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Application Summary

Competition Details

Competition Title:	Black Trailblazers in Engineering
Category:	Events and Conferences
Submission Deadline:	1/29/2021 11:59 PM

Application Information

Submitted By:	Joseph Wasswa
Application ID:	1495
Application Title:	Graduate Research Assistant
Date Submitted:	12/30/2020 12:02 PM

Personal Details

First Name:	Joseph
Last Name:	Wasswa
Title:	Graduate Research Assistant
Email address:	jwasswa@syr.edu
Phone number:	6195983859
PhD Institution:	Syracuse University
Date or Expected Date of PhD:	Dec/2021
Engineering Discipline:	Civil and Environmental Engineering
Current Institution:	Syracuse University

Application Details

Acknowledgment

Acknowledgement of BTE Program Requirements

[Acknowledged] If selected as a BTE Fellow, I will be available to attend all workshop sessions on the follow dates and times:

Feb. 24, 12:00 - 8:00 pm ET

Feb. 25, 12:30 - 8:00 pm ET

Feb. 26, 12:00 - 8:00 pm ET

Feb. 27, 12:00 - 4:30 pm ET

In addition to being available to virtually attend the above sessions in their entirety, other requirements for participation in BTE include the program elements listed below:

- Ability to create and share a poster for a virtual poster session
 - Willingness to share life experiences and your passion for a career in Engineering
 - Completion of pre- and post-workshop surveys
 - Permission to be featured on a BTE webpage that will be promoted to other Engineering institutions
- A \$500 scholarship will be awarded, pending full participation in the workshop

151 Link Hall
Department of Civil and Environmental Engineering
Syracuse, New York, 13214, USA
jwasswa@syr.edu

December 30, 2020

Black Trailblazers in Engineering Search Committee
610 Purdue Mall, Hovde Hall
College of Engineering, Purdue University
West Lafayette IN 47907

Dear Members of the Black Trailblazers in Engineering Fellows Search Committee,

I am writing to apply for the position of Black Trailblazers in Engineering Fellow in the College of Engineering, at Purdue University. I am completing my Ph.D. in Civil Engineering in the College of Engineering and Computer Sciences at Syracuse University. I expect to complete my Ph.D. by Dec 2021. My previous mentoring, teaching, tutoring, and research experiences, along with my desire to work in academia makes me a strong candidate for the Black Trailblazers in Engineering Fellowship.

My research focuses on understanding the effect of several biogeochemical processes on the photophysical, photochemical, and redox properties of terrestrial and algal dissolved organic matter and how these changes affect engineering applications like drinking water treatment, contaminant abatement and ecological engineering. Three manuscripts are expected from this thesis (One published, the second and third one in preparation) all for ACS ES&T journal. In addition to my Ph.D. research, with funding from the NSF-NRT EMPOWER program, at Syracuse University, and 2018 NSF-CUAHSI pathfinder fellowship, I am leading a team of researchers from Syracuse University and Makerere University, Uganda to study the occurrence of organic micropollutants in drainage channels, lakes, rivers, wastewater treatment plants, and drinking water sources in Kampala, Uganda. I collected over 90 samples from drinking water sources, waterways and wastewater treatment plants in Kampala, filtered, and solid-phase extracted (SPE) them from Uganda and transported them to Syracuse University for further analyses. I am working with an undergraduate student on this project and a manuscript from this work in under preparation of ACS ES&T journal.

Since my undergraduate, I have always been excited about the opportunity to teach. I graduated top of the class and my love for teaching was the sole reason I decided to remain in my undergraduate department to work as a graduate assistant for two years where I taught and tutored classes under the guidance of faculty members as indicated in my CV. I have had rewarding and enriching mentoring and advising experiences during graduate school. Specifically, during my master's degree, I mentored two undergraduate students who went ahead to win graduate fellowships and enrolled in graduate schools at Stanford and Cornell Universities respectively with full funding. In my Ph.D., I am mentoring an undergraduate who is also interested in joining the graduate school. Looking at these students succeeding in their career aspirations gives me tremendous joy and a sense of satisfaction.

