

EUTROPHICATION

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Aquatic plants need two essential nutrients for growth: phosphorus and nitrogen. They receive these nutrients through a process known as eutrophication, in which water bodies accumulate plant nutrients. In a healthy lake both nutrients occur in limited amounts, restricting plant growth. However, human factors can dramatically increase the concentration of plant nutrients in water bodies, a phenomenon known as “cultural eutrophication”. The rise in eutrophic events has been attributed to the rapid increase in intensive agricultural practices, industrial activities, and population growth which together have increased nitrogen and phosphorus flows in the environment. The Millenium Ecosystem Assessment found that human activities have resulted in the near doubling of nitrogen and tripling of phosphorus flows to the environment when compared to natural values. Cultural eutrophication is harmful to water ecosystems and leads to a progression of symptoms that include:

1. Excessive plant and algae growth that is the source of organic carbon for accumulation. This can reduce light penetration and lead to a loss of submerged aquatic vegetation and an increase in water turbidity.

2. Low dissolved oxygen and formation of hypoxic or dead zones (oxygen-depleted waters). These oxygen-starved areas stress aquatic ecosystems, often leading to kills of aquatic organisms, altered ecosystem energy flows, and in severe cases ecosystem collapse.

3. An imbalance of nutrient ratios that can lead to a shift in phytoplankton species composition and creating conditions that are favorable to toxic algae blooms that can cause kills of aquatic organisms.

4. Change in species composition and biomass of aquatic organisms. Eventually it may lead to reduced species diversity.

Eutrophication also jeopardizes the resource value of lakes as recreation, fishing and aesthetic enjoyment diminish. As such, the impact of eutrophication on recreation and tourism is probably the most sensitive area for the public. Lakes and reservoirs deteriorate through excessive addition of plant nutrients, organic matter and silt which combine to produce increased algae and rooted plant biomass, reduced water clarity and usually decreased water volume. In this condition water bodies lose much of their attractiveness for recreation, as well as their usefulness and safety as industrial and domestic water supplies.

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