthesis –
Sunlight (position in the photic zone)
Carbon dioxide and water
 2. Nutrients (nitrogen, phosphorus, etc.)
 3. Favorable temperature or season of the year (spring, summer or autumn)
- B) Explain that students will participate in an activity that will demonstrate the importance of these factors in limiting the growth of phytoplankton populations.**

Count off in fours.

The ones are phytoplankton and will go to one side of the room. At the beginning of each round, each phyto will choose an abiotic factor and represent it by:

Photosynthesis - hold hands above head in the shape of a circle to represent the sun.

Nutrients – clamp hands over stomach

Favorable season – cross arms over chest

The two's, three's and four's are the necessary abiotic factors and will go to the other side of the room. At the beginning of each round, each student will choose to become an abiotic factor and represent it in the way described above.

- C) The activity starts when all players line up on opposite sides of the room with their backs to the students on the other side of the room.**
- D) Begin the first round by asking the two's, three's and four's to decide which factor to become and make the appropriate sign. The one's (phytos) must decide which factor they need and make the appropriate sign. Once a sign has been chosen, it may not be changed.**
- E) When all the players are ready ask them to turn around so the others can see their signs. Have the two lines slowly walk toward each other (phytos float, so running would not represent them well). When a phyto sees a sign that matches its sign it brings that factor back to the phyto line to represent the phyto successfully meeting its needs and being able to reproduce. Any phyto that fails to match up with a factor becomes part of the limiting factors group. If a factor is not needed it continues to be a factor in the next round.**
- F) The facilitator keeps track of the fluctuations in the numbers of phytos and factors at the end of each round. Continue the activity for 12 to 15 rounds. Take a minute or two to discuss the fluctuations in the number of phytos and its correlation with the availability of the abiotic factors necessary for primary production.**

Extensions

Primary Consumers – introduce at round 7 or 8

Introduce a zooplankton primary consumer. The consumer begins in an area off to the side of the playing field and can move a little faster than the phytos. The consumer can tag one phyto and bring it back to its starting point. The captured phyto now becomes a consumer to represent a favorable food supply and growth of the consumer population.

Thermocline – a one round demonstration

Divide the phytos into diatoms and dinoflagellates. The diatoms cannot swim but the dinos can. Have the players choose their signs and turn to face each other, but don't let the rounds begin. Establish a thermocline a few feet from where the factors line up. The nutrients cannot cross the line. The diatoms also cannot cross the line, but any dino that has chosen the sign for nutrients can swim across the line to get the nutrient. Those making the sign of photosynthesis or favorable can cross the thermocline.

Assessment

Have students graph the results of each round. The vertical axis is the population and the horizontal axis is the round (or generation). They can then make generalizations regarding the relationship that exists between populations and limiting factors. See assessment sheet.

Who are the Primary Producers?

Use the classroom resources to find out about these ocean primary producers:

Cyanobacteria Coccolithophores Diatoms Dinoflagellates
(dinophytes)

For each type of organism try to find the following information:

Biological classification ____

Structure and appearance ____

Social structure-Does it live alone or in colonies or in chains, etc. ____

Locomotion ____

Pigments ____

Autotrophic or a combination ____

Adaptations ____

Reproduction ____

A representative species ____

Size ____

Present the information for each type of phytoplankton on one sheet or paper that includes a drawing or picture of your representative species.

Diatoms

Species drawing

Structure:

Adaptations:

Locomotion:

Classification:

Social structure:

Pigments:

Etc.