I am applying for the Black Trailblazers in Engineering Fellowship program because my career aspiration is to remain in academia and specifically I plan to apply for a faculty position at an R1 institution. Although graduate school empowers us with research skills, due to its intensiveness, as graduate students, we find little time to empower ourselves with the necessary skills and knowledge that are needed to succeed in the faculty job search processes as well as succeeding as a young/ new PI. These include proper understanding of goals and expectations in the academic world, proper communication and presentation of oneself as a

competitive candidate, preparation of application material, salary, and start-up packages negotiations as well as getting early career research funding. Research skills attained during graduate school are key to succeeding as a researcher, however, as an early career/new PI in an academic institution, the ability to secure funding, recruit the appropriate personnel (graduate students and postdocs) as well as the balance between fulfilling departmental and university's expectations, and establishing oneself as lead PI for a lab are the most important. If selected for the fellowship, I expect to get training and knowledge to be able to equip myself with these skills and knowledge.

In my family, I am the firstborn (family of thirteen), and the first person to obtain a college degree and a Ph.D. with a father as a secondary teacher and mother as a primary teacher. In addition, my experience as an international student, coming from a poor and disadvantaged background as well as being a person of color in a predominantly "white" occupied specialties has given me firsthand experience of the daily struggles the people who come from such backgrounds face. These challenges range from coping up with the cultural differences, lack of family and emotional support, lack of financial support to even make an application, lack of a sense of belonging, daily self-doubt, and loss of self-esteem. Because of this experience, as a future faculty, I will champion the causes of such populations. These include helping in establishing programs and policies that enable to increase in percentage enrollment of people of color in engineering fields, promote training for faculty, staff, and students that help to reduce racial bias-related incidents, and help other population to acknowledge the vulnerability of such populations, as well as starting programs and platforms that bring together students to feel comfortable in the academic environments. In addition, as I state in my research and teaching statements, I plan to look for funding to start a program where students can gain hands-on research experience in economically disadvantaged areas of the world. This will include starting a summer program where students can travel to East Africa and carry out research-related activities which will mainly include water, sanitation, and hygiene. This will not only equip students with research experience and knowledge in third world countries but will also expose these students to the other part of the world, hence helping them in becoming global citizens. I know this program is possible because I have been part of the NRT-NSF EMPOWER program at Syracuse University which every other year takes selected students to Rwanda for international experience. My former Lab at SDSU during my master's program had a program taking students to South Africa for summer research experience. In addition, I have traveled to Uganda to do research and I have been successful.

I have enclosed my CV, research, and teaching statement and I have asked several faculties to write letters of recommendation on my behalf. If needed, I can provide more evidence of my accomplishments and well as future plans.

Thank you for your time and consideration. I look forward to hearing from you.

Yours sincerely,

Joseph Wasswa
Syracuse University

Research and Teaching

Future Research

My future research work relies on expanding my current as well as past research work. Firstly, DOM in the environment undergoes many transformation processes and new DOM can be generated from insitu and transportation process. Although there has been tremendous research output aimed at understanding the functionality, characteristics, and molecular composition of DOM, most of these studies use either commercially available standard DOM or obtain samples from the environment that are already processed. With such samples, it is nearly impossible to identify the roles of different transformation processes as well as sources towards the observed properties and roles. There is a need to understand how DOM changes in active biological systems such as wastewater impacted systems may affect several biogeochemical processes. In this area, I want to understand the role and contribution of microbially produced, microbially transformed, and terrestrially produced as well as algal produced DOM in photophysical, photochemical, and redox properties as well as the effect of interaction DOM from different sources. I want to extend this research into understanding how such sources and processes affect several biogeochemical processes and engineering-related processes. In addition, I also aim at understanding how the photophysical models (charge transfer interactions and/or superposition model) can be used to explain the optical and photoreactivity properties in DOM from different sources.

