

NITRATES (NO₃) FACT SHEET

Definition: An important nutrient for plants and animals used in the building of proteins, DNA, and RNA. It is found naturally in waterways but, excessive amounts cause problems.

Background:

- Nitrogen is a very common element found in many forms throughout the environment (occurs in waters as nitrate (NO₃), nitrite (NO₂), and ammonia (NH₃)).
- Bacteria and blue-green algae convert atmospheric N₂ into forms (ammonia & nitrate), which plants can absorb through their roots. This process is called **nitrogen fixation**.
- Aquatic animals obtain nitrogen by either consuming aquatic plants or consuming those animals that consume the plants.
- Nitrates can be returned to the soil from animal urine, feces, carcass decay and plant decay.

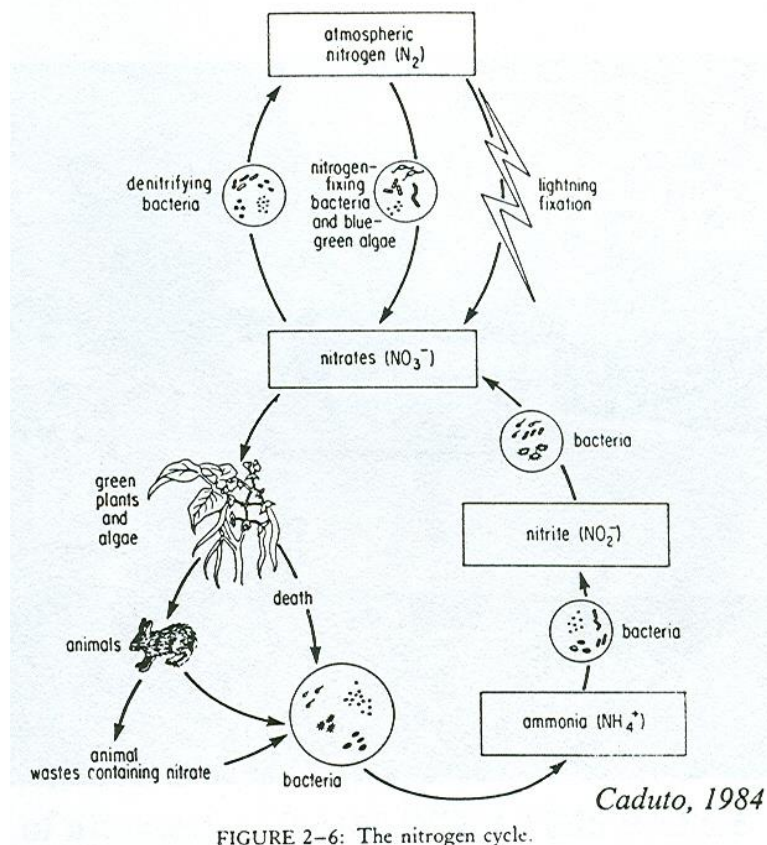
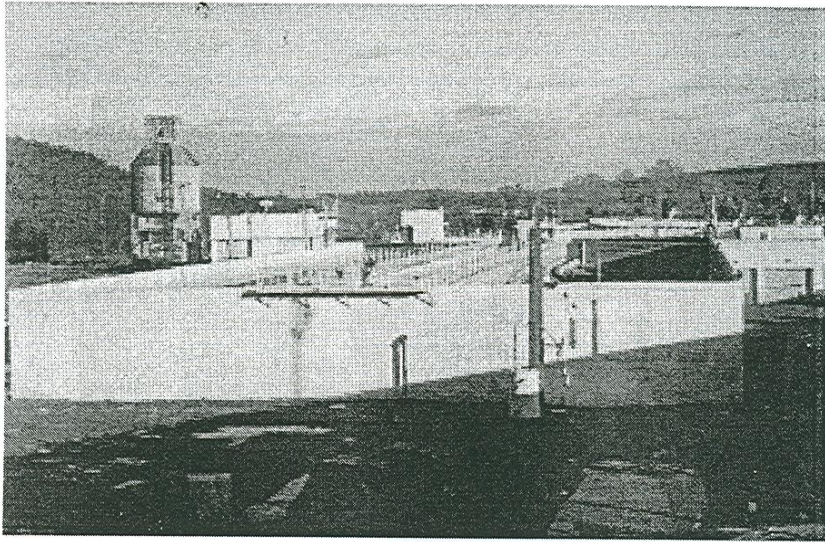


FIGURE 2-6: The nitrogen cycle.

Environmental Consequences:

- Oversupply of nitrates and ammonia leads to **eutrophication**. High levels of nitrates or phosphates stimulate algae and aquatic plant growth. Aerobic bacteria populations then increase because of the large amounts of organic matter now available in the water. The resulting elevated bacteria populations deplete much of the dissolved oxygen found in the water.
- Excessive algal growth creates a soupy green stream, which can be visually displeasing.
- Excessive aquatic weed (macrophytes) growth can make boating and swimming difficult.
- Humans add large quantities of nitrates into waterways through sewage (treatment plants and septic tanks), fertilizers (from farms and lawns), nutrient rich runoff from cattle feedlots, dairies, and barnyards and nutrient rich soils washed in from a deforested area.





Sewage is a major source of waterway nitrates. It can enter from outdated wastewater treatment plants, faulty septic tanks, and illegal sewage connections. There is a new Meadville Wastewater Treatment plant (left) that has eliminated releasing untreated sewage to French Creek. Photo source for above: Cunningham and Saigo, 1999.

- Nitrates can produce a serious condition in fish called "brown blood disease."
- Nitrates also react directly with hemoglobin in human blood and other warm-blooded animals to produce methemoglobin. This destroys the ability of red blood cells to transport oxygen. This condition is especially serious in babies under three months of age.

Water Quality:

- Unpolluted waters have a Nitrate level of below 1 mg/L.

Links:

1. NO_3 ~ General overview of Nitrates in streams
http://www.heinzctr.org/ecosystems/forest/nitr_strms.shtml
2. *Testing for Nitrates* ~ Describes what nitrates are, and how to test for them in water
<http://www.epa.gov/volunteer/stream/vms57.html>