

Aaron Forbis-Stokes

TWRI Mills Scholarship Application

Student

Aaron Forbis-Stokes

Chair

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Proposed Research:

Effects of Climate Change on On-site Wastewater Treatment Systems – Galveston, TX

This research project will study the effects that climate change will have on on-site wastewater treatment systems in Galveston, Texas. The project will focus on the use of the HYRDUS modeling system to assess the effects of climate change, specifically sea level rise, on the ability on-site wastewater treatment systems to function properly.

The importance of on-site wastewater treatment systems (OWTS) is rising across the United States. Decentralized and on-site treatment systems are being used more as development expands beyond current centralized treatment systems. OWTS are also now being used for longer time frames and are no longer used only temporarily, waiting to be replaced by centralized systems. Other upcoming issues facing OWTS are increased standards for effluent concentrations, replacing older and unsuitable systems, and climate change, the focus of this project.¹

Climate change, characterized by rising water tables, increased drought, severe storms, and sea level rise, will have a significant impact on OWTS designs. Currently, OWTS designs only consider existing conditions and historical data. New designs and sites need to consider the potential effects of climate change, especially in coastal areas where the effects of sea level and water table rise are most drastically experienced. If no changes are made to design or siting, rising water tables and other results of climate change will result in higher concentrations of contaminants in underground water, endangering public health and the environment.¹

To help improve siting and design practices, the computer model HYDRUS will be used. The main functions of HYDRUS are to simulate the flow of water, solute, and heat through soil. Simulation is based on the hydraulic properties of the soil, daily weather, and the concentration of contaminants in the effluent. The model can then return the concentrations leaving the bottom of the profile, in this case, entering the water table.¹

¹ NE1045: Design, Assessment, and Management of Onsite Wastewater Treatment Systems: Addressing the Challenges of Climate Change. Project Outline.

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The desired outcome of the project is to have a better understanding of the influence of climate change on OWTS in Galveston, Texas. This understanding will lead to better siting and enhanced performance of OWTS on the island.

Academic Qualifications:

Undergraduate qualifications

Department	Course	Classification	Title	Grade
CVEN	339	UG	WATER RESOURCES ENGR	
CVEN	463	UG	ENGINEERING HYDROLOGY	
CVEN	301	UG	ENVIRONMENTAL ENGR	
CVEN	455	UG	URBAN STORMWATER MGMT	
CVEN	406	UG	ENV PROTECT PUB HEALTH	
CVEN	413	UG	NATURAL ENVIRON SYSTEM	

Graduate qualifications: GPR

Department	Course	Classification	Title	Grade
CVEN	601	GR	ENVIRON ENGR PROC III	
CVEN	605	GR	ENVIRON MEASUREMENT	
CVEN	619	GR	ENVIRON ENGR PROC I	
CVEN	620	GR	ENVIRON ENGR PROC II	
BAEN	669	GR	WATER QUALITY ENGR	
CVEN	603	GR	ENVIRON ENGINEERING MGMT	
CVEN	604	GR	ENGR ANLY OF TREAT SYSTM	
ESSM	675	GR	INTL SUST COMMUNITY DEV	

GRE Scores

Use of funds:

This project currently has no funding because I am a Civil Engineering student working on a project in the Biological and Agricultural Engineering Department. Funds will be used to help with student fees, possible travel to Galveston, and any other expenses related to the project.

Intended career path pursuing:

I plan to graduate in May 2011 with a Master of Science in Civil Engineering with a focus in environmental engineering. After graduation, I hope to pursue a doctoral degree in environmental engineering with a focus on rural or international engineering applications. Specifically, I would like to research innovative treatment methods for wastewater and drinking water that can be applied anywhere. I would like to spend most of my career in developing communities and applying different treatment methods to find sustainable solutions in each community. I plan to work in this capacity for an indefinite amount of time, but I would like to return to academics as a professor to train the next generation of problem solvers.

Letter of Recommendation Attached