Secondly, I want to establish research that evaluates the environmental fate of pollutants. When contaminants get into the environment, they can be broken, transformed, adsorbed, or can interact with other compounds to produce new compounds. There are different pathways through which contaminants can be broken down or transformed and these include direct and indirect photodegradation, biological degradation, adsorption, and volatilization. This research will focus on the abiotic degradation of these pollutants and the transport of these pollutants in and between environmental compartments (water, soil, & air) as well as their uptake into biological organisms. In addition, this research will be extended into understanding the fate of these contaminants in wastewater, water, and water reuse treatment systems. This research will also extend into evaluating the current and future technologies for the abatement of contaminants as well as developing and evaluating technologies that can be used to efficiently remove contaminants in wastewater, drinking water, and water reuse systems.

Thirdly, water and sanitation issues are highly variable from location to location, from season to season, and community to community. In Uganda, the biggest percentage of the population is not connected to centralized water and wastewater treatment systems with a substantial percentage in the suburbs of Kampala and other cities and towns around the country still practicing open defecation. Flooding during the rainy season often results in disease outbreaks like cholera. Although the problem of open defecation may not be rampant in rural areas of Uganda, the problem of accessibility to clean drinking water, as well as proper hygiene practices, is still a big challenge with no foreseeable future accessibility to centralized systems. My aim is to create strong collaboration with my colleagues from Makerere University to establish a research program that can address some of these challenges in most marginalized communities. My plan is to have students travel to Uganda during summer and this research will also be used to help students gain hands on experience in solving WASH related challenges in the developing world. The proposed research will focus on identifying the challenges, understanding the causes of these challenges as well as producing solutions related to WASH. My focus will be the technologies and solutions that are easiest for households to adopt immediately and for the long-term, and also provide an entry-point for motivating action on other WASH components. In the case of drinking water, my research will focus on evaluating the efficiency of technologies like chlorination, solar disinfection, biosand filtration, and slow sand filters to remove pathogens and other drinking water related contaminants like metals, and organic contaminants. There is a need to design and evaluate these technologies by embracing the cultural differences as well as using locally available material that can be easily adopted by households.

Most rural and city suburb households use pit latrines for the provision of sanitation services with an estimated 1.77 billion people rely on pit latrines as their primary means of sanitation globally. These structures are constructed with a lack of professional guidance which has led to groundwater contamination and air pollution

for the users. Studies of pit latrines and groundwater are limited and have generally focused on only a few indicator contaminants especially pathogens. Although not very common, some households use other sanitation structures which include Ventilated improved pit (VIP) and Reed's odorless earth closet (ROEC) latrines, pour-flush latrines, composting latrines, and septic tanks. However, some of these technologies have faced great challenges due to cultural acceptance and lack of knowledge to use and maintain these structures. There is a need to evaluate the benefits, risks, challenges as well as opportunities posed by these structures in communities in terms of WASH in addition to designing and developing technologies based on local material and knowledge. Due to the high nature of entrepreneurship activities in the country, small-scale agro-processing and other small-scale industrial activities discharge untreated effluents in waterways and drainage channels which end up polluting water sources. My research will also focus on evaluating the current state of small-scale industrial effluent treatment as well as proposing and design technologies to provide solutions. Although my area of focus is currently Uganda, my plan is to expand this collaborative effort in the East African and Southern African region with time. I understand that building successful and productive partnerships in such regions possess challenges which include time funding constraints, restrictions, and lack of experience but with my experience and background, I strongly believe this program can be successfully established.

Teaching Philosophy

During my undergraduate and graduate classes, I have sometimes found it hard to comprehend the material taught in classes. This is not because it's very hard to understand but the lack of connection between the principles and the applications makes it hard for me to believe why I should strongly grasp the taught material. I strongly believe in teaching the fundamentals and foundations of the classes but I believe that if these are translated into practicability, the students can have a strong grasp of the taught material. To give an example, many people can comfortably deal with the mathematics related to money, running a business, and other everyday life experiences without possessing any formal related education. However, if you take away the applicability of mathematics and offer to teach the fundamentals of mathematics as a class, most of these people will choose to walk away because they believe it's hard. In my classes, I try as much as possible to relate the teaching material to the everyday examples and applicability since I teach engineering related classes. Where possible I use field trips to give students a chance to have firsthand experience of the knowledge they learn in class.

