2015

Watershed Newsletter
Nitrogen Contamination
Issue 2

Produced by: Zach Lee

SWCD

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Introduction:

Nitrogen is one nutrient that has greatly impacted our water quality. Nitrogen is responsible for crop growth and if the soil has insufficient amounts of nitrogen, the yields will be greatly impacted. In this newsletter we are going to discuss the problems that nitrogen has on our water quality, how nitrogen is transported from the field to the river or stream, what type of effects it has on us and the rest of the ecosystem, and how we can reduce the amount of Nitrogen going into the streams and rivers.

Nitrogen Background

Nitrogen is the most abundant gas in our atmosphere, but it needs to go through a cycle to be used by plants. There are some bacteria in legumes that stores Nitrogen in their roots. As the plant dies it slowly releases this nitrogen. Different types of bacteria have a specific role to turn Nitrogen into ammonium and then into nitrates. Nitrates are a type of nitrogen that plants obtain and use. When plants and animals die, they are consumed by decomposers releasing ammonium and repeating the cycle. It will take a long time to replenish these nitrates. For this reason, farmers apply fertilizers to replenish this nutrient and promote rapid crop growth.

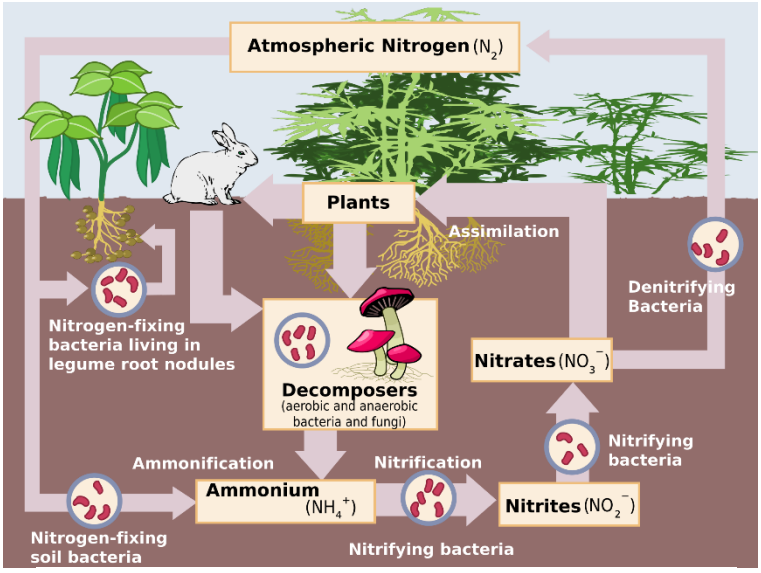


Figure 1- This diagram is showing the nitrogen cycle.

Some farmers may overspray nitrogen because it is an important nutrient, but that does not mean that it will result in higher yields. Plants have a critical limit of nitrogen use and once it hits that limit, the excess nitrogen will not be used. An article by the American Farmland Trust stated, “When a farmer applies fertilizer at recommended rates, only 30% to 50% of N will be taken up by the plant. The rest is loss due to surface runoff, leaching, ammonia volatilization or bacteria competition (American Farmland Trust).” Applying too much nitrogen can be harmful to the soil and rivers. The main source of nitrogen in rivers come from drainage tiles. Rainfall is a key element on how much nitrogen runs into the stream. A saturated soil will more likely drain nitrogen into streams or rivers. According to a Purdue study, drainage tiles were placed in narrow to broad spacing. They concluded that more nitrogen loss was found with the more narrow spacing.

What happens when Nitrogen gets into the stream?

