

EUTROPHICATION

A eutrophic body of water is one that is rich in nutrients and decaying organisms.

Name some possible causes of eutrophication:

Why are N and P needed by organisms? List at least 3 uses of each.

How might these nutrients limit growth? What is needed for growth, repair and cell division?

Possible scenario for a water system that undergoes eutrophication:

1. Excess N or P into stream, lake or estuary.
2. Algal bloom – growth of one or two species of very high population densities. Possibility of production of toxins that are harmful to livestock and humans e.g., *Pfeisteria*
What type of growth is occurring initially?
3. Floating algae can form mats that block sunlight to lower levels.
4. Plants at lower levels die due to lack of sunlight. This decreases biodiversity and adds decaying organisms to the system.
At the same time, decomposers increase in population density due to all the available material for them to feed on.
When does photosynthesis occur?

When does cellular respiration occur?

Do the decomposers work only during the day?

What is likely happening to levels of O₂ and CO₂ at this point and why?

5. Anoxia is the lack of oxygen. Is this occurring? How might this affect fish and other organisms?

Lakes that are undergoing eutrophication are characterized by enormous growth of photosynthetic algae that release oxygen. Why then, do these lakes undergo severe oxygen depletion?

- a) The algae exhaust the available supply of phosphorus and stop photosynthesis.
- b) Fish in the lakes die as a result of the low oxygen concentration.
- c) The rate of decomposition of dead algae (and other water plants) becomes greater than the rate of photosynthesis of living algae.
- d) Oxygen diffuses into the lake water from the atmosphere.
- e) Oxygen diffuses out of the lake water into the atmosphere.

Which one of the following biogeochemical cycles is most dependent on bacteria?

- a) Water cycle
- b) Carbon cycle
- c) Nitrogen cycle
- d) Phosphorus cycle
- e) Lunar cycle

In some ecosystems it has been found that the amount of phosphorous, calcium, or nitrogen is often limited. This may be due to heavy rainfall (leaching) or removal of plants from the ecosystem. The amount of carbon available is seldom a problem. Why?

- a) Organisms do not need very much carbon.
- b) Plants can make carbon using sunlight and water.
- c) Plants are much better at absorbing carbon from the soil.
- d) Many nutrients come from the soil, but carbon for photosynthesis comes from the air.
- e) Symbiotic bacteria help plants capture carbon.