Secondly, I know that the home, classroom, or school environment can deter students from learning. I have learned this from the classes I have taught in my teaching experience where some students could not reach school because they are bullied, other students can't participate in class activities because they don't feel welcome or included by their fellow students, some student has home-related problems of which some are abuses and others lack esteem due to lack of diversity. As an international student with no family or friends' support and a person of color, I have consistently faced emotional challenges of which most times I have felt I cannot open up about them because either people will assume I am weak and over-emotional or I think people around me will not understand. Some of these have deterred me from active participation in classes, collaborations with classmates on homework, class projects, and class activities. However, later in life, I have come to understand that I am not alone, most of my fellow students go through the same struggles, and seeking help or opening up does not indicate weakness. I, therefore, plan to provide regular one on one meetings with students who may have socially related challenges for my classes. Inclusiveness, respect, and openness should be part of the class to offer all students a conducive environment for learning. Thirdly, I believe that students are different, some students can quickly grasp class material during lecture time, and others need constant revisiting of the material during their free time while other students may grasp the material after a one on one meeting. I will therefore offer regular office hours to make sure that all students are accommodated. I strongly believe although grades are a good measure of how good students grasp class material but this may not necessarily translate into how better a student may turn out to be as an engineer or scientist. Some students may be good at timed exams while others are good at project design, class presentation, and real-world problem-solving. I, therefore, believe that grading should be a combination of all these aspects.

JOSEPH WASSWA

Dept of Civil and Environmental Engineering, Syracuse University, 151 Link Hall, Syracuse, NY
13244

Education

- **PhD Civil Engineering**, Syracuse University, Syracuse, NY | August 2017 – Present (CGPA=3.9/4). *My research focuses on understanding the effect of several biogeochemical processes on the photophysical and photochemical properties of dissolved organic matter and how these changes affect engineering applications like drinking water treatment, contaminant abatement and ecological engineering.*
- **MS Civil Engineering**, San Diego State University, San Diego, CA | August 2015 – August 2017. (CGPA 3.9/4). Thesis title; “*Application of Fluorescence Spectroscopy to Track Membrane Fouling, Failure, and Contaminants in Water and Wastewater Systems.*”
- **BSc Agricultural Engineering**, Makerere University, Kampala, Uganda | Aug 2008 – January 2013 (First-class Degree and Best student, class of 2013). (CGPA 4.61/5). Thesis title; “*Feasibility study for the construction of a subsurface dam on River Kanyagareng in Amudat, Karamaoja.*”

In addition to my PhD research, with funding from NSF-NRT EMPOWER, and 2018 NSF-CUAHSI pathfinder fellowship, I am leading a team of researchers from Syracuse University and Makerere University, Uganda to study the occurrence of micropollutants in drainage channels, lakes, rivers, wastewater treatment plants and drinking water sources in Kampala, Uganda. I collected over 90 samples from drinking water sources, water ways and wastewater treatment plants in Kampala, filtered, and solid phase extracted (SPE) them from Uganda and transported them to Syracuse University for further analyses. A manuscript from this work is under preparation of ACS *ES&T* journal.

Professional Certification

- Engineering in Training (EIT)

Skills

Project Management, GIS (basics), Autocad, Solid works, MINITAB, R software, SAS, Microsoft excel, MATLAB, SIMCA, HPLC, LC-MS/MS, Fluorescence spectroscopy and Absorbance, ICP-MS, Data analysis, Multivariate statistics, Machine learning, Python and SQL(Basics), Electrochemistry, Experimental research design, Sustainable enterprise and Report writing.

