



Driving Question:

What is the influence of plants, animals and light on the oxygen concentration in a pond?



Introduction

In and around a pond live different organisms. Think about reed, algae, duckweed, fish and insects. Oxygen plays an important role in the lives of these aquatic organisms. Sufficient oxygen in the water will include a healthy aquatic ecosystem.

In this activity you are going to investigate the influence of plants, animals and light on the oxygen concentration of pond. Using the model the oxygen concentration in a pond can be calculated. In this simple model the photosynthesis and respiration of plants and animals, the production and consumption of oxygen can be calculated.

Material

In this activity you use the following materials:

- Computer/ laptop with Coach.

Investigation

1. Open the Coach Activity 'Life in a pond'.
2. The model calculates the oxygen concentration in a pond over time. Look at the model and explain:
 - Which two processes influence the oxygen concentration in water and in which way?
 - Which variables influence the photosynthesis process?
 - Which variables influence the respiration process?

3. In the model you can change a few parameters (plants, animals, light intensity) to simulate different conditions in a pond. More information can be found in the Coach Activity.
4. Use the model to answer the research question. The questions below help you in your investigations.
 - What happens to the oxygen concentration when there are no plants and animals in the water? (assume light intensity = 50).
Note you can change values of all parameters (animals, plants, light intensity) at the same time or each time explore only one of the parameters.
5. What happens to the oxygen concentration when there are no plants and only animals in a pond?
6. What happens to the oxygen concentration when there are more animals in a pond?
7. What can you say about the effect of animals on the oxygen concentration in water?
8. What happens to the oxygen concentration when there are only plants in a pond?
9. What happens to the oxygen concentration when there are more plants in a pond?
10. What can you say about the effect of animals on the oxygen concentration in water?
11. Assume that in the water there are only animals, what happens to the oxygen concentration in the water when it is:
 - completely dark
 - there is a light
 - the amount of light is changing?
12. Assume that in the water there are only plants, what happens to the oxygen concentration in the water when:
 - completely dark
 - there is a light
 - the amount of light is changing?
13. At which moment of the day is the oxygen concentration in the water the highest; the lowest?
14. How does light affect the oxygen concentration?
15. How do the oxygen peaks match with the light level peaks? Why might the oxygen level reach a peak after the light level does?

Extra

16. The model is a simplified representation of real processes that take place in a pond. You now know that the oxygen concentration decreases if many animals are present in the pond. You can imagine what happens if there is not enough oxygen in the water, the animals die. In this model, the number of animals remains the same even though the oxygen concentration is equal to zero. How can you improve model to better describe life in the pond?

Coach Activity: Life in a pond.cma7

Coach Result: Life in a pond.cmr7