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Dissemination of a Sustainable Comprehensive Wastewater Treatment System to the Industries in Bangladesh

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Abbreviations: ETP: Effluent Treatment System; WRC: Water Research Center; CETM: Comprehensive Effluent Treatment Model

Introduction

Over the last twenty years surface water quality in Dhaka has deteriorated due to unregulated industrial expansion, urbanization, encroachment of the rivers, overloading of infrastructure, confusion about the institutional responsibility for the quality of Dhaka's water bodies and weak enforcement of environmental regulations.

A scientific journal report on Alteration of Water Pollution Level with the Seasonal Changes in Mean Daily Discharge in Three Main Rivers around Dhaka City, Bangladesh by Islam *et al*. [1] found that only in Dhaka city around 7000 tons of solid waste producing along with 60000m^3 of toxic waste every day. This reports also suggested that textile industries around Dhaka city annually discharge as much as 56 million tons of waste among which 0.5 million tons are sludge while tannery producing 88 million of solid waste and 7.7 million of liquid waste. Another report on an analysis of industrial water use in Bangladesh with a focus on the textile and leather industries Report 2014 reviewed that vital chemical water quality indicator like DO levels have deteriorated at an alarming rate since 2000. This report predicted that if the situation is not reversed soon, the serious water pollution and environmental degradation of Buriganga, Sitalakhya, Turag, Dhaleshwari etc. rivers are likely to have long term public health, environmental and socio-economic consequences. In its current condition the water is not "available" to support other uses. However this is only the pollution scenario of rivers around Dhaka city. Other polluted rivers alongside the industries are not included here. In addition to water demand, the textile and leather sectors face even greater challenges in relation to environmental management and pollution. Untreated effluent from the industrial sector is a key source of poor surface water quality in and around Dhaka. If is going business as present trends, this will result in an additional water demand of over 6,750 megalitres per day by 2030. This is equivalent to the annual water needs of a population of approximately 60 million people in Bangladesh [2] (Figure 1).

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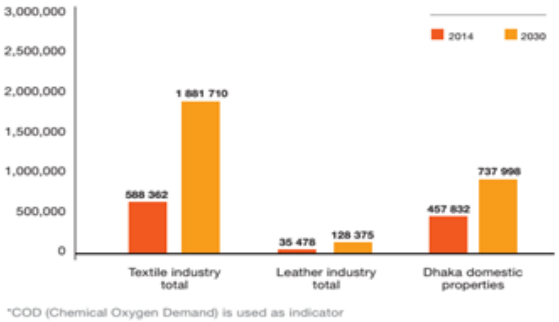
Comparison of DO level change in Buriganga at critical locations in different



Comparison of pollution in 2014 and 2030

(Images taken from: An analysis of industrial water use in Bangladesh with a focus on the textile and leather industries Report 2014).

Figure 1: Comparison of DO level change in in Buriganga at critical locations and Comparison of pollution in 2014 and 2030.

However, the scenario would be changed if sustainable wastewater management system like Effluent Treatment System (ETP) can be built in mass level industries. Though some of industries are started to take initiative to treat the effluent, lack of technological knowledge, high operational cost, high chemical consumption, high manpower involved, unwilling to take extra expenditure, technical fault of ETP due to poor after sales service from the suppliers, dependency on the foreign expert/technology and lack of monitoring from the authority reduce the comprehensive effectiveness of ETP operation. Water Research Center (WRC) under the Department of Environmental Sciences, Jahangiragar University carrying out several researches works to estimate the damage due to different industries around Dhaka city and investigated their ETP practice and effectiveness of ETPs as well since 2013. Unfortunately results obtained from samples of treated water from discharge points of ETP showed that ETP of few industries is not even capable of treating the effluent chemically and most of the parameters were found above the DoE Standards. Water Research Center (WRC) of Jahangiragar University is currently working on chemical dose optimization with variable pollution loads in an ETP, development of a model ETP that combines all major process into a single one and the study on the feasibility of natural coagulants and adsorbents in bulk ETP system. The newly established model ETP of WRC is a comprehensive ETP with all popular techniques, well designed pipe line with adjustable control and compatible filter systems like filter cartridge. This model ETP also contains waste sludge management options as well as the aerobic alternation of the three phased aeration tanks [3] (Figure 2).

Figure 2: Model ETP at WRC.

WRC also provides services and training to the researchers, students and industrial persons. Training features of WRC includes industrial wastewater treatment & management, operation & management troubleshooting of ETP, waste/sludge management practices for different WWTP, lab setup, routine analysis, safety & data handling. Consultation and counseling services include regular visit to the industry, design modification/process optimization of ETP, regular monitoring of effluent quality; process efficiency, lab analysis of environmental quality standard, training of industry staff for effective operation & management of the ETP. There are also some of

achievements gained by WRC. For instance, development of comprehensive effluent treatment model (CETM) that minimizes the major conventional treatment disadvantages with user friendly mode at cheaper rate in present and future. Another milestone is Development of a biogas production unit from wastewater sludge. Sludge from wastewater treatment is the hardest threat in wastewater treatment system. A model digester is developed in WRC for the management of sludge which is generated from wastewater effluent. This prototype model digester will be a mile stone for management of sludge from wastewater treatment system. A good number of post graduate students are enrolling in Department of Environmental Sciences every year [4-6].

Initially, these students/researchers will monitor the most common pollutants delivered into the surface water from industries with the aid of advanced analytical techniques of WRC and prepare report of each investigation that will act as the baseline data. The identification of the process optimization will capacitate them to publish their research work in a peer-reviewed impact factor contained journal.

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