Professional Experience

- **Research Assistant, Environmental Chemistry Lab, Syracuse University (August 2017-present)**
Responsible for maintaining laboratory equipment and chemical inventory, ensuring health and safety operating procedures in the lab are enforced, soil and water quality analyses and supervising and training new laboratory recruits.
- **Research Assistant, Water Reuse Lab, San Diego State University (August 2015-July 2017)** I was laboratory lead personnel responsible for the maintenance of laboratory equipment and supplies which included Shimadzu TOC-TDN analyzer, pH meters, Benchtop and insitu fluorescence machines, HPLC; water quality sampling and analyses, ensuring health and safety working procedures in the lab; training new laboratory recruits, designed and operated bench scale anaerobic baffled reactor and membrane filtration set up for class demonstration and laboratory experiments; and produced reports for the semi-monthly chemical inventory in the laboratory.

- ***Soil and water engineer, the Global climate change alliance Project funded by the Irish government and Kingdom of Norway under UN-FAO, Uganda. (Feb 2014-Nov 2014)*** I lead a team of hired consultants, government technical team, and partner NGOs for implementing the soil and water related activities of the project and ensuring that these were done in accordance with terms of agreement with UN-FAO.

Activities included mapping of watersheds using GIS, collected and analyzed soil samples along the horizons in dug pits for laboratory analysis, collected and analyzed water samples from identified water sources in the watersheds, designed small scale irrigation systems that can be managed by community farmers, designed and recommended structures for slope stability on the dams, recommended soil and water conservation measures for the farmers under the project basing on results from watershed analysis and I produced the initial working report that was later implemented for the whole project.

- ***Water resources engineer, BLOWI Engineering Consultancy (U) Limited. (Nov 2012- Jan 2014; then Dec 2014-June 2015)*** I worked as a water resources and sanitation engineer on projects which included; (i) feasibility studies for the construction of water storage dams and irrigation schemes across the country; (ii) monitoring and evaluation of the Eco-San toilets in the country implemented by government of Uganda funded by Swedish government, and (iii) mapping of the catchment areas by different river like Rwizi.

Activities included collecting GPS points and mapping using GIS, topographic surveying to estimate the valley dam volume and amount of cut and produced topographic maps, designing a subsurface dam, estimating the bill of quantities for the construction of the subsurface dam and supervising the construction of the dam, assessing the efficiency of Ecosan toilets in providing both sanitation and resource recovery benefits and performed watershed analysis survey to recommend measures that can be implemented for soil and water conservation. I produced reports for all these activities.

- ***Food processing engineer and research assistant, School of Food Technology, Nutrition and Bioengineering, Makerere University.(August 2012-Oct 2013)*** I was the project manager and engineer for the fruit processing mobile factory that was deployed around the country to provide feasibility studies for the construction of current mango and tomato processing factories in Uganda.

I managed the budget to run the factory as well as pay workers and buy fruits from local people. I operated, serviced and maintained all machines and equipment in the factory. I produced quarterly reports for the status quo of the whole project.

Teaching Experience

During my tenure at Makerere University, I also tutored undergraduate courses

Research grants and fellowships

- CUAHSI pathfinder fellowship, 2018
- NSF-EMPOWER Program Emerging Interdisciplinary Research Seed Grant

Honors and Awards

- (a) The Nelson L. Nemerow Memorial Scholarship in Environmental Engineering (2019)
- (b) Syracuse University Water Fellowship, 2018/2019
- (c) Turner Designs Travel Fund, 2017
- (d) SDSU Graduate Student Travel Fund, 2016
- (e) 2016 Student Scholarship, the American Society of Civil Engineering Young Membership Forum (ASCE YMF)

- (f) Third Best Student, Poster presentation competition, AWWA California-Nevada Annual Conference 2016
- (g) Intercultural Student Ambassador Honorarium, SDSU 2016
- (h) Presidential Non-Resident Tuition Waiver Fellowship, SDSU 2015/2016
- (i) Best student in the Department of Agricultural and Bio-systems engineering at Makerere University for Class of 2013
- (j) Uganda Government Sponsorship for BSc. in Agricultural Engineering at Makerere University

