CHAPTER I

INTRODUCTION

Wastewaters have been the important environmental problems from past to present. In particular, municipal wastewater has been the most vital problem because its enormous discharge quantity. In every community, wastewater is mostly produced by houses. This problem will become more severe if there is no adequately proper management.

Today, there are many ways for treating wastewaters. Scientists tried to search better, simplier and cheaper ways than previous ones. Wastewater treatment plants usually use high technology, such as activated sludge, aerated lagoon and oxidation pond. These modern wastewater treatment plants require experts to operate and maintain the system. Thus, these wastewater treatment plants are not always practical. Scientists, therefore, are interested in using natural treatment method to deal with the wastewater problem. One of the methods that currently attracts the public attention is the use of wetlands.

Wetlands are an ecotone - an "edge" habitat, a transitional zone between dryland and deep water, environments that are not always wet nor obviously dry. Now, there are various existence types of wetlands, so a precise definition for wetlands that would satisfy all is not possible. The most comprehensive definition for wetlands was advanced by the U.S. Fish and Wildlife Service:

Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water . Wetlands must have one or more of the following three attributes:

1. at least periodically, the land supports predominantly hydrophytes;
2. the substrate is predominantly undrained hydric soil, and;

3. the substrate is nonsoil and is saturated with water or covered by shallow water at some times during the growing season of each year.

Wetlands are the land where the water surface is near the ground surface long enough each year to maintain saturated soil conditions, along with the related vegetation (Reed, 1991)

Wetlands have both value and function that can be categorized into 6 majors comprising life support, hydrologic modifications, water purification, erosion protection, open space and aesthetics, and geochemical storage (Hammer, 1992).. Wetland ecosystems have intrinsic abilities to modify or trap a wide spectrum of water-borne substances commonly considered pollutants or contaminants. Doubtlessly our ancestors perceived and exploited these abilities; but in more recent times, casual observations fostered renewed interest, leading to investigation that documented changes in concentrations of various materials after processing by natural physical, chemical and biological systems. To avoid damaging natural wetland ecosystems, they simulated constructed wetlands for wastewater treatment by observing this purification phenomenon in natural wetland systems.

Constructed wetlands are defined as those systems specifically designed for wastewater treatment. They can be part of the wastewater treatment system while most natural wetlands are part of the receiving waters.

The emergent plants such as cattails (Typha spp.), bulrush (Scirpus sp.), and reeds (Phragmites spp.) are the major and typical components of these wetland systems. However, sedge (Cyperus sp.) and spikerush (Eleocharis sp.) are also interesting plants because they are local which can be found easily and very useful..

In this study, the two emergent plants were studied to find their capacity and optimum water depth for wastewater treatment in free water surface constructed wetlands.

Hypothesis

The hypothesis of this study was that emergent plant species, Cyperus corymbosus and Eleocharis dulcis, and wastewater level of constructed wetlands would increase the efficiency of wastewater treatment by at least 60 percents compared to the oxidation ponds.

Objectives

The purpose of this study was to investigate the efficiency of two emergent plant species in FWS constructed wetlands for treatment of municipal wastewater . The main objectives were:

1. To find out the efficiency of Cyperus corymbosus and Eleocharis dulcis in constructed wetlands for municipal wastewater treatment.
2. To determine the optimum level of wastewater for the two emergent plants in the treatment of wastewater.

Scope of Study

The constructed wetlands were built and operated at Sakol Nakorn Fisheries Station.

Municipal wastewaters used were collected from individual homes and urban stromwater runoff from the whole area of Sakol Nakorn municipality.

Treatment efficiency of this constructed wetlands was estimated with respect to the reduction in quantity of BOD, TSS, TDS, NH_3 and phosphate in the wetland effluent.

Anticipated Benefits

1. Suitable emergent plants can be selected for minimizing pollutants in municipal wastewater and can be planted well in other constructed wetlands.

2. These constructed wetlands can treat the most amount of wastewaters effectively.

3. In the future, the analysed data can be applied for designing constructed wetlands for the treatment of wastewaters in other regions or areas.