

Agricultural Nonpoint Pollution and Eutrophication: Control and Prevention

Alan Gleisner (Advisors - Dr. Ernie Diedrich, Dr. William Lamberts), Department of Environmental Studies, College of St. Benedict and St. John's University (MN)

Introduction

Minnesota has the luxury of an abundant resource of water. The necessity of water for daily functions like drinking, bathing, and food preparations is essential, however there are also many other secondary needs for water. Industry, irrigation, transportation, and recreational purposes are also taxing on the water system of Minnesota.

With the increase in the demand and use for water there is also increasing importance linked with water quality and pollution. The amount of pollution added to water systems in the form of excessive nutrients, like phosphorus and nitrogen, is tremendous. The focus of the paper will be the impact of agricultural practices on nonpoint pollution entering water and ways it can be controlled and prevented.

Pollution and Agriculture

The basis of the agriculture system is to mass-produce as much as possible for as little money as possible. To accomplish this, farmers oftentimes must use procedures and practices that are not sustainable or environmentally friendly. Fertilizer and manure are used in incredible amounts to help the land produce as much as possible. This overuse of nutrients on the soil has detrimental effects to the water systems. The oversaturation of soil with nutrients allows precipitation to carry the extra nutrients into water systems through groundwater, runoff, and erosion.

Eutrophication

Eutrophication is caused by the huge influx of nutrients, which increases the growth of phytoplankton that causes water systems to become eutrophic, making the water green and slimy, and sometimes toxic to humans.

The negative effects of eutrophication include increased plant growth, shifts in phytoplankton species, water transparency loss, problems with taste and odor, oxygen depletion, increase of winterkills, and losses in biodiversity. The increase in plant growth is due primarily to the increase of the limiting nutrients of P and N. The rapid influx of nutrients allows free-floating phytoplankton and other plants to easily absorb the high demand nutrients that are suspended throughout the water column, therefore supporting plant growth. The rapid increase in nutrients can lead to a shift in phytoplankton species. In many lakes, cyanobacteria or blue green algae is the kind of alga that becomes dominant in eutrophic lakes. The increase and presence of eutrophication causes loss of water quality.

Control and Prevention

The control and prevention of eutrophication from nonpoint pollution by agriculture is a tough and difficult task. Every water system is different and combining the right set of natural and anthropogenic methods will take time and practice to achieve success. Artificial means are often necessary in many water systems because eutrophication is too late of a stage for it to be naturally corrected. However, there are natural methods available, and along with changes in economic, societal, agricultural practices, and governmental policies nonpoint pollution and eutrophication can be control and prevented.

Biological

- Biomaniplulation
- Hypolimnetic Aeration
- Alum

Social

- Economic changes that include shifting shift in demand for agricultural products, implementing restrictions/ taxes, and offering subsidies.
- Increase in education for both farmers and society to help increase knowledge of human impact on the environment.
- Changes in agricultural practices that include new tilling methods, altering fertilizer applications, and new land use and land cover management .



© Great Lakes Lodging



<http://www.des.state.nh.us/Beaches/graphics/BowLakeBennettAnabaena.JPG>



COLLEGE OF
Saint Benedict



Saint John's
UNIVERSITY