

Nitrogen and phosphorus pollution in the Chesapeake Bay

The effects of nitrogen and phosphorus on the Chesapeake Bay estuary

The biggest impact of nitrogen and phosphorus pollution in the bay boils down to the fact that it contributes to the Eutrophication problem.

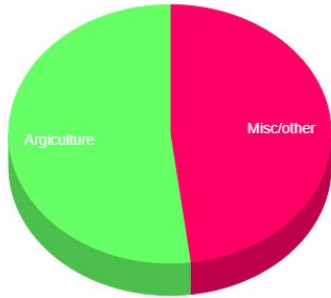
This includes

- Algal blooms
- Fish kills
- Hypoxic dead zones
- Negative impact on environmental stability

Introduction to the bay

The Chesapeake Bay program study concluded that agriculture is the largest contributor of nitrogen and phosphorus pollution to the Bay.

Nitrogen contribution by percentage



● Misc/other ● Agriculture

● Agriculture

● Misc/other

Nitrogen contribution by percentage



● Misc/other ● Agriculture

Understanding the effects of nitrogen and phosphorus

- Introduction to the bay
- Chemical composition
- Effects of its presence

Point source pollution vs. nonpoint source pollution

Point source

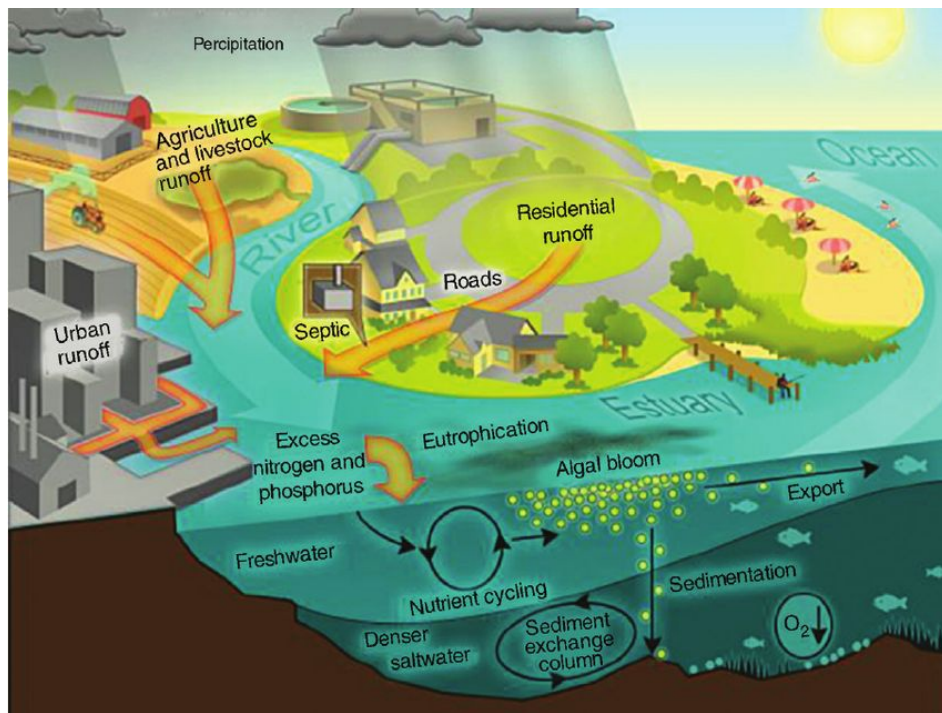
- comes from a single, identifiable source, such as a factory or a sewage treatment plant.

Nonpoint source

- comes from non-traceable sources such as rainwater, runoff, or snowmelt

Nutrient loading

- Non point source pollutants seep into water.
- Promotes the growth of algal blooms



Chemical composition

Urea

Chemical name : Carbamide

Chemical formula: $\text{CO}(\text{NH}_2)_2$

(1 carbon double bonded to an oxygen, and 2
 NH_2 groups)

Rock phosphate

Chemical name: fluorapatite

Chemical formula: $\text{Ca}_5(\text{PO}_4)_3\text{F}$

(5 calcium atoms, 3 phosphate groups, and 1
Fluorine atom)

Spotted sea trout (*Cynoscion nebulosus*)



- **Diet:** Feeds on small fish, shrimp, and crustaceans. The spotted sea trout is an opportunistic predator that uses its sharp teeth to capture prey.
- **Habitat:** Prefers shallow coastal waters, estuaries, and seagrass beds within the bay.

How its affected by N&P pollution:

- Oxygen low dead zones create fishkills.
- N&P worsens naturally habitat and indirectly makes life harder due to the “butterfly effect”

Striped Bass (*Morone saxatilis*)



- **Diet:** Predatory fish that feeds on smaller fish such as menhaden, herring, and other forage fish, along with crustaceans and invertebrates.
- **Habitat:** Found in estuarine and coastal waters of the Bay, particularly around river mouths, reefs, and tidal areas. It migrates up rivers for spawning and spends much of its life in brackish and coastal waters.

How its affected by N&P pollution:

- Oxygen low dead zones create fishkills.
- N&P worsens naturally habitat and indirectly makes life harder due to the “butterfly effect.”

Eelgrass (Zostera Marina)



- **Photosynthesis:** Eelgrass uses sunlight, carbon dioxide, and water to produce glucose (a form of sugar) and oxygen.
- **Habitat:** Found in the shallow, clear waters of the bay, particularly in areas with sandy or muddy bottoms

How its affected by N&P pollution:

- Oxygen low dead zones create fishkills.
- N&P worsens naturally habitat and indirectly makes life harder due to the “butterfly effect.”

Widgeon grass (*Ruppia Maritima*)



- **Photosynthesis:** Widgeon grass use sunlight, carbon dioxide, and water to produce glucose (a form of sugar) and oxygen.

- **Habitat:** often grows in areas with muddy or sandy bottoms, like Eel grass

How its affected by N&P pollution:

- Oxygen low dead zones create fishkills.
- N&P worsens naturally habitat and indirectly makes life harder due to the “butterfly effect.”

How to fix this issue



- Not all hope is lost!! There are still options to combat N&P pollution

Solution

- The downwelling technique and Nutrient management plans are the solution going forward