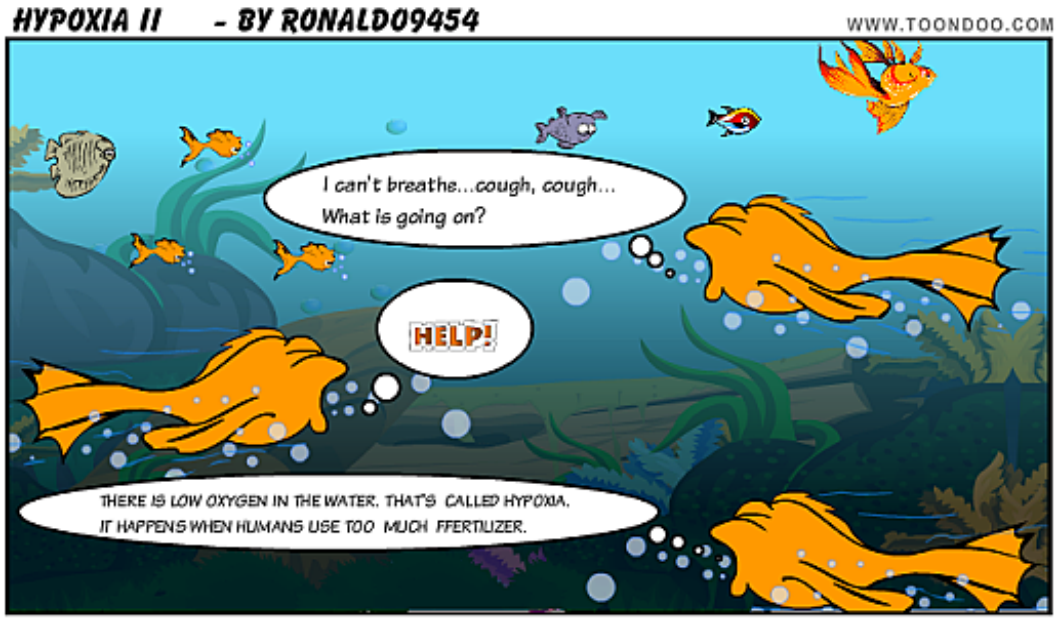
Nitrogen can promote plant growth in both land and in water. There is a very limited amount of oxygen in an aquatic environment and when something decomposes in the water it also decreases the amount of oxygen in the water. Algae is a microscopic plant found on the surface of the water and given excess amount of nutrients and sunlight the algae population will explode. Algae will then block out the sun from the plants living on the river bed. The plants on the river bottom will start to die and decay which will reduce the amount of dissolved oxygen resulting in fish kills or hypoxia zones. The largest Hypoxia zone is found off the

coast of Louisiana. This is from the runoff draining into the Mississippi River and out into the Gulf of Mexico. This hypoxia zone can be described as deserts in the ocean.

An excess of nitrogen can also be harmful to both people and animals. Too much nitrogen or nitrate can be harmful to young infants or young livestock (Nitrogen Water). The excessive nitrates can result in restriction of oxygen transport in the bloodstream. Infants under the age of 4 months lack the enzyme necessary to correct this condition and results in “blue baby syndrome” (Nitrogen Water).

How to reduce the amount of Nitrogen?

Cover crops can help reduce the amount of nitrogen by taking up nitrogen from the air and storing it during the fallow season. As the cover crop decays, it will slowly release the nitrogen and allow the cultivated crop to use this source of nitrogen. This will reduce the amount of nitrates that need to be applied to the fields. Placing drainage tiles as wide as possible can also reduce the amount of nitrates flowing into the river or streams. No-tillage or conservation tillage will increase and maintain the amount of organic material which will help hold water and nutrients. The implementation of Best Management Practices, such as Grass Waterways, Filter Strips, Field Borders, and Riparian Buffer Zones will also help keep the excess nitrogen from flowing off of fields and into the rivers and streams.



Citations:

United States Geological Society. (March 17, 2014). ***Nitrogen and Water***. Retrieved from USGS website https://water.usgs.gov/edu/nitrogen.html

(2013) Controlling Nutrient Runoff on Farms. *American Farmland Trust Center for Agriculture in the Environment*. 2-10. www.farmland.org/documents/FINAL-ControllingNutrientRunoffonFarms.pdf