Publications

- Wasswa, J.**, Driscoll, C. T. and Zeng, T. (2020) 'Photochemical Characterization of Surface Waters from Lakes in the Adirondack Region of New York', *Environmental science & technology*, 54(17), pp. 10654–10667. doi: 10.1021/acs.est.0c02811.
- Alexandra Sanchez, A., Mladenov, N. and **Wasswa, J.** (2020) 'Fluorescent compounds retained by ultrafiltration membranes for water reuse', *Journal of Membrane Science*. 600, doi: 10.1016/j.memsci.2020.117867.
- Kajjumba, GW, Eren. Y.S. Aydın, S. Emik, T. Ağun, F. Osra, and **J. Wasswa**. (2019) A facile polymerization of magnetic coal to enhanced phosphate removal from solution. *Journal of Environmental Management*, 247, 356-362. doi.org/10.1016/j.jenvman.2019.06.088
- Wasswa, J.**, Pearce, W., and Mladenov, N. (2019) Assessing the potential of fluorescence spectroscopy to monitor contaminants in water systems, *Environmental Science: Water research and Technology*, 5, 370-382. DOI: 10.1039/C8EW00472B
- Wasswa, J.** and Mladenov, N. (2018) Improved Temperature Compensation for In Situ Humic-Like and Tryptophan-Like Fluorescence Acquisition in Diverse Water Types, 2018, *Environmental Engineering Science*, 35(9). DOI: 10.1089/ees.2017.0315
- Xie, M., Mladenov, N., Williams, M.W., Neff, J.C., **Wasswa, J.**, and Hannigan, M.P. (2016). Water soluble organic aerosols in the Colorado Rocky Mountains, USA: Composition, sources and optical properties. *Scientific Reports* 6 (September), Nature Publishing Group: 39339, doi:10.1038/srep39339.
- Wasswa, J.**, Driscoll, C. T. and Zeng, T. 'Contrasting Controls of Photochemical and Microbial Processing on DOM Photochemical Reactivity', *in preparation for Environmental science & technology journal*
- Wasswa, J.**, Shiru, W., Feldman, A., Banadda, N., Kabenge, I., Kiggundu, N., and Zeng, T. 'Spatial and temporal distribution of organic micro pollutants in the waterways, drinking water sources and wastewater treatment plants in Kampala, Uganda', *in preparation for Environmental science & technology journal*

Conference Presentations

(i) Oral Presentations

- **Wasswa, J.** and Mladenov, N. Assessing the potential of fluorescence spectroscopy to monitor contaminants in water systems. 10th Annual SDSU Student Research Symposium. Presented on Mar 4, 2017.
- **Wasswa, J.** and Mladenov, N. Fluorescence spectroscopy: A tool to monitor presence of contaminants in water reuse systems. 253rd ACS National Meeting, San Francisco, CA. Presented on Apr 3, 2017.
- **Wasswa, J.** and Mladenov, N. 3D bench top fluorometer vs an insitu C3 submersible fluorometer. American Water Works Association (CA-NV AWWA) 2017 Spring Conference, Anaheim, CA. Presented on Apr 13, 2017.

Membership

- American Chemical society (ACS)
- American water works association (AWWA)
- American society of Civil Engineers (ASCE)
- American Membrane Technology Association (AMTA)

SYRACUSE UNIVERSITY

Civil and Environmental Engineering
151 Link Hall
Syracuse University, Syracuse, NY



January 8, 2021

BTE: Black Trailblazers in Engineering
Purdue University

Subject: Letter of Recommendation for Joseph Wasswa

Dear BTE Committee:

I am writing to enthusiastically recommend Mr. Joseph Wasswa for your *Black Trailblazers in Engineering* program. Joseph is a fourth-year PhD student in Environmental Engineering at Syracuse University. He joined my research group in 2017 after obtaining his MS degree from San Diego State University and is expected to graduate in December 2021. As a native of Uganda and the eldest sibling in a family of twelve kids, Joseph has come a long way in his education. He is a superb student with great passions for environmental research and education that make him an ideal candidate for your program. He is poised to succeed as a researcher, educator, and mentor.

