Universität Stuttgart

WAREM
Water Resources Engineering and Management

akkreditiert durch ZevA
im Auftrag des Akkreditierungsrats (KMK / HRK)

Universität Stuttgart · WAREM · Pfaffenwaldring 7a · 70569 Stuttgart

Pfaffenwaldring 7a
70569 Stuttgart
Telefon: (0711) 685 - 66615 / 66616
Telefax: (0711) 685 – 66600
warem@iws.uni-stuttgart.de
http://www.warem.uni-stuttgart.de/

Anne Weiss M.A., M.Sc.
(Durchwahl: - 66616)

WAREM Seminar
October 23, 2018

Master Thesis Presentation

presenter: Efemena Samuel Ovie

Abstract

Evaluation of Woven Fibre Microfiltration Textile as Pretreatment for UV-LED Disinfection

By 2025, an estimated 1.7 billion people will not have access to enough water to satisfy their basic human needs. Majority of people facing insufficient water supply also lack centralized sanitation systems. Since agriculture accounts for 70% of global water withdrawal and 80% of wastewater flows untreated into the environment, wastewater reuse for agriculture can help to alleviate water demands. The goal of this research is to develop and evaluate an inexpensive decentralized system for wastewater reuse for agriculture to address water scarcity and to divert wastewater from the environment in low to middle-income countries.

In this research, investigations were conducted on the application of an inexpensive, simple, and robust polyester textile, developed by researchers at Durban University of Technology and Stellenbosch University, as pretreatment for ultraviolet (UV) disinfection. Combining the two water treatment mechanisms (large pore size filtration and UV disinfection) provides a complementary approach to remove microbial pathogens.

This study is taking advantage of Eawag's expertise in gravity-driven membranes (GDM) and imaging techniques to evaluate the woven fiber microfiltration fabric in gravity-driven applications. Secondary wastewater effluent from was filtered through the textile and monitoring changes in flux while determining the filter's efficacy at removing suspended solids, lowering turbidity, and increasing UV transmittance. The results after 6 weeks show the flux stabilizing at 0.75 and 0.60 L per m2 per hour (LMH). Permeate quality has a mean total suspended solid of 66 and 48 mg/L, turbidity of 0.65 NTU, and UV transmittance of 45-105 %.

The study involves characterizing the structure, composition, and permeability of the biofilm forming on the textile's surface using optical coherence tomography (OCT), confocal laser scanning microscopy (CLSM) and a scanning electron microscope (SEM) and it shows biofilm was heterogeneous on and within the fabric which increased the resistance and improved the permeate quality. Also, the microbial abundance of the filtrate was measured to determine the reduction of microorganisms via ATP, Flow cell cytometry and plate counts for Indicator organisms.

Date: **Tuesday, October, 2018** **Time: 17:30**

Location: Pfaffenwaldring 5a, Seminar # 2,

WAREM Students and other interested parties are cordially invited.