

Controlling non point source agricultural pollution with vegetative treatment systems

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Abstract

Non point source pollution is the largest factor in the growth of the hypoxic zone in the northern Gulf of Mexico. Studies have shown that the Upper Mississippi River Basin is the largest contributor of the nitrates that are responsible for eutrophication in the gulf. Iowa because of its large use of lands for agriculture is a key state in the fight against the problem. Because of previous land use practices, Iowa's waters have some of the highest concentrations in the country. Vegetative treatment systems such as riparian buffer strips and wetlands have been shown to be effective in diminishing nitrogen pollution. Vegetative treatment systems use biological processes to remove pollutants from affected waters.

Keywords

Non point source pollution, hypoxia, nitrates, vegetative treatment systems, wetlands, riparian buffer strips, denitrification

Introduction

Non-point source pollution is a major cause of excess nitrates in natural waters. The largest contributor of nitrates in the state of Iowa is agricultural runoff from row crops and animal feedlots. Nitrogen pollution is a large problem in the United States as well as in Iowa. Nitrate pollution can cause problems such as methemoglobinemia (blue baby syndrome) in infants as well as adverse health effects in adults and environmental health problems such as eutrophication. This paper will cover the effects of nitrate pollution, the scope of the problem in Iowa and will review some of the most common methods of limiting the problem.

Nitrate pollution is one of the key factors in the phenomenon of eutrophication. Eutrophication is caused by excessive algal growth, which during certain times of the year can consume nearly all of the dissolved oxygen in a body of water. This loss of DO is called hypoxia. Hypoxia can lead to the destruction of marine habitats and the death of nearly all organisms that inhabit them. Hypoxia is a seasonal problem that is at its worst during the summer months (US EPA).

Nowhere is the problem of hypoxia greater than in the northern Gulf of Mexico. The Mississippi River/Gulf of Mexico task force measured the average size of the "Hypoxic Zone" in the gulf from 1985-2000 and determined the average effected area to be 14,178 km². In this area there is significantly less fish, shrimp, crabs and zooplankton than other areas of the gulf. This loss of aquatic wildlife has had a very negative affect on commercial fishing in the northern gulf as well as aided in the destruction of coastal habitat.