Joseph has an excellent record of academic accomplishment that is complemented by highly relevant and meaningful research experiences. His dissertation work focuses on understanding the role of natural organic matter playing in aquatic systems historically impacted by atmospheric acid deposition. Specifically, he has been investigating the photochemical reactivity and optical properties of natural organic matter collected from forested watersheds and lakes in the Adirondack Mountain region of New York, a focal point for extensive research on the long-term ecosystem effects of acidification. Joseph has a strong capability to assimilate the literature and works through sophisticated analytical tasks with great perseverance and thoughtfulness. More importantly, his interpersonal skills and friendly demeanor have contributed to his ability to work with other faculty members and students to drive a collaborative project forward. To date, he has published an article in *Environmental Science & Technology* (a top journal in the field of environmental engineering) as a lead author and is currently finalizing a second manuscript for publication in the same journal. I find his productivity very impressive, and I believe it is in part a result of his tireless work ethic and confidence in pursuing challenging problems.

Joseph's intuition for identifying active areas of research that are in the broader interests of society will provide him with a competitive advantage when he is ready to develop his own research agenda. Born and raised in a suburb of Kampala, the capital city of Uganda, Joseph witnessed an intensification of chemical pollution brought about by rapid urbanization and population growth over the past two decades. However, the environmental impacts of synthetic organic chemicals remain ill-defined in Uganda and other sub-Saharan African countries. Joseph saw a unique opportunity to fill in knowledge gaps regarding the sources, distribution, and ecological impacts of these contaminants. He wrote a proposal independently and successfully secured a research grant (\$5,000) through the Pathfinder Fellowship program funded by the Consortium of Universities for the Advancement of Hydrologic

SYRACUSE UNIVERSITY

Civil and Environmental Engineering
151 Link Hall
Syracuse University, Syracuse, NY



Science. With funds from this fellowship, Joseph was able to collaborate closely with students and Dr. Noble Banadda, the Chair of the Department of Agricultural and BioSystems Engineering, at Makerere University in Uganda to study the occurrence and fate of human-use pharmaceuticals and agricultural pesticides in Kampala's surface waters. I expect Joseph to publish this work in a high-quality peer-reviewed journal as a lead author. His ability to excel in diverse research topics at this stage of his career is truly impressive and underscores his intellectual versatility and scientific acumen.

On top of his research excellence, Joseph's skills as a communicator will serve him very well as an educator in both academic and outreach settings. For example, he has gained extensive experience as a research mentor for multiple high school and undergraduate students, conducting experiments with them in the laboratory and assisting them in data analysis despite all the demands on his time. His unwavering patience and collegiality make it clear to me that he will be a dedicated and exceptional mentor to motivate and inspire a diverse group of students as he moves forward in his career. I should also note that Joseph is thoughtful with his remarks and is respectful of everyone he encounters. His balanced and constructive attitude has a very positive effect on the atmosphere of the lab, something which has not gone unnoticed by his peers.

In summary, Joseph has proven himself as a productive scientist and is poised to become a leader in environmental engineering research and education. Knowing that Joseph aspires to become a university professor, I believe that the BTE program will have a lasting impact on Joseph's future academic career, and I am confident that he will navigate this pathway successfully. He would make an outstanding addition to the roster of BTE Fellows. I give my highest recommendation that Joseph be considered for your program and sincerely hope that he gets this opportunity. Please do not hesitate to contact me if you would like any additional feedback about him. Thank you very much for your consideration of Joseph's application.

