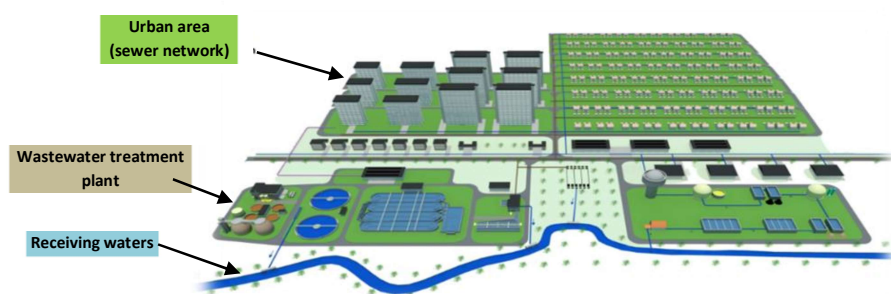


Investigation of integrated model for optimizing the performance of urban wastewater system

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GRAPHICAL ABSTRACT



ARTICLE INFO

Article type:

Research Article

Article history:

Received xx Month xxx

Received in revised form xx

Month xxx Accepted xx Month

xxx

Available online x Month xx

Keywords:

Mathematical modeling

Urban wastewater system

Integrated model

Wastewater treatment

Optimization



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Publisher: Razi University

ABSTRACT

Due to the rapid population and economic growth, the demand for water has increased. In addition, the natural resources are limited and degrade because of several factors such as the climate change. These challenges lead to reduce the ability of providing water at the required quantity and quality. One of solutions to maintain the sustainability of water supply from different sources is reuse of wastewater. For this aim, it is crucial to optimize wastewater systems. This research paper aims to describe different modelling possibilities and optimization methods for various components of integrated urban wastewater systems. The main conclusion of this research paper is the lack of study of optimum design and operation of urban wastewater systems in a holistic method. Moreover, most of previous studies on integrated wastewater management have been conducted on combined sewer systems.

1. Introduction

All biological and human activities depend on water. Recently, with development of technology and industry, Greater use of water resources, climate change, irregular urbanization and increasing population lead to increased pressure on water resources. The pollution of environment is happened as a result of human activity and harmful substances. Most of pollution (dangerous materials) is conveyed by water to dozens of kilometers away due to disposal of the wastewater on the receiving water. Therefore, there is need to collect wastewater without harming human being and environmental haleness and removing the harmful substances from the environment without causing detrimental impacts. The collecting, transporting, treating and finally releasing of wastewater into the environment (or reuse) in safe manner need to a complex system consists of the urban wastewater system. Integrated urban wastewater management poses significant challenges, but also presents a major opportunity to minimize both the impact on aquatic ecosystems and the associated costs (Benedetti et

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al., 2013). There are two major parts of an urban wastewater system (UWS): sewer system and wastewater treatment plant (WWTP). Each of these components can be studied separately. However, the performance of sewer system affects that of WWTP and the performance of the later influences the receiving water quality. Thus, in order to be able to optimize the performance of an UWS for the intent of reducing its effect on quality of receiving water, the interactions between these two components and the impact of the final effluent on quality of receiving water must be considered in a holistic manner.

This research paper introduces an explore the most popular modeling techniques for the components of UWS analysis, in addition to understanding their characteristics in terms of simulation techniques, interaction mechanisms, and simulations software (this is followed by a discussion on how to optimize the UWS performance, and this will be done by considering the interaction between UWS components).

2. Modelling of UWS

2.1 Modeling of sewer system