

Impacts of Eutrophication

Cut out the cards on the dashed lines and place them in a flow chart to show the relationship between cause-and-effect of this aquatic system. Remember to draw arrows between the boxes. While nutrients are important for the growth and survival of organisms, too many nutrients like phosphorus can cause problems.

Urban Development increased paved surfaces, reduced natural water filtration, use of fertilizers and pesticides	Forestry removal of trees alters water flow and reduces natural water filtration	Septic Systems leaky and non-functional systems	Agriculture use of fertilizers, and pesticides on farmland
Erosion wind and water remove nutrients from soils and rocks, and deposit them into the lake	Cyanobacteria Blooms	Cyanobacteria Die & Decompose	Aggressive Growth aquatic plants grow rapidly with enough phosphorus and sunlight
High Oxygen Levels	External Nutrient Loading phosphorus, and other nutrients are carried by water, sediments and air particles and deposited into the lake from external sources	Internal Nutrient Loading phosphorus in the water settles and collects in lake sediments (P-burial), and is released back into the water (P-release) during low oxygen conditions	Rapid Growth cyanobacteria grow rapidly with enough phosphorus and sunlight

High Phosphorus Levels 	Bioturbation disturbance of sediments by animals or human activities releases phosphorus into water	Decomposition plants and cyanobacteria die and decompose, using up oxygen and releasing phosphorus into lake sediments	Water Impoundment dams reduce flow of water and nutrients out of the lake, increasing amount of nutrients in the lake
Low Oxygen Conditions conditions unsuitable for fish and aquatic invertebrates	Climate Change heavier winter rains increase nutrient inputs into the lake from run-off	Climate Change warmer temperatures and longer growing seasons improve conditions for algae and aquatic plant growth	Invasive Species invasive plants (Eurasian milfoil) thrive in high phosphorus conditions, outcompeting native plant species
Algae Blocking Sunlight blocking light from reaching aquatic plants	Shorter Food Chains a simpler system	Algae Producing Toxins toxins which can poison aquatic organisms	Algae Uses Up All Nutrients (phosphates and nitrates) in the water
Low Biodiversity in Aquatic System	Aerobic Bacteria Use Up Oxygen in Water	Reduced Recreational Opportunities for People	Lakes Flush Out Phosphorus & Nutrients flushed out via creeks or streams