Sincerely,

Teng Zeng, Ph.D.
Assistant Professor
Syracuse University
Civil and Environmental Engineering
151 Link Hall, Syracuse, NY 13244
Email: tezeng@syr.edu
Phone: 315-443-1099



**SYRACUSE
UNIVERSITY**
**ENGINEERING
& COMPUTER
SCIENCE**

January 4, 2021

Black Trailblazers in Engineering Search Committee
610 Purdue Mall, Hovde Hall
College of Engineering, Purdue University
West Lafayette IN 47907

Dear Members of the Black Trailblazers in Engineering Fellows Search Committee,

I am writing to provide a letter of reference for Mr. Joseph Wasswa who has applied to participate in the Black Trailblazers in Engineering program at Purdue University. Joseph is a PhD student in the Department of Civil and Environmental Engineering at Syracuse University. Prior to matriculating into the PhD program, he received his MS degree in Civil Engineering at the San Diego State University and his BSc in Agricultural Engineering at Makerere University in Uganda. I have known Joseph for approximately three years. He took two classes from me, receiving a grade of “A” in each and I serve on his PhD committee.

Joseph is a dedicated scholar and high-class individual. He is one of the top students in our PhD program and starting to think about his career path. As you know we have a dire shortage of Black faculty in STEM fields at US universities. Joseph has expressed interest in an academic career. From what I have read on your website, participation in the Black Trailblazers in Engineering program would be a terrific opportunity for Joseph to start to orient himself and prepare for a potential academic career. I have a few early career colleagues at academic institutions who are Black. I have had the opportunity to speak with these colleagues about their experiences and challenges. From these conversations, I learn some things about the hurdles that younger Black colleagues experience in academic positions beyond those of white colleagues, which are already those of a challenging career path. Nurturing Black and minority colleagues is a critically important endeavor if we are going to transition engineering toward the discipline it needs to become to address the critical technical and societal problems we will face in the future. Thank you for this initiative.

That said, based on what I read on your website, Joseph would be well positioned to learn from and take advantage of activities planned for Black Trailblazers in Engineering. Joseph is very smart and has a strong work ethic. He is largely an experimentalist with research interest in environmental organic chemistry. He aspires for a faculty career at a R1 university. Joseph has been successful at Syracuse University. The first paper from his dissertation research involves characterization of the photo reactivity of dissolved organic matter in surface waters (Wasswa et al. 2020). This work is relevant to recent phenomenon in surface water quality, called “browning” which is associated with increases in dissolved organic matter. This paper was recently published in the well-respected journal, *Environmental Science and Technology*, and builds on other scholarly outputs from his Masters research.



Joseph is also examining concentrations and patterns of synthetic trace organic contaminants, such as pesticides, and personal care products, in surface waters and drinking water supplies in his native Kampala, Uganda. This work is also part of his dissertation research.

Beyond research, Joseph has a great passion for teaching. He developed this interest at Makerere University in Uganda where he taught and tutored undergraduate classes and at his graduate programs at San Diego State and Syracuse universities where he has mentored undergraduate scholars in research projects. Joseph is an active participant in our NSF NRT graduate training program on the energy-water nexus. This program emphasizes interdisciplinary research and science communication.

Joseph is particularly interested in promoting the participation of underrepresented minorities in STEM activities. Given his experience, intelligence and outgoing personality, I would envision that Joseph would be very effective in this endeavor. I would imagine that recruitment and retention of minorities into STEM would be an important element of the Black Trailblazers program.

In summary, I strongly support and endorse the application of Mr. Joseph Wasswa to the Black Trailblazers in Engineering program at Purdue University. Joseph has developed a strong track record in basic and applied research. He seems motivated to secure an academic faculty position at a RI university. He has a keen intellect and works hard. Joseph is outgoing and personable. He is effective in interactions ranging from one-on-one discussions to conversations involving larger research teams with diverse personnel. He has the skill sets and experience to effectively position himself for an academic career. Given his interest in teaching and research, and his passion for promoting academic opportunities for underrepresented minorities, Joseph would greatly benefit and be a strong participant in the Black Trailblazers in Engineering program.

If I can provide additional information concerning Joseph Wasswa's application, please do not hesitate to contact me.

Yours truly,

Charles T. Driscoll, Jr, PhD, NAE
University Professor of Environmental
Systems Engineering