

The Use of Constructed Wetlands for Controlling Nonpoint Source Pollution from Urban Storm Water Runoff

Sarah Look

ABSTRACT

Constructed wetlands are an attractive, relatively low-cost alternative to treating wastewater including nonpoint source pollution. Nonpoint source (NPS) pollution is a concern for many of the United States' inland surface waters as it contributes over 65% of the total pollution load (Olson, 1993). Urban storm water runoff, a source of NPS pollution, can be successfully treated with these systems. Nutrient removal efficiencies around 90% for nitrogen and up to 70% for phosphorus can be achieved in a well designed constructed wetland. In addition to treating storm water, constructed wetlands can also provide much needed wildlife habitat in an urbanized setting, as well as possible recreation areas for the community. Therefore, constructed wetlands can be incorporated into a city's overall water management plan to remove or reduce the amount of pollutants, primarily sediment and nutrients, and provide green space for both wildlife and people to use.

KEYWORDS

Constructed wetland, nonpoint source pollution, nutrient removal, urban runoff

INTRODUCTION

Throughout the lower 48 states, over 50% of the wetlands have been lost, through drainage or habitat conversion, in the past 200 years (Olson, 1993). Wetlands can serve an important function of buffering lakes and streams by reducing runoff velocity and intercepting pollutants before reaching these surface waters. Of the nation's impaired waters, approximately two-thirds are a result from nonpoint source pollution, with the primary cause of impairment being nutrient and sediment loading (Baker, 1993). Increasing development and urbanization of watersheds has resulted in a significant increase in the volume of water entering lakes and streams. For example, the Des Plaines River in Illinois has had an increase in median discharge from 4 ft³/sec. in 1886 to over 700 ft³/sec. in more recent years (Apfelbaum, 1993). And much of this additional water is carrying the nonpoint source pollutants with it.

The handling and treatment of wastewater, including urban runoff, is a necessary process all communities must deal with. Conventional methods suggest using a centralized wastewater treatment facility. Often these facilities are expensive to build and operate, and serve only one purpose – to treat wastewater.

An alternative method to treat storm water runoff and other nonpoint source pollutants could be a decentralized system utilizing constructed wetlands. These systems can not only meet treatment objectives at lower costs, but also create wildlife habitat, recreation opportunities, and become a resource for reclaimed water for irrigation (Campbell and Ogden, 1999). Diverting storm water runoff into wetland systems can also lessen the burden on conventional treatment plants.

SOURCES AND PROPERTIES OF URBAN RUNOFF

Nonpoint source (NPS) pollution is a concern for many of the United States' inland surface waters, including rivers and lakes, as it contributes over 65% of the total pollution load (Olson, 1993). According to Baker (1993), it is the "major remaining cause of surface water impairment," as many point sources have been reduced. Sources of NPS pollution can include urban or agricultural runoff, septic systems, concentrated agricultural wastes, and